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

Monitoring Times

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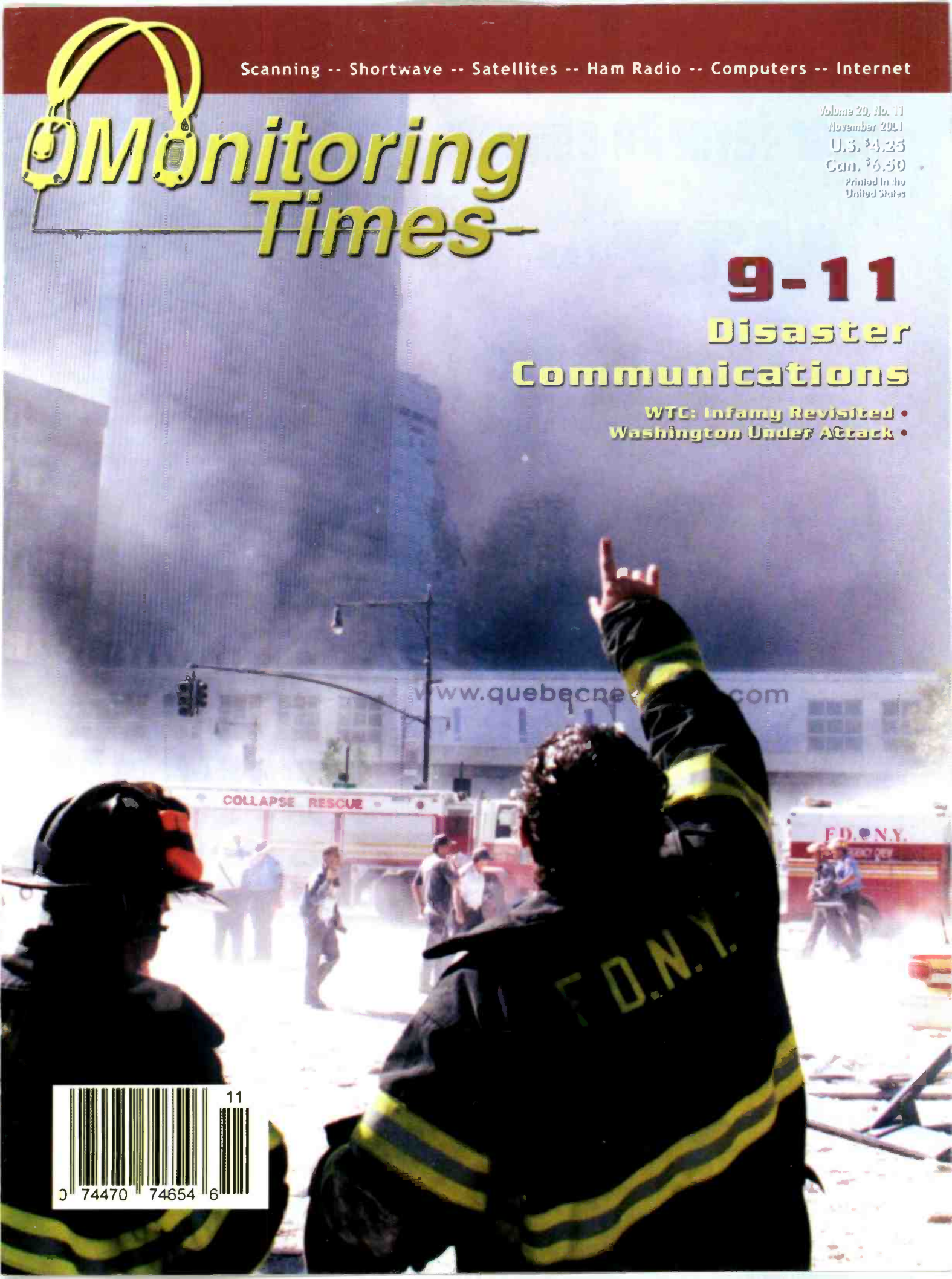
9-11 Disaster Communications

WTC: Infamy Revisited •
Washington Under Attack •



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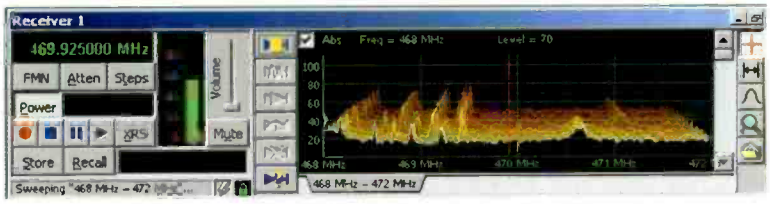
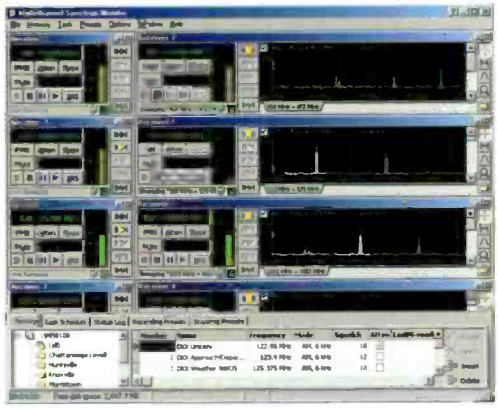
The MS-8100 series is another innovative multichannel radio monitoring solution from WiNRADiO.

MS-8108 Front Panel



Each channel has its own informative control panel



Status of each channel can be easily observed

MS-8108SR fully integrated system

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www.winradio.com

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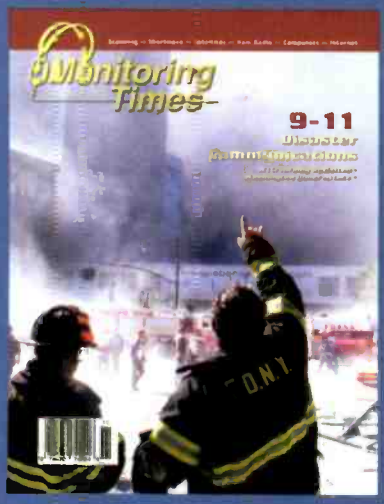
Monitoring Times

Vol. 20, No. 11 November 2001



On our Cover

9-11 Infamy Revisited

By Bob Kozlarek

On September 11, the World Trade Center towers were demolished by terrorists using hijacked commercial planes as missiles. Among the horrified onlookers was the author, watching and listening from his location in Northern New Jersey. He reports public safety communications worked remarkably well considering the circumstances and the fact that a good portion of the cities' broadcast and communications systems had been located atop the WTC.

In a twist of irony, the author had been working on a communications story for *MT* about the World Trade Center when it was first bombed in 1993. This time, the city wasn't so fortunate. See the full story plus federal and local frequencies for the ongoing rescue and recovery efforts on page 10.

Photos on our cover, this page, and in the article are by Mike Coppola, Unit 301 of Metro Fire Radio, a two-way radio notification group.

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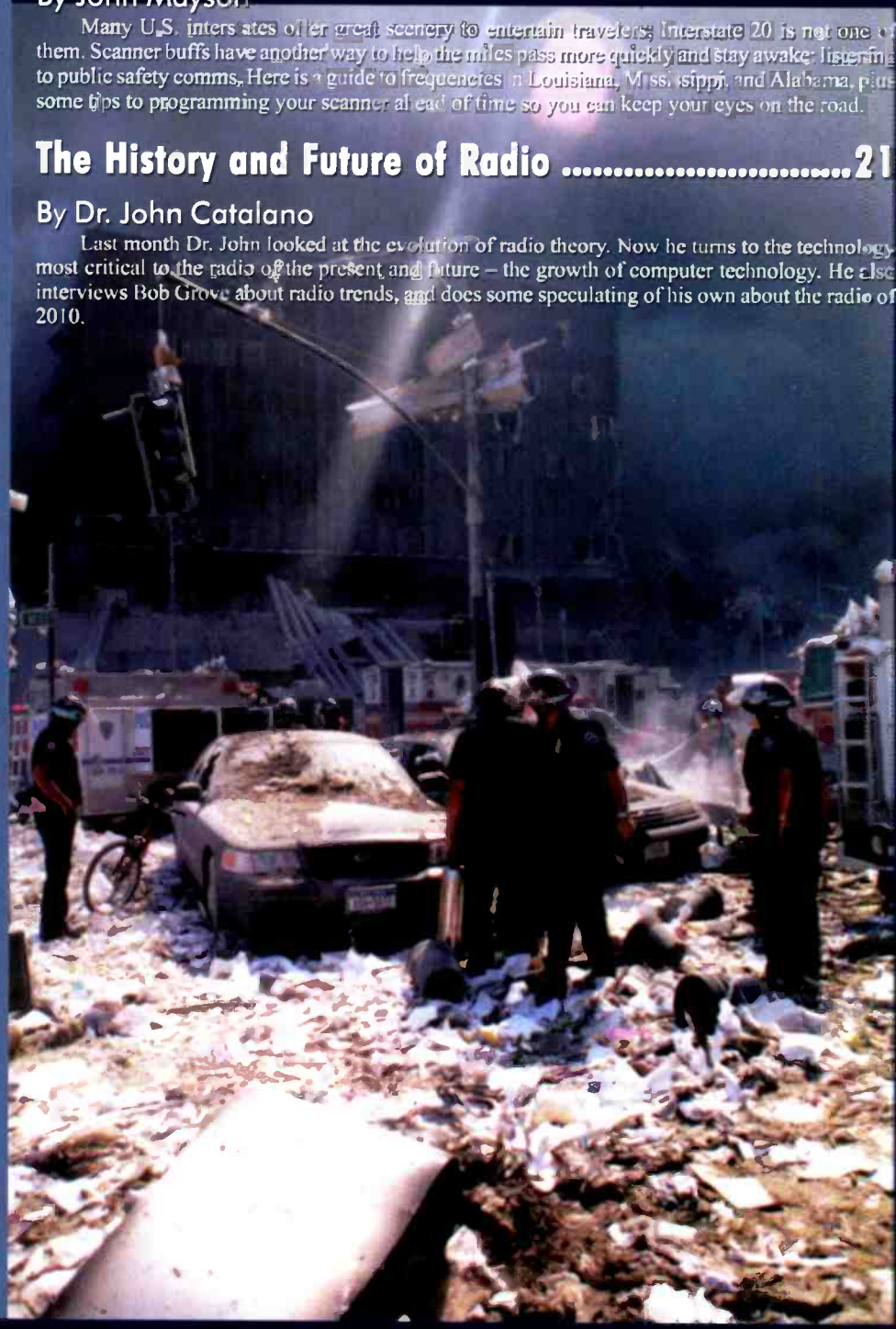

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Reviews:

In the first of two parts, John Catalano looks at software to control the do-everything BC 780XLT Trunk Tracker. This month he compares Scanner Master's **WinScan 780** by Pozilla Software and **TrunkStar780** by Signal Intelligence (makers of the ScanStar products) (p.82).

In the final installment of our series on mobile shortwave listening, Ken Reitz looks at preassembled and kit-built converters for your car radio, especially the **LFB 4-Band Converter** and the **Ramsey Converter**. Sources are also given for converters from **MFJ** and **Vectronics**. Ken also summarizes the strong and weak points of all the alternatives discussed in this series – and throws in a new option for good measure: satellite radio (p.84).

Bob Grove reviews several pieces of radio equipment this month: an inexpensive **Sangean pocket portable receiver**, a more affordable spectrum display unit from **Avcom Ramsey**, and an AM broadcaster filter for VLF listeners from **PAR Electronics** (p.87).

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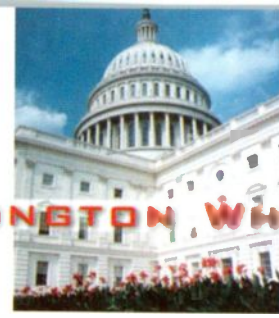

WASHINGTON WHISPERS

Fred Maia, W5YI

The Digital Satellite Revolution Comes to Broadcast Radio.

Satellite-based broadcast radio has been nearly ten years in the making. It all began in 1992 when the FCC allocated spectrum in the "S" band (2.3 GHz) for the nationwide broadcasting of satellite-based Digital Audio Radio Service (or "DARS").

On April 2, 1997, the FCC auctioned off two DARS licenses. CD Radio (now called Sirius Satellite Radio) submitted a winning bid in the amount of $83 million for the 2320-2332.5 MHz portion of the frequency band and American Mobile Radio Corporation (XM Satellite Radio) paid $90 million for the 2332.5-2345 MHz spectrum slice.

Hundreds of millions of dollars have now been poured into satellite broadcast radio and these two companies are now fighting for a share of the tens of millions of potential listeners trapped in their cars for several hours a day.

By the time you read this, these two companies – Sirius Satellite Radio and XM Satellite Radio – each will be delivering up to 100 channels of crystal-clear coast-to-coast music, news, information, and talk-show programming via satellite.

Most radio signals begin to fade 30 miles away from their source. Not so with satellite radio! You could drive from Tacoma, Washington, to Washington, D.C., without ever having to change from the satellite radio station! Some of the DARS channels will be commercial free.

The XM service will be available by paying a $9.99 monthly fee. That is, after you purchase the $200 to $400 radio hardware. XM Radio began service to the Dallas/Ft. Worth and San Diego area on Sept. 12th; the entire southwest in October with nationwide expansion is planned for November. The big question is, will the public pay to listen to the radio when it has always been free?!

Approximately 60 percent of the channels are original content created by XM at its state-of-the-art studios and broadcast center in Washington, DC, and at its studios in New York City, and at the new country Music Hall of Fame and Museum in Nashville.

Sirius Satellite Radio will cost $12.95 monthly. Sirius has already begun broadcasting and is now "...conducting a comprehensive quality assurance program." Supposedly the service will be offered to consumers by year end but no launch date has yet been announced. Sirius' broadcast studios are also located in New York City.

Potential subscribers are the 36 million commuters who are on the road 1 to 2 hours daily, 1.1 million long distance truckers, and 9.3 million recreational vehicle owners. Analysts forecast 10 to 12 million in-vehicle satellite-radio subscribers by the end of 2004.

Most satellite radio sets will be installed as original equipment in vehicles beginning with the 2002 model year. But home and portable radios for the XM Satellite Service will also be manufactured by Kenwood, Panasonic, Clarion, Sony, Jensen, and others and available at retailers such as Circuit City and Best Buy.

Because satellite radios are addressable, Sirius and XM will eventually offer car "telematics" services. They will be able to remotely unlock car doors if the owner locks the keys inside, remotely start the engine on cold mornings, or even deliver custom content.

The National Association of Broadcasters has turned thumbs down on satellite radio's request to operate terrestrial repeaters to fill in areas where their satellite signals cannot reach, such as in between tall buildings, underpasses or in tunnels.

The NAB wants to preclude digital audio radio (DAR) companies from turning satellite-delivered radio into a local "terrestrial" service. In comments to the FCC, the NAB said "If XM and Sirius want to provide traditional over-the-air radio service, they should apply for over-the-air licenses like everyone else."

On the web: **http://www.xmradio.com** and **http://www.siriusradio.com**.

FCC to Implement Federal Registration Numbers

Effective December 3, 2001, you will have another "FCC Number" to deal with. The FCC is requiring all applicants and licensees doing business with the FCC (including amateur radio operators) to provide a (ten digit) FCC Registration Number (FRN). The FRN is required under new FCC rules in Part 1, Subpart W. It's a uniquely identifying number obtained over the Internet through the Commission Registration System (CORES).

When CORES became operational in 2000, licensees in the Universal Licensing System (ULS) were automatically assigned FRNs. To discover whether you have been assigned an FRN and what the number is, go to **http://www.fcc.gov/wtb/uls/** and click on the Licenses link. Click on Continue and enter your call sign into the form and click on Search at the bottom of the page. When your name comes up, click on your call sign and then the second Licensee Information link at the top of the next page. Look for the box labeled FRN.

If you do not have an FRN assigned, you may obtain it through CORES. Go to **http://www.fcc.gov/omd** and click on the CORES link, or by filing. This number will be required whenever making any application or payment to the FCC. Without it your application or renewal will be returned or dismissed.

For more information on registering for an FRN, contact the CORES Administrator toll-free at 1-877-480-3201 or by email at *CORES@fcc.gov*.

Preparations for WRC-2003

Since radio waves do not respect international boundaries, it is at the World Radio Conferences of the International Telecommunication Union that the various nations of the world meet to agree on telecommunications matters. The next WRC is to be held June 9th to July 4th, probably in Venezuela. In preparation, study groups on both the civilian and governmental level take place to formulate the recommendations to be brought to the Conference. To follow the U.S. and international amateur radio preparations, here are some key website addresses:

ITU Study Group 8 (SG-8):
http://www.itu.int/brconf/rag/wrc-cpm-process/index.html Click on Study Groups
ITU-R Radiocommunications Sector:
http://www.itu.int/ITU-R
FCC International Bureau:
http://www.fcc.gov/wrc-03
United Kingdom Regulatory Agency:
http://www.radio.gov.uk Click on International link
Asia Pacific Telecommunity (APT): **http://www.aptsec.org**
Inter-American Telecommunications Commission (CITEL):
http://www.citel.oas.org
European Conference of Postal and Telecommunications Administrations (CEPT): **http://www.cept.org**
Australian Communications Authority (ACA):
http://www.austel.gov.au
National Telecommunications and Information Administration (NTIA):
http://www.ntia.doc.gov/osmhome/wrc99pre/ntia.htm

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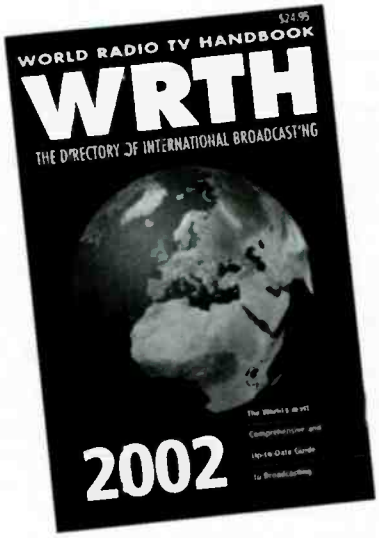

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LETTERS TO THE EDITOR

Perspectives on Israel

We usually stay away from non-radio debates, especially on such a sticky problem as the Middle East debate; excerpts from these two letters (written prior to Sept 11) show how differently two knowledgeable people can view the same situation.

"I read [*Listening in on the Middle East* by Dave White]. Please don't insult my intelligence by reporting Israel as 'one of the few democracies in the region'..... Israel is a fascist state dedicated to a racist policy of apartheid against the Palestinian people. I have lived and worked in the Middle East for many years and have seen the suffering in the refugee camps. Israel is the main culprit in the region and they are funded by our tax dollars. Ever hear of "no taxation without representation".... something which the terrorist George Washington and his band of terrorists, the Continental Army fought so hard against."

– C. Link N4ZIR

"There is only one country in the region with an acceptable level of freedom, and that is Israel. When I go to the Middle East and visit Syria or Lebanon or Egypt, there is no question that I am in a police state. And believe me, working as a journalist in a police state is no fun. By contrast, when I am in Israel, I feel that I am in a free country.

"So, why is the media always critically focused on Israel? It is one of the few places you can take a television camera with virtually unlimited access. Why can't we take cameras to Syria when the president there decides to destroy an entire town? Simple: we are not allowed.

"When I engage in debates with Arab-Americans, I constantly raise this. Their families came to the United States for freedom and opportunity, just like mine did. So, why, when they look at the Middle East today, do they side with the regimes that perpetuate the oppression that their parents or grandparents fled? Why do they think that they are standing up for Arabs when they justify the murderous actions of someone like Saddam Hussein?"

– Joseph Farah – Arab-American, founder of the Western Journalism Center and founder, and CEO of the Internet news site WorldNetDaily.com. He invites readers to visit **http://www.americancoalition.org**

By the way, author Dave White wrote to N4ZIR: "While the reference to Israel as a democracy is factual, based on the classifications used by the U.S. State Department, I understand the basis of your comments. I do realize the extent to which both religion and politics play a role in every facet of life in that region, so I appreciate your concern about the use of a term which, while accurate, may carry implications that are not necessarily valid in real life."

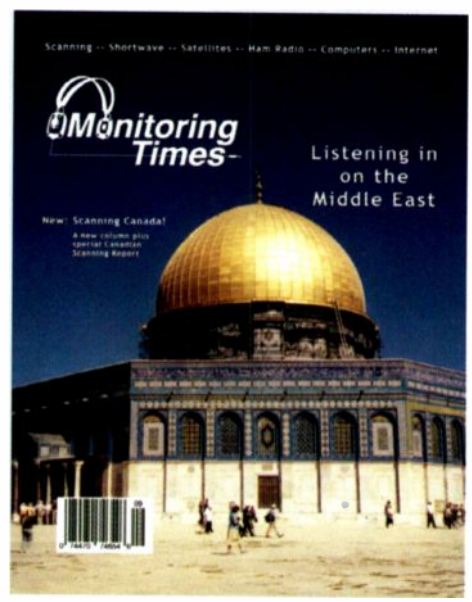
We've Got It Covered

"Two weeks ago I cleaned up my Shack and came over my old *MT* issues. The September issue of 1993 took my interest because of the title story "Target for Terrorism- Monitoring the New York Port Authority" with a picture of the World Trade Center! Had no idea that this story become an dramatic actually just a week later. Sorry my english is not good enough to describe my feelings. Still mourning,"

–Björn Gerlach, Germany

"Just wanted to let you know *Monitoring Times* deserves an award for a timely magazine cover in its September issue."

– Donald Byerly



Computers no Panacea

"Today's events of terrorism in the US have shown the fallibility of relying upon 'newer technologies', such as the Internet, in broadcasting to the public. Virtually all US news sources on Internet were jammed and even attempts to get the BBC updates from their web page reported 'Services to News may be slow due to the weight of traffic. Please bear with us.'

"The beauty of shortwave radio is that, aside from the band congestion we are already used to, there is a limitless number of people who can be tuned in and listening at any time, and in real time. Hopefully the BBC will learn from this lesson and return to full-time broadcasts to North America."

– M. P. Reece, AA0GL

(Ditto: I also experienced this difficulty regarding the Internet - ed)

" I'm always amused by the various discussions of how computers will change the radio hobby. Computers were a good thing when they (essentially .. through programmable logic ICs) made programmable scanners and radios possible. Now computers are coming into question because they may be replacing radio as it has traditionally been.

"That's progress, I guess, but things really haven't changed that much. I remember being a kid and driving around the lake and listening to the clear channels like WBZ, WABC, or WLS. There was a strong signal and then there was fading. Now I can connect through RealAudio and guess what? Net congestion and buffering! Kinda the same thing from a listening standpoint. Funny how you can dial 760 kHz or wjr.com and end up with the same result. It may not be the same as DXing an unknown station, but trying to listen to a familiar station far away is quite the same.

"Radio is a hobby that has various fascinations to various people. Some people restore old radios, some people crave the state-of-the-art radios. Computers are here to stay, like it or not. But whether one chooses to listen to the BBC on SW or satellite or the internet, who cares? If people are enjoying what they are doing, then they should have

every right to do so. On the other hand, few people drive the same car they did 20 years ago, so they shouldn't expect everyone else to do that either."

– Bernie Brainerd

A Safety Issue

Geoff Gidman, KA1EPF, and Jerry Smith were two observant readers who wrote regarding the September 2001 "Shortwave Equipment" article by Douglas Harrigan which illustrated the use of adhesive backed Velcro® to affix a shortwave receiver to the dashboard of his car. As Jerry commented, "Obviously, this author has an older vehicle with no air bags! I would strongly suggest that a user who thinks this is a great idea make sure that he does not mount his radio with Velcro to the passenger side airbag compartment lest his radio be launched out the rear window of the vehicle or worse."

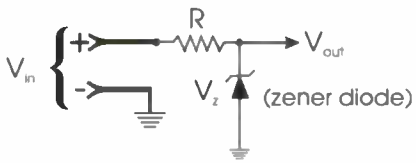
Point well taken! Now that that's out of the way, we'll address another question that came up about the same article:

Zener Diode Circuit

In the Sept. *Monitoring Times* on page 83, D. Harrigan tells of using a zener diode to convert 12V to 4.5V. What would an actual schematic look like of such a setup? How about two or three zeners in parallel for more amperage?

– Anthony Glen

Simple DC Voltage Reducer Circuit



Chose V_z equal to desired output voltage. V_{out}
Zener power rating must be > $I_{max} \times V_z$
$R = (V_{in} - V_{out})/I_{max}$ (or nearest smaller value). $P_z \geq (V_z)^2/R$
All V's in volts, R's in ohms, I's in amps, P's in watts

Circuit & formulae provided by G. Harlow & Co. P.O. Box 281 OR 97034

Douglas G. Harrigan sent *MT* the requested reverse-bias zener dc voltage reducer circuit. Following are some of his notes about the circuit:

"This circuit uses a a reverse-biased zener diode to provide a reduced dc voltage equal to the zener voltage at the output.

Choose the closest zener diode with a zener voltage close to, but not too large, for your particular application. While this circuit was used to provide dc power for my Sony ICF-2010 portable shortwave receiver from the automobile's nominal +13.8 Vdc electrical system, the circuit and formulae provided will work with any dc source and output requirement (as long as the source has a higher voltage than the output requirement!) In my case, I needed 4.5 Vdc, with a max current requirement of 600 ma. Digikey lists 4.7 Vdc zener diodes, which should work for a nominal 4.5 Vdc requirement, as fresh alkaline batteries in the radio will often provide slightly more than 4.5V without harming the radio.

"For higher power requirements, the designer of the circuit does NOT recommend multiple diodes in parallel; the concern is that thermal runaway could occur in one of the diodes, with most of the current trying to get through the runaway diode, thus frying it. A single zener of appropriate power dissipation rating is the way to go.

"Lastly, if a zener of the appropriate voltage for your needs is not available, the user would probably be better off fabricating a power supply based on one of the many variable-output voltage regulators, which allows the user to dial in the desired output voltage.

"The original circuit design was provided to me over 20 years ago, when voltage regulators were far more expensive than they are now. This circuit really has no real advantage over the modern variable-output voltage regulators, unless you already have the parts lying around in your parts bin, or cannot find one that meets your particular voltage and current requirements."

– Douglas G. Harrigan

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

-Rachel Baughn, KE4OPD, editor

September 11 Radio Honor Roll

Our hats are off to all the Amateur Radio Operators who volunteered their services and equipment; fire, police and emergency radio dispatchers who helped bring some order out of chaos; broadcast and telecommunications engineers who helped restore communications to a desperate city; media personnel who volunteered time and services; and the many companies who donated communications equipment and services. We dedicate this issue to the victims who were able to reach family, friends, or just friendly strangers by means of radio waves in the last moments of their lives, most especially to those on United Flight 93 who learned the true nature of their hijacking and decided to do something about it.

NYC TV Scrambles for Antenna Sites

The transmitters of nine of New York's analog television stations, five DTV stations, four FM radio stations, and many communications channels were all located atop the World Trade Center (WTC), and many video fiber paths were located below it. When the north tower went down, so did most off-air New York TV. Six transmitter engineers, two of whom were hams, are presumed to have lost their lives in the collapse. "The broadcast community is in absolute shock," said Hudson Division Vice Director Steve Mendelsohn, W2ML, who works for ABC News. "We all knew transmitter engineers, we all knew people who worked up in those towers near those big television transmitters, and they're gone."

When the WTC was bombed eight years ago WCBS was the only station able to switch to an auxiliary, full-power transmitter on the Empire State Building. The same was true again: WCBS was the only WTC station able to continue operating at full power. Most area cable-TV systems continued to broadcast based on direct audio/video feeds and a microwave interconnection system, though the network programming was not necessarily out of New York. There were also broadcast arrangements with PBS, Home Shopping, and educational channels.

ABC and CBS are looking to rebuild primary sites in Manhattan. NBC moved to a site in Alpine, New Jersey, where it will probably remain. Interestingly, this site " which looks like a giant power pylon," according to Mark Schubin, OpenDTV, "was the site of the world's first FM broadcast and was a beloved spot of its creator, Major Edwin Armstrong." One source said that NBC had its Burbank, California, station dismantle the emergency antenna off Mount Wilson and ship it to NYC, but it turned out to be too heavy to mount on the Alpine tower.

Jay Ballard commented that "the loss of the NY stations has created some DX opportunities for those living in Long Island. Both Channel 9 in DC and WJZ in Baltimore were seen."

Telecoms Respond to the Crisis

Here are a few of the tremendous efforts made by telecommunications companies to help in the recovery effort:

* A wireless emergency response team combining technicians from prominent telecommunications firms was put together to locate possible survivors of the attack on the World Trade Center. The technicians detected some 50 cell phones present under the rubble, but no active transmissions. It did clear some missing persons reports when calls were determined to have been made from outside the area.
* Verizon deployed portable cell sites in Manhattan and New Jersey, at the Pentagon, and in Shanksville, PA. They also made 5,000 phones available for emergency officials.
* BellSouth reported three times and AT&T reported twice the normal volume of long-distance calls. Cingular Wireless reported attempts to make a call increased a thousand percent in New York. Major telecommunications carriers said that most interruptions in service were caused not by physical damage but by network overloads caused by extraordinary numbers of people trying to make calls at once.
* Email quickly became the only way to get in touch reliably; EarthLink president Michael McQuarry said, "A lot of people don't realize that the Internet was originally created to manage communication in such an instance of attack as this." He said it began as an U.S. army project to allow computers to communicate in the event of a national disaster.
* Motorola delivered around 9,500 portable radios, 120 base stations, 700 Iridium satellite telephones, and 10,000 IDEN multifunction phones to various federal, state and local government agencies. Motorola also sent three trailer-mounted 900 MHz and 800 MHz radio systems to New York City, plus an 800 MHz, 15-channel communications system to serve as back-up for the Empire State Building communications site, now that it has become the primary system.

A New Hero

From The Dallas Morning News:

Among the innumerable heroes to emerge from this week's tragedies is a device that many have loved to hate: the cellular phone.

Phones, two-way pagers and other wireless devices have been credited with providing invaluable information about the hijackers, helping rescue efforts, reassuring loved ones and giving people the opportunity to hear their spouses' last words.

Unsung Heroes

Ham radio operators responded to the New York emergency by staffing more than 30 Red Cross shelters and other sites. Local clubs and repeater groups volunteered gear, frequencies and operators.

The emergency area is now contained to Manhattan. However, it could be months before hams are no longer needed. Hams have been operating in two shifts daily with 30 to 50 operators needed for each shift. To see whether volunteers are still needed, check into the Division web site and the NLI page at **http://www.arrlhudson/nli**

At the scene of the Pentagon attack near Washington, DC, a crew of about two dozen amateurs staffed six Amateur Radio stations and provided logistical support between the Salvation Army's relief and recovery effort on site and the agency's Arlington headquarters.

At the Somerset County western Pennsylvania crash site, Kevin Custer, W3KKC, arranged preliminary repeater communication into and out of the crash site to help the Red Cross, Salvation Army, Pennsylvania State Police, the FBI and other state and federal agencies on the scene.

The ARRL reminds hams to be aware of what they say on the air, as there are a lot of people listening in on scanners as well as on amateur radios. Hams should self-monitor what they say on air and not allow racist anti-Moslem rhetoric. "That's not the American way. That's not ham radio!"

photo credit - Mike Coppola

BULLETIN BOARD

Nov 2-3: Odessa, TX

West Texas Amateur Radio Club hamfest at the Holiday Inn Center (6201 E Hwy 80), 5-9p.m. Fri, 8a.m.-5p.m. Sat; $3 admission; Talk-in 145.470, 444.425, HF 3.922. Mike Glen K5EG, 3104 Dumont, Odessa, TX 79762 (915) 362-1428; K5EG@caprok.net

Nov 4: Litchfield, IL

Sixteenth Annual Central IL/ST Area Amateur Television Banquet to be held at Ariston Restauront. For information, contact Scott Millick K9SM, 217-532-3837 or *smillick@cillnet.com*

US Secret Codes Compromised?

According to a report from DEBKA Intelligence Files, anti-American terrorists may be in possession of all or part of the codes used by the Secret Service, Drug Enforcement Administration, the National Reconnaissance Office, Air Force Intelligence, Army Intelligence, Naval Intelligence, Marine Corps Intelligence and the intelligence offices of the State Department and Department of Energy.

After two hijacked planes struck the twin towers of the World Trade Center in New York, the U.S. Secret Service reportedly received a message using that day's White House code, saying "Air Force One is next." Immediately, Vice President Dick Cheney was hustled down to the president's emergency operations center, a bunker built to withstand a nuclear blast.

Holding the White House code and a whole set of top-secret signals would have made it possible for a hostile force to pinpoint the exact position of Air Force One, its destination and its classified procedures. In fact, they could also pick up and decipher the presidential plane's incoming and outgoing transmissions.

The implications shocked everyone in the president's emergency operations center: Is there a mole, or more than one enemy spy in the White House, the Secret Service, the FBI, the CIA or the Federal Aviation Administration? The DEBKA report suggests the trail may go as far as back as 1993, when Aldrich Ames leaked US secret codes to someone at the United Nations in New York. From there the codes went to Africa where America was participating in a UN police action in Somalia. U.S. involvement there ended not long after disastrous ambush on US troops by soldiers trained by bin Laden. There is evidence to suggest that bin Laden's aides acquired more than just US secret codes for the Mogadishu operation.

In the wake of these and other discoveries, said the report, agency experts are not only changing codes one-by-one, but also replacing procedures and methods of encryption.

Spy Found in US Intelligence Agency

Ana Belen Montes, a 44-year-old senior analyst with the Defense Intelligence Agency, was arrested Sept 21 by the FBI and charged with providing U.S. national secrets to Cuba. Montes was the senior analyst responsible for matters pertaining to Cuba.

Montes had been under surveillance since May, when a court-authorized covert search of her apartment turned up a portable computer whose contents included, among other things, instructions on how to erase material from the computer, tips for radio reception, and references to "the numbers that you receive via radio." A Sony shortwave radio was also found.

The complaint said that the FBI identified text consisting of 150 sets of numerical groups. "The text begins, '30107 24624,' and continues until 150 such groups are listed. The FBI has determined that the precise same numbers, in the precise same order, were broadcast on February 6, 1999, at AM frequency 7887 kHz, by a woman speaking Spanish, who introduced the broadcast with the words 'Atención! Atención!' "

Radio hobbyist Chris Smolinski says, "For those who are interested a quick check of WUN's huge frequency database, the text file on the older WUN CD (1995-1999) shows three entries for the freq (all as the "Atencion Stn".) And a quick search on **http://www.wunclub.com** has a single entry for 7887.0 from 2000."

Members of the Cuban-American community speculated that FBI agents moved in to arrest Montes to stop leaks to Cuba as U.S. forces mount a war on the Osama bin Laden network.

Report Code Transmissions?!

ARRL Monitoring System Administrator Brennan Price, N4QX, suggests that unidentified transmissions of code groups should be directly reported to federal authorities. "The Monitoring System best documents and pursues regular, persistent intrusions to the Amateur Radio Service," he said. "Most code group transmissions are neither regular nor persistent." Price has received increased reports of such transmissions, likely due to increased alertness on the part of listeners in the wake of September's terrorist attacks.

FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth invites reports of suspicious radio transmissions via e-mail to *fccham@fcc.gov*. Those submitting such reports should include their location plus the date, time, and frequency of the transmission monitored.

MT suggests those most likely to know the difference between regular code transmissions and those which are unusual are shortwave utility monitors like the WUN club who have already been doing this for years. But we unite with the principle of citizens doing their part to listen and report. Please turn to page 86 for a special proposal on how you might help!

Emergency Alert System Suspended

Following the September 11 terrorist attacks, the Federal Emergency Management Agency (FEMA) requested that broadcast stations suspend their routine weekly and monthly tests of the Emergency Alert System (EAS) in order to avoid potential public confusion or fear. The tests were expected to resume as required by the FCC after October 2.

Emergency Nets Serious Business

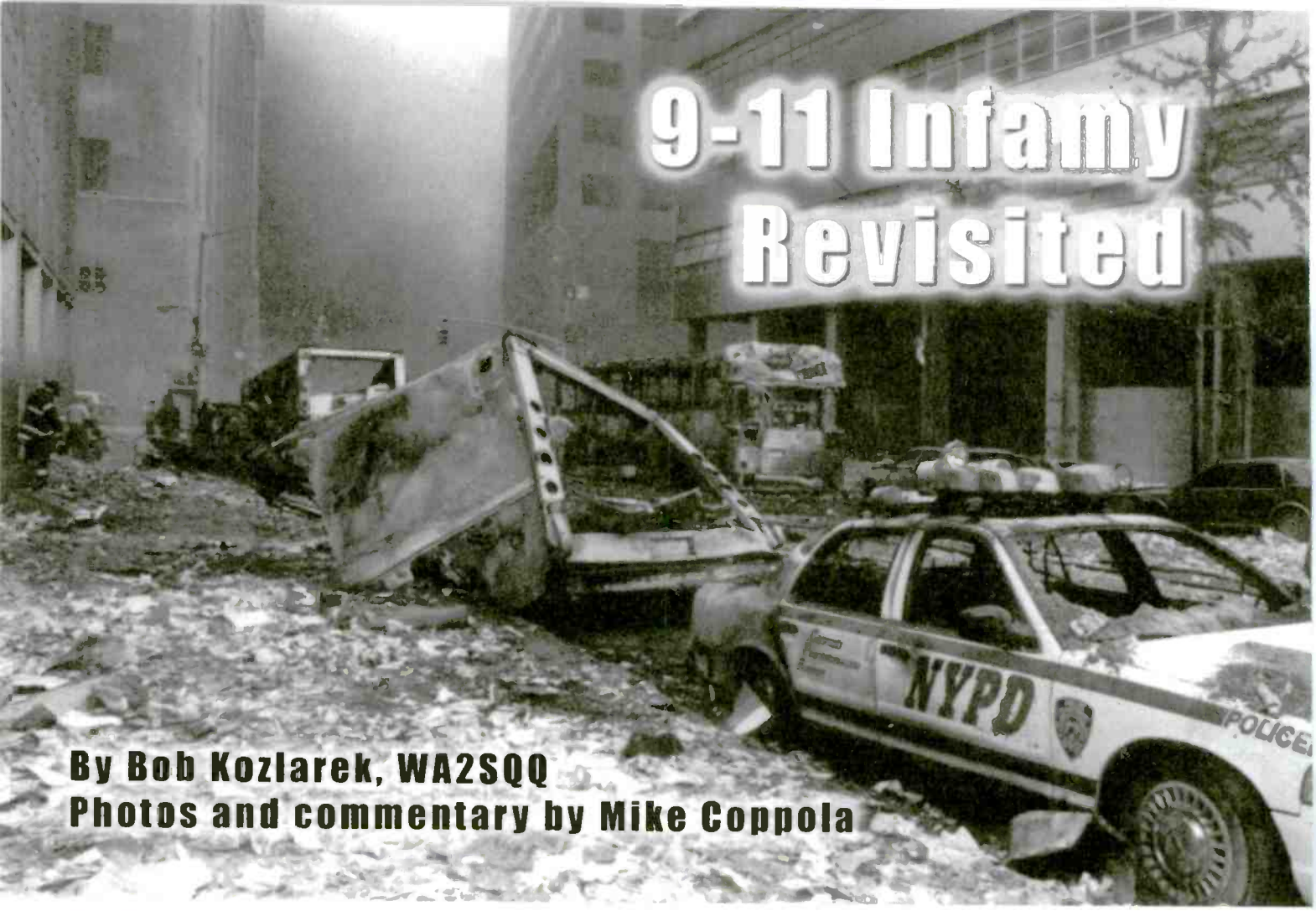
Although the FCC issued no emergency declarations nor other special instructions to the Amateur Radio community as a consequence of the September 11 terrorist attacks, the FCC apparently intends to put teeth into its infrequent emergency declarations. The Commission has written a Springfield, Missouri, ham regarding alleged interference to an emergency net after the FCC declared a general communications emergency on June 10.

Because of severe flooding in Texas and Louisiana, the FCC had declared 3.873 and 7.285 MHz – plus or minus 3 kHz – off limits to all but flood emergency traffic. Agents say they monitored William C. Dennison, K0VCD, causing interference to – an emergency net.

Dennison's alleged action "reflects an alarming failure in understanding what Amateur Radio was established for and the basis for its allocation of broad frequencies and privileges," Riley Hollingsworth said.

"Communications" is compiled by editor Rachel Baughn KE4OPD (mteditor@groveent.com) from newsclippings and reports submitted by our readers. Thanks to this month's reporters: Anonymous, Albany, NY; Norman Hill, Arlington, VA; Doug Robertson, Oxnard, CA; Alan Stoddart, Brooklyn, NY; Robert Thomas, Bridgeport, CT; Jeff Weinberg, Highlands Ranch, CO; Susan Wilden, Noblesville, IN; Via email: ARRL; Mark Ansel; Ed Cummings; Robert Felton; Alan Henney; Bob Kozlarek; Fred Moore; Ed Muro; Matthew Sadler; Mark Schubin, OpenDTV; John Stanko; Ron Tull; Larry Van Horn; Robert Wyman; Dave Zantow

9-11 Infamy Revisited



By Bob Kozlarek, WA2SQQ
Photos and commentary by Mike Coppola

History will record September 11, 2001, as the day when America suffered unprecedented horror, grief, and personal loss. Truly this was a day that will live in infamy. How ironic that it occurred on September 11 - "911". In less than 90 minutes a low-tech, high-concept attack using two hijacked jet liners transformed New York's World Trade Center complex to a pile of rubble, fifty feet deep in some areas.

Simultaneously, in Washington, D.C., the Pentagon was dive bombed by another hijacked jet. In Pennsylvania yet another hijacked jet presumed to be headed for Washington, D.C. crashed, killing all aboard. We now know that the heroic efforts of a few passengers who attacked the hijackers stopped this would-be suicide flight. These attacks were executed with surgical precision by terrorists who could fly the aircraft using little more than knives and box cutters to overpower the crew.

"We got right back to putting out more fires and dodging exploding car fires."

Several years ago I wrote an article for *Monitoring Times* on the Port of Authority of New York and New Jersey. In the midst of writing the article terrorists bombed the underground garages of the World Trade Center (henceforth called "WTC"). Fortunately, the loss of life was minimal, the damage to the WTC was repaired, and authorities apprehended and brought those responsible for the act to justice. This time, we weren't so fortunate.

Local Media Scramble

It was about 8:50 a.m. and I was at work when I heard the first mention of an aircraft hitting the WTC. Local TV quickly provided images of a huge hole in the side of the WTC's North Tower. In the bright morning sun the building's now blackened silvery skin rained a river of fire and glass down the side of the building onto thousands of morning commuters. The news media reinforced my immediate skepticism that a small private aircraft could cause such damage; terrorism might be involved.

Almost as fast as the situation was unfolding, local TV channels suddenly went off the air as power was cut to their transmitters atop WTC. WCBS-TV maintained backup transmitters atop the Empire State Building, so for a time they were the only active TV station in New York City. WABC-TV quickly started using three UHF transmitters and remained on air with reduced coverage. Residents subscribing to cable TV and direct satellites only experienced brief outages. Within the next five days, five of New York' City's seven VHF stations were back on with reduced coverage from alternate transmitter sites.

As luck would have it I left the house that morning without my scanner and I knew I was missing a lot of action. My resourcefulness paid off when I got the idea to use a piece of RF test equipment, an IFR, as a receiver. A few feet of coax, a BNC Tee connector and two different rubber duckies made a good makeshift multi-band antenna. Within minutes I was listening to several NYPD channels in my lab at work. The traffic was chaotic with the sounds of sirens and 10-13s on every channel. The IFR's built-in spectrum analyzer displayed so many active channels that it resembled a comb!

Since all bridges and tunnels in and out of New York City were being closed, companies in the adjacent New Jersey communities were closing early. Given the mood of the moment most of us were happy to leave and it gave me the opportunity to do some listening from my home.

Lessons Learned from 1993

Following the 1993 terrorist attack on WTC many agencies realized that better inter-agency communications were needed. After comparing the two disasters it is now apparent that the new systems performed very well. NYPD's

New York City Public Safety Agencies

Note: Private line or PL tone in parenthesis

National 800 MHz Public Safety Mutual Aid Channels
866.0125, 866.5125, 867.0125, 867.5125, 868.0125 (156.7 Hz PL)

Police Department

Manhattan South Patrol Borough (PBMS) Patrol Borough Systems

476.5625	Zone 1 Precincts 1/5/7 (100.0 Hz)
476.4375	Zone 2 Precincts 6/9 (110.9 Hz)
476.3375	Zone 3 Precincts 10/13 (123.0 Hz)
476.5875	Zone 4 Precinct s17/MTN/MTS (136.5 Hz)

Manhattan North Patrol Borough (PBMS) Patrol Borough Systems

476.3875	Zone 5 Precincts 19/23 (151.4 Hz)
476.3125	Zone 6 Precincts 20/24/CP (167.9 Hz
476.6375	Zone 7 Precincts 25/28/32 (186.2 Hz)
476.3625	Zone 8 Precincts 26-30 (100.0 Hz)
476.8875	Zone 9 Precincts 33/34 (110.9 Hz)

Patrol Borough System

471.0875	Manhattan South (100.0 Hz)
471.0625	Manhattan North (110.9 Hz)

Dispatch - City-Wide Systems

470.8125	Traffic (123.0 Hz) Simulcast with 482.4625
470.8375	Special Operations Division (136.5 Hz) Simulcast with 482.4875
482.4625	SI Traffic Units (123.0 Hz) Simulcast with 470.8125
482.4875	SI Special Operations Units (136.5 Hz) Simulcast with 470.8375

Inter-Operability System

482.3875	Citywide Police/Fire/EMS Inter-Op (110.9 Hz) Simulcast with 482.6875
482.6875	Citywide Police/Fire/EMS Inter-Op (110.9 Hz) Simulcast with 482.3875
482.7125	Manhattan Police/Fire/EMS Inter-Op (123.0 Hz)

Fire Department

153.770	Command Primary (portable radio channel 3 simplex)
153.830	Tactical Primary (portable radio channel 1 simplex)
153.890	Portable Repeater (portable radio channel 7 simplex)
153.950	Command Primary/Tactical Secondary (portable radio channel 5 simplex)
154.010	Command Primary/Tactical Secondary (portable radio channel 4 simplex)
154.070	Command Primary/Tactical Secondary (portable radio channel 6 simplex)
154.250	Manhattan (Vehicle radio plan channel 4 186.2 Hz) Command Secondary (portable radio channel 2 simplex)

EMS (Emergency Medical Services)

477.8625	Tactical 1 Simplex (85.4 Hz)
478.0125	Citywide/Command (85.4 Hz)
483.2375	Manhattan North (85.4 Hz)
483.4875	Manhattan Central (85.4 Hz)
483.3625	Manhattan South (85.4 Hz)
487.4875	Tactical 2 Simplex (85.4 Hz)

Transit Police

Citywide Police Operations

160.905	Division 1 (DIV1) Districts 1/2/4 F1/Manhattan South Patrol Ops (103.5 Hz)
161.175	Tactical 1 (TAC1) F2/Manhattan South Tactical Simplex (103.5 Hz)
160.500	Division 2 (DIV2) District 3 F3/ Manhattan North Patrol Ops (103.5 Hz)
160.485	Tactical 2 (TAC2) F4/Manhattan North Tactical Simplex (103.5 Hz)
160.695	Division 3 (DIV3) F5
160.260	Tactical 3 (TAC3) F6
160.305	Division 4 (DIV 4) F7
160.530	Tactical 4 (TAC4) F8
160.965	Citywide F9
160.965	Repeater Talk Around F10
155.925	Repeater Output F11
155.370	State Municipal Radio Dispatch (MRD) Interagency F12
463.550	TriBori Tunnel Authority Desk

D.O.I.T.T 800 MHz Trunk System

This is the layout for Bank 1 of a Motorola 3000 radio being used for disaster communications. Additional information on D.O.I.T.T system can be found at **http://www.n2nav.net/doitt.html**

856-860.4375, 856-860.7625, 856-860.9375

CH	Talk Group	User
01	10400	Red Cross (Mass Care and Emergency Response Vehicles)
02	8752	DOH Transport
03	000-1	OEM Alert (Interagency Talk Group)
04	10416	Sanitation #1
05	10432	Sanitation #2
06	11632	Department Citywide Admin Services (DCAS)
07	10448	Probation
08	10464	Homeless Services
09	000-10	Department of Buildings
10	8720	HPD Inspectors
11	10480	Loaner #1
12	10496	Loaner #2

Federal Emergency Management Agency

These are the "official" VHF assignments for FEMA

New Jersey
138.225 138.150 138.350 138.450 139.825 141.725 141.875 142.375 142.650 142.750 142.925 143.000

New York
138.225 138.350 138.450 139.825 141.725 141.875 142.450 142.750 142.925 143.000

Other Active VHF / UHF frequencies

154.250	Fire Department New York (FDNY) field operations
154.370	FDNY coordinating channel
156.675	Ferry boat coordination
161.670	News Media traffic
162.7875	Federal Bureau of Investigation (FBI) traffic
163.4125	New York District Army Corps of Engineers at 26 Federal Plaza
165.475	Linked FBI system
166.325	Gateway US Park System coordinating triage activity to Ellis Island
166.925	Coordination with Coast Guard Medivac
169.975	FBI Newark (Quite Active)
414.400	Linked FBI system

Port Authority George Washington Bridge Command Channel

VHF Marine Channels

156.300 156.800 157.050 157.100

Civilian Aircraft

La Guardia Airport

118.000	New York Approach Control
118.700	Tower
119.950	Class B Flight Service (North)
120.400	New York Departure Control
120.800	New York Approach Control
121.700	Ground Control
121.850	Ground Control
121.875	Clearance Delivery
122.950	UNICOM
124.450	New York Departure Control
124.950	New York Approach Control
125.950	ATIS Arrival
126.050	Class B Flight Service (South)
127.050	ATIS Departure
127.300	New York Approach Control
128.800	New York Final Approach Control
132.700	New York Approach Control
135.200	Pre-Taxi Clearance/Helicopter Clearance Delivery
263.000	Ground Control/Tower/Class B Flight Service

Newark International Airport

115.700	ATIS Arrival
118.300	Tower
118.850	Pre-Taxi Clearance/Clearance Delivery
119.200	New York Departure Control
121.800	Ground Control
122.950	UNICOM
125.500	Class B Flight Service
125.850	Final Vector
126.150	Gate Hold
127.600	New York Approach Control
127.850	Class B Flight Service
128.550	New York Approach Control
132.450	ATIS Departure
132.700	New York Approach Control
132.800	New York Approach Control
134.050	Tower
134.825	ATIS South Arrival
257.600	Tower/ Class B Flight Service

John F Kennedy International Airport

109.500	New York Approach Control (Transmit only)
115.100	ATIS Departure
115.400	ATIS Arrival SW
117.700	ATIS Arrival NE
118.400	New York Approach Control
119.100	Tower
121.650	Ground Control
121.900	Ground Control
122.950	Unicom
123.700	New York Approach/Departure Control
123.900	Tower
124.750	New York Departure Control
125.050	Gate Hold
125.250	Class B Flight Service
126.800	New York Approach Control
127.400	New York Approach Control
128.725	ATIS Arrival
132.400	New York Approach Control
134.250	New York Approach Control
134.350	New York Departure Control
135.050	Pre-Taxi Clearance/Clearance Delivery
135.900	New York Departure Control
281.550	Tower/Class B Flight Service
348.600	Ground Control/Clearance Delivery/Pre-Taxi Clearance

For complete agency channel assignments and information check the links below.

NYPD - FDNY - EMS
http://www.n2nov.net/nypd_ems.html
NYPD Tactical (Simplex) Channels
http://www.n2nov.net/nypd1.html
FDNY - EMS
http://www.n2nav.net/ems800.html
NY Transit and Rail System
http://www.n2nov.net/transit.html
NYSP Metro 21 800 System
http://www.n2nav.net/NYSP800.html
Port of Authority Conventional System (800 EDACS System Out of Service)
http://www.n2nov.net/PAPD800.html
NJSP
http://www.n2nov.net/njspd800.html

basic UHF system grew since 1993, now including more channels and separate subsystems for medical units (EMTs) and the NYC Transit Authority. Many of the new 482-485 MHz channels were put into use, thus presenting an excellent opportunity to verify channel data we had received over the past few months. Since the transmitter sites are scattered throughout the city, few if any experienced obvious problems.

Communications for New York's Fire Department (FDNY) also did very well despite previous negative publicity they received during their intended migration to a Motorola digital system. Phase one of that transition would have transferred the fire ground communications to digital radios. Problems related to multiple simultaneous transmissions caused FDNY to reject the radios. Many previously used VHF analog channels were active so I would have to assume that their original equipment was in working order. FDNY itself was not as lucky. Up to 200 of their members, the first to arrive on the scene, were killed while evacuating the building. In some cases, every member of an

"We started back through the piles of debris, documenting with photos and updating the other Metro Fire units with what we were seeing."

entire fire company lost their lives in the line of duty. To maintain leadership, "field" promotions had to be made.

Another change since 1993 now finds New York City's infrastructure communications using the D.O.I.T.T. 800 MHz trunked system. Fortunately this system is atop the Empire State Building and just received a major overhaul just two weeks before the WTC incident. Within 48 hours of the disaster crews from Motorola were on the scene, programming hundreds of new radios. Talk groups were also added to satisfy logistic requirements.

The World Trade Center complex served as the headquarters for The Port of Authority and the New York Office of Emergency Management (OEM). The Port of Authority's EDACS 800 system served the major airports. Moments after the planes impacted the buildings their system went silent, forcing radio communications to the old UHF repeater-based system. One would think that after the 1993 bombing, an alternate transmitter site would have been established.

New York's OEM office at 7 World Trade Center was itself a casualty when the building collapsed at 5:24 p.m. Authorities moved OEM Operations to the Police Academy on 20th St. Among those who lost their lives was Fr. Mychal Judge, FDNY's Chaplin. While administering the last rites to a fire fighter he removed his helmet and was struck in the head by a piece of falling debris. Symbolically, Mayor Rudolph Giuliani declared FDNY's spiritual leader the first confirmed casualty.

"On the morning of Tuesday, September 11th, 2001; shortly after 8am, I transmitted a tone and announced an alarm for the Borough of Manhattan NY – a high rise fire in the World Trade Center Tower #1. We "convoyed" into the city. Shortly after the 5th alarm was announced over Manhattan, a "Mayday" was yelled by the incident commander who stated "Another plane just hit tower #2". At this time, all Metro Fire units en-route to the scene knew that we weren't going to an accident."

Not Business as Usual

The amateur radio community responded interfacing with RACES and the Red Cross. Their preparedness was obvious as several nets started on 2M and 440 MHz repeaters within 30 minutes. Hundreds of dedicated volunteers offered countless hours coordinating medical / health and welfare communications. Metro Fire Radio (**http://www.metrofireradio.com**), a two-way radio notification group, also responded. Several of their members helped police and fire units in many situations. Their primary goal is to keep members of the police, fire, EMS, press, and OEM organizations informed of ongoing emergency incidents. Metro Fire uses three active channels, 452.175, 463.650, and 451.825. Metro Fire's Mike Coppola (Unit 301) was also first on the scene and captured some of the photos used in this article. Their web site offers many photos we could not include.

Virtually every government agency was represented, though identifying them by frequency was not always possible due to the frequent inter-agency communications. Scanners with a subaudible tone search made this task somewhat easier as the tone used often identified agencies. Since the WTC complex is on the Hudson River, the US Coast Guard was among the first to respond, closing the river to all traffic. The Federal Aviation Administration (FAA) grounded all air traffic in the US within 30 minutes after the attack so the only aircraft using the Hudson River corridor were police and military. Two active frequencies were 123.1 and 125.125 MHz.

"Once the area we were in was stabilized, we returned to the "war zone" to re-evaluate."

Since all the bridges and tunnels in and out of the city were closed, tens of thousands of people were stranded. Initially, the ferry services were used to carry the injured to Liberty State Park in New Jersey and Ellis Island where trauma centers were set up. Later in the day ferry services provided the first means of leaving Manhattan to the New Jersey side of the Hudson River. The exodus was calm and orderly, though closely monitored by both NYPD and military police. Virtually every marine channel was being used, so finding something to listen to was not a problem. In situations like this it is amazing how many frequencies seem to pop up out of nowhere. Channels in the 165 - 172 and 400 - 420 band that have not shown activity in years were suddenly alive, most of them "in the clear."

In normal times, New York City is not especially active when it comes to military air communications. Hearing and seeing military aircraft fly overhead was both exciting and alarming. Our

scanning group, New York DX Association (NYDXA), publishes a monthly newsletter via E-mail, so I immediately sent our members a request to inform me of all active frequencies. I posted the results on our web page: **http://nydxa.4t.com** Within minutes I was listening to several channels, including communication from AWACS, "Northernlights" and "Huntress." Nearby McGuire AFB provided several aircraft used for in flight refueling.

Since the World trade Center buildings had thousands of antennas atop them, the loss of communications is not limited to New York City based agencies. Countless Federal and state agencies including the New Jersey State Police now find themselves scattering for new equipment and transmitter sites.

Frequencies for Follow-up

In an article of this type, including all the frequencies for the agencies mentioned would be customary. While many have been included, space and time constraints required some abbreviation. Since the activity in and around New York City won't be short term, updated information will be posted on our group's web page mentioned above. Discussions will also take place on our weekly net each Wednesday at 8:00 p.m. held on the 147.000 (-600) repeater in New York City. All are welcomed to participate and scanner listeners may participate via E mail, answered live during the net. Those questions and your comments can be sent to *NYDXA@hotmail.com*

My sincere thanks goes out to all those who contributed to this article, especially Charles Hargrove N2NOV, Mike Coppola, and Pete Monaco. Finally, let us not forget those who lost their lives and their families.

About Metro Fire Radio

By Michael J. Coppola ~ Unit 301

Metro Fire Radio is a two-way radio notification system for the New Jersey/New York metropolitan area that is used to keep the members of the police, fire, Emergency Management Service, press, and Office of Emergency Management organizations informed of ongoing emergency incidents. Our main transmitter (UHF), is located in Alpine, NJ, with a satellite receiver in Hackensack, NJ. Our sub channels, better known as Metro 2, 3, and 4, are located in Hawthorne, Hackensack, and West Orange respectively.

When a member hears of an emergency incident, he retransmits the information over the radio system. Members who are available may respond to the site to provide detailed, up-to-the minute reports of the scene conditions. This has always been a great benefit to the organizations that depend on our system for reliable information.

Metro Fire Radio has a membership of over 120 members. Most agencies in our area that have UHF radios dedicate a channel for our organization. The system has been proven effective time and time again. Most of our members take photos of the incidents and coordinate with arson squads, emergency agencies, and press personnel after the job is over.

Unfortunately, this is the largest incident anyone in the world could ever report. It's also a great example of how the members of this radio system do more than just "buff." We're the first group to put down a camera and help out at the scene. Rehabbing, stretching lines, tapping hydrants, treating patients, and whatever else is asked of us. Further information on our system can be found at our web site: **http://www.metrofireradio.com.**

Washington Under Siege

By Alan Henney
Photos and captions by Bob Pugh

September 11 was an eerie day for the country's scanner listeners, especially those of us in the Nation's Capital. The tragedy struck home for Washingtonians almost an hour after the World Trade Center was first attacked. "I was scanning Alexandria and Arlington County on one of three scanners on my desk in Old Town Alexandria, Va., while listening to WTOP's [AM-1500] coverage of the New York happenings," recalls freelance photographer Bob Pugh. "An Arlington dispatcher shouted there was a plane down at the 14th-Street bridge. The battalion chief answered up asking for details. She said new reports indicated that it was now in the Del Ray area." Next it was reported at the Navy Annex, and finally, the Pentagon.

It was "too much to be a coincidence," Bob thought. Hearing that, he jumped in his car, made the over 4-mile trip in five minutes, took U-turn into the Pentagon lot and parked on the grass at the northeast corner of the 60-year-old building. "Smoke covered the entire horizon," Bob recalled. He was among the first, if not *the* first, of the photographers to arrive at the crash scene minutes after the ill-fated American Flight 77 crashed into the Pentagon at 9:37 a.m. Bob's video aired on the local TV stations and on MSNBC, *Fox News, Dateline*, CNN, and *Good Morning America*, among others.

The Arlington County trunk radio system buzzed with chatter about the crash, Bob said. Much of the coordination he observed during the first 30 minutes was face to face, as officials struggled to deal with the tragedy. Meanwhile, the sounds of continuous sirens filled the air as apparatus from adjacent jurisdictions responded to the Pentagon.

Better Communications

In January 1982, when Air Florida Flight 90 slammed into the 14th-Street bridge, officials expressed much concern about poor radio communication. Although many of the fire/EMS departments that responded to Air Florida had VHF-high band radio systems, most lacked the ability to communicate directly on each other's radio channels.

Steve Souder, who was with D.C. fire/EMS communications that snowy day in 1982, has since become the administrator for Arlington County's Emergency Communications Center (ECC). Emergency radio communications in the area, he says, has greatly improved since then.

Much of the mutual aid fire/EMS apparatus which was on the scene of the Pentagon now communicate using 800 MHz Motorola trunked radio systems. These radios are preprogrammed with Arlington County talkgroups, and vice versa. When appropriate, Steve says, they were able to communicate sector-to-sector or sector-to-command on the appropriate Arlington County talkgroup.

He also noted that the five national 800 MHz mutual aid channels, as well as the six local 800 MHz mutual aid channels, known as the Council of Governments-Mutual Aid Radio System (COG-MARS) channels, were used mainly for unit-to-unit "talk-around" coordination (frequencies listed below).

In 1982, the same area had only two fire mutual aid channels, 154.28 and 154.265, and one for police, 453.55. With little ability to communicate directly on each other's channels, rescue efforts during the Air Florida crash were further complicated.

Minutes after United Flight 175 became the second jetliner to crash into the World Trade Center at 9:06 a.m., MedSTAR paramedic Jim Burke said that the D.C. Hospital-Mutual Aid Radio System (H-MARS) was activated for a citywide bed status check. From this perspective, Jim pointed out, hospitals were alerted far sooner than they ever would have been before. This allowed hospital disaster plans to be implemented in a more timely fashion. The network, which operates on 462.4, was a new addition since the Air Florida crash.

photo credit - spaceimaging.com

One of the best sources of what was happening at the Pentagon was the Virginia State Police, says Dr. Willard Hardman, a Catholic University professor and loyal scanner listener (see his Pentagon frequencies below). He heard VSP troopers on 159.0 talk about the fourth plane inbound from Pennsylvania. Troopers set up a command post at the Pentagon with other agencies and remained there for days. VSP quickly brought in additional troopers from as far south as Richmond. Some listeners had also reported hearing a low-power VSP repeater on 158.985 (the Salem-South channel) in the immediate area of the Pentagon.

Willard said that the new police-mutual aid radio system (P-MARS) channel on 866.3625 was also a good source of information as emergency dispatch

With the sheer spectacle of the Pentagon on fire with the thick black smoke rolling over its face to the south, I knew I had to prioritize the visual overload of the scene....Medics treating a dozen or so victims...trucks, hoses, volunteers with blackboards, clergy, fire and smoke everywhere

centers coordinated with one another. He said he heard various agencies, including the military, distribute radios to allied agencies to further enhance coordination. A D.C. National Guard MP battalion was activated and became quite active later in the day on 161.0MHz.

Skies Controlled by Military

While all this was happening on the ground, in the skies of North America commercial air traffic was being grounded as fighter jets blasted off for combat air patrol (CAP) duties. "I started listening to the events around 10:30 a.m.," states military air buff Ron Perron. The World Trade Towers and the Pentagon had already been attacked. "By that time," Ron observes, "there was not a peep of civil air traffic in the area."

One of the first transmissions he heard was Andrews AFB's tower announcing on its VHF and UHF frequencies that its airspace was closed and that all intruders would be shot down. "That certainly put an exclamation point on what I was to hear for the rest of the day," Ron said!

Throughout the day, the Reagan National Airport controller (on 125.65) was the overall controlling authority for the D.C. area. He authorized all departures and entries into the "Class B" airspace. That role remained throughout the evening hours.

When the Air Force took over the air space, Ron says the D.C. Air National Guard assumed the combat air patrol. Ron monitored the two D.C. ANG F-16s (Wild and Caps) which started flying CAP missions around 10:30 a.m. At that time there were news reports of a fourth missing airliner, so presumably, he assumed the F-16s were airborne protecting the D.C. area from that threat, among others. These F-16s were soon joined by three more F-16s from Langley (North Dakota ANG aircraft normally deployed to Langley in an air-defense mode). The D.C. ANG flight leader assumed the role as CAP commander while trying to track the aircraft. The D.C. ANG F-16s assumed control of the airspace below 23,000 feet, and the Langley F-16s and F-15s took the airspace above that. After about an hour, Ron says two Langley F-15s (First) joined the CAP and took up position high above the area. They were also joined by some F-18s up from Oceana.

About an hour after Ron started listening, he said he heard an AWACS (Bandsaw Kilo) off the Maryland and Virginia coast which started to assume control of the airspace. The D.C. ANG CAP commander, however, continued to control the immediate airspace around downtown D.C.. Later in the afternoon he was joined by another AWACS (Chalice).

Interspersed among the medevac choppers trying to land at the Pentagon to extricate the wounded, helicopters from the 1st Helicopter Squadron (Mussels) were busy ferrying military officials from the Pentagon. Huntress assumed the NCS (net control station) role sometime in the late morning and set up on 255.8, 228.9 and 234.6. Ron says Huntress also assumed responsibility for designating targets and releasing fighters to prosecute those targets.

In the early evening hours of that fateful Tuesday, Air Force 1 was flying back from Offutt

Air Force Base near Omaha, Neb. That's when Dan Patrick and a handful of other scanner listeners in the Washington area monitored the fighter jets protecting the president's aircraft on its return trip to Andrews Air Force Base.

It "sounded like an enormous amount of fire power" that was airborne, Dan observed. Dan, who works for WUSA-TV, had used his video camera to record some of the fighter jet radio chatter on 225.8 as the Air Force 1 escort came into range over the Blue Ridge. It was as if they "were concerned about every target," he said. "It was an interesting coordination effort" for the 10 to 15 minutes that it lasted.

Now, days after the attacks, Washingtonians struggle to recover while operating in a lockdown state which the city has never before seen. Bomb threats, suspicious individuals, vehicles, aircraft and package reports plague the radio waves, shut down area streets, empty buildings, and further drain the city's remaining productivity. Never before has the Coast Guard had such a substantial presence on the Potomac and Anacostia rivers. Two Coast Guard cutters and two patrol boats guard the city's meager waterways using 157.15.

One D.C. police officer estimated that as much as half of the city's officers who would normally be on patrol each shift have been detailed to fixed posts, including the city's reservoirs, federal and city office buildings, and an expanded perimeter around the White House. Meanwhile, Urban Search and Rescue (USAR) teams continue their dig through the ruins of the Pentagon (much of FEMA's incident support team overall coordination has been using 418.05). After the recovery efforts will come clean-up and rebuilding, while Washingtonians try to cope with a forever-changed world.

About the contributors:

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Bob Pugh (*bobpugh@totalshow.com*) is a freelance photographer for BlindSpot News Services. He uses a Radio Shack Pro 2030, 2066 and Pro 33 and 39. In his car he carries a GE MPD 45 channel portable that uses a mobile converter for 460 MHz, and a Motorola 16 channel Radius.

Washington Area Mutual Aid Radio Systems (MARS)

I could see the evacuations well under way and hundreds of people milling around the Pentagon lawns.

154.2650	Fire Mutual Aid (Northern Virginia)
154.2800	Fire Mutual Aid 2 (tactical on-scene)
154.2950	Fire Mutual Aid 1 (base to base)
462.4000	Hospital Emergency Network "H-MARS"
866.0125	National Mutual Aid Calling Channel
866.5125	National Mutual Aid Tactical 1
867.0125	National Mutual Aid Tactical 2
867.5125	National Mutual Aid Tactical 3
868.0125	National Mutual Aid Tactical 4
866.3625	Police Mutual Aid (was 453.55)
868.5125	Council of Governments COG-1
866.8375	Council of Governments COG-2
867.2375	Council of Governments COG-3
867.4875	Council of Governments COG-4
866.8625	Council of Governments COG-5
867.7625	Council of Governments COG-6

D.C. Media Desk Channels

455.0875	ABC Channel 1 Desk
450.4875	CBS Channel 2 Desk
161.6700	NBC Desk
450.8875	CNN Channel 3/4 Desk
455.5500	WJLA Channel 1 Desk
153.0500	WRC Desk
161.7300	WTTG Channel 1 Desk
450.2125	WUSA Channel 2 Desk
455.9125	Metro Traffic Control

Pentagon Freqs (Willard Hardman)

143.100	Heliport (AM mode)
231.300	Heliport (AM mode)
241.000	Heliport Army Standard Stand-by (AM mode)
248.000	Telemetry/Heliport RLB
268.000	Wheelhouse Air-Ground RWI
287.600	Wheelhouse Air-Ground RWI
293.500	Wheelhouse Air-Ground RWI
406.725	Defense Protective Service
413.500	Defense Protective Service

Most of the Pentagon is secured by the Defense Protective Service, although selected areas are protected by elements of the military/security police of the various services. The Army at Fort Myer, which is adjacent to the Pentagon, and the Arlington County Fire Department provide fire and rescue services to the Pentagon. The DiLorenzo Army Tri-Service Health Clinic provides EMS and operates on the Arlington County trunked system.

"Wheelhouse" is an Air Force-operated DoD switchboard for use by aircraft, mostly helicopters. The heliport, including the tower, at the Pentagon is operated by the Army. It is currently out of operation, since that is the area where the plane crashed.

Aircraft Frequencies (Ron Perron)

All frequencies are in MHz and mode is AM unless otherwise indicated

118.125	Navy Fleet Area Control and Surveillance Facility (FACSFAC) Virginia Capes Discrete (callsign Giant Killer)
118.400	Andrews AFB Tower
119.100	Reagan National Airport Tower
119.300	Andrews AFB Approach Control
120.750	Reagan National Airport Helicopter Control
123.025	Helicopter Unicom
124.200	Reagan National Airport Approach Control
125.650	Reagan National Airport Departure Control
126.550	Reagan National Airport Departure Control
127.275	District of Columbia Air National Guard Discrete
138.425	Florida Air National Guard (callsign Gator)

I turned to the building in time to shoot the end of the collapse of the upper three floors.

139.900	District of Columbia Air National Guard Supervisor of Flying (SOF)
141.550	Special Air Mission (SAM) Command
225.800	NORAD Northeast Sector Operations Control Center (callsign Huntress)
228.700	NORAD Northeast Sector Operations Control Center (callsign Huntress)
228.900	NORAD Northeast Sector Operations Control Center (callsign Huntress)
234.600	NORAD Northeast Sector Operations Control Center (callsign Huntress)
234.800	District of Columbia Air National Guard Supervisor of Flying (SOF)/113th Fighter Wing Command Post
238.100	Navy Fleet Area Control and Surveillance Facility (FACSFAC) Virginia Capes Discrete (callsign Giant Killer)
243.600	VMFA-321 Hell's Angels Andrews AFB F-18 aircraft
249.800	Navy Fleet Area Control and Surveillance Facility (FACSFAC) Virginia Capes Discrete (callsign Giant Killer)
255.000	Navy Fleet Area Control and Surveillance Facility (FACSFAC) Virginia Capes Discrete (callsign Giant Killer)
257.200	Reagan National Airport Approach Control
276.400	Marine Helicopter Squadron One (HMX-1) Operations
303.000	Common military tankers/boom frequency
320.600	Airborne Warning and Control System (AWACS) Operations
343.700	Reagan National Airport Approach Control
348.725	Reagan National Airport Approach Control
360.700	Washington Air Route Traffic Control Center (ARTCC)
378.100	Special Air Mission (SAM) Command

Military Callsigns Monitored

Abatable Bravo-	E-3 AWACS aircraft
Angel-	VMFA-321 Andrews AFB F-18 aircraft
Bandsaw Kilo-	Tinker AFB E-3 AWACS aircraft
Binge-	McGuire AFB KC-10
Bully-	D.C. ANG F-16
Caps-	D.C. ANG F-16
Chalice (no suffix noted)-	Tinker AFB E-3 AWACS aircraft
First-	Langley F-15 aircraft
Flop-	Ohio ANG KC-135 aircraft
Fueler-	McGuire AFB KC-10 aircraft
Huntress-	NORAD Northeast Sector Operations Control Center controller
Maine-	Maine ANG KC-135 aircraft
Mussel-	USAF 1st Helicopter Squadron UH-1 Helicopter Andrews AFB
Quint-	Langley F-16s (North Dakota ANG deployed)
Raygun-	Langley F-15 aircraft
Roy-	Langley F-15 aircraft
Senate-	D.C. ANG Supervisor of Flying
Snake-	New Jersey ANG F-16 aircraft
Steel-	Pennsylvania ANG KC-135 aircraft
Tazz-	Ohio ANG KC-135 aircraft
Team-	McGuire AFB KC-10 aircraft
Wild-	D.C. ANG F-16 aircraft

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10 Priority Channels • Programmed Service Search

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Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner	$89.95
Bearcat Sportcat 200 alpha handheld sports scanner	$169.95
Bearcat Sportcat 180B handheld sports scanner	$149.95
Bearcat 80XLT 50 channel handheld scanner	$99.95
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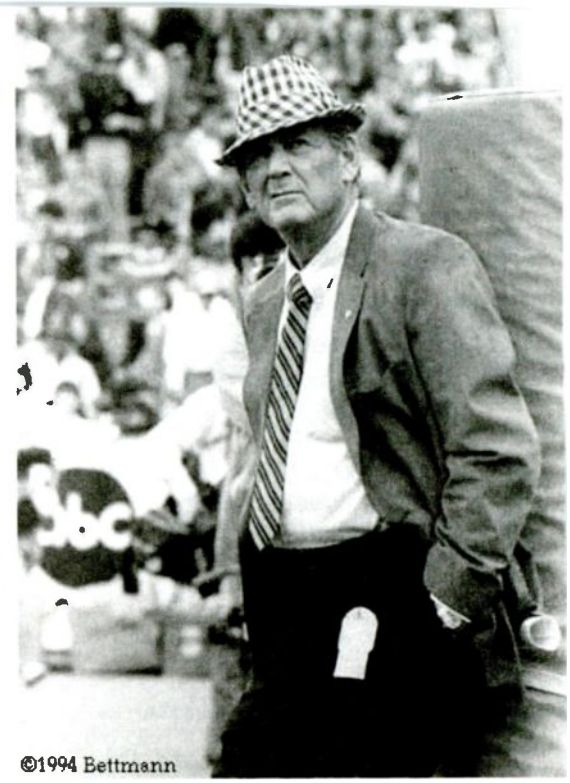
Scanning the Heart of Dixie

By John Mayson



Paul "Bear" Bryant, the University of Alabama footb coach who passed away in 1983.

Our nation has scores of Interstate highways, hundreds of U. S. highways, and thousands of state highways. Many of these offer scenic views, and breathtaking landscape that keep driver and passenger alike in awe. Interstate 20 is not one of these.

I-20 starts just west of Florence, South Carolina, and stretches deep into Texas near Gomez Peak in Reeves County. The highway takes drivers through Columbia, Atlanta, Birmingham, Jackson, Shreveport, and Dallas/Fort Worth. While the route isn't completely void of scenery, the long, straight, flat stretches between the urban centers can make for tedious driving.

Having driven almost the entire length of I-20 more times than I care to remember, I can personally vouch for the boredom that grips even the most easily amused of drivers. I know when I start wondering what ants dream or if balsa wood is edible, it's time to pull over and snap back into reality. I recently discovered taking a scanner along is a great way to make the trip go by faster.

Scanning in the Middle

In this article we're going to visit three states making up the heart of the Deep South: Louisiana, Mississippi, and Alabama. With a scanner in hand, you'll hear everything from casino regulators to Mississippi River barges to the Alabama Bureau of Investigations. The county and parish lines will seem to go by faster as you listen to the police, sheriff, fire, and ambulance calls in the communities.

What you will need

Obviously you'll need a scanner. One with lots of memories that also follows trunked systems, such as the Uniden BC780XLT or Pro-94 is an ideal choice. I also suggest an externally mounted antenna. These receivers and antennas can be found at Grove Enterprises, as well as many other advertisers in this magazine. You will monitor everything from several 800 MHz trunked systems to the Mississippi Highway Patrol's 42 MHz system. Choose your antenna accordingly.

The second piece you need is frequency and trunked talkgroup information. This article will give you that piece. As a bonus, I'll suggest ways to get as much information into your scanner before you leave home to avoid reprogramming it on the road.

The Bayou State

When you're greeted to the state with English and French welcome signs, you know you're in the Bayou State, also known as Louisiana. Despite what you might have heard, *bayou* is not the French word for swamp. It's a derivation of a Choctaw word describing the marshy, sluggish bodies of water that feed lakes and rivers.

Louisiana is different. Rather than counties, Louisiana is divided into parishes, which have the same legal distinction as counties. The state's legal system is based on Napoleonic law rather than English Common law. While many states grapple with the idea of being officially bilingual, Louisiana boasts of its French and Anglo heritages.

Northern Louisiana is what southern Louisiana isn't. You won't find the quaint depravity of New Orleans or political legacies of Baton Rouge like Huey Long. Instead you'll find quiet, conservative towns. Parish names such as Union and Lincoln were chosen because the locals were sympathetic to the north during the American Civil War, while further down the Mississippi River; New Orleans fought Union forces with a vengeance.

I-20 runs through eight parishes: Caddo, Bossier, Webster, Bienville, Lincoln, Ouachita, Richland, and Madison. Each parish has its own sheriff's office, plus many police, fire, and ambulance services can be found. The Louisiana State Police has two troops in northern Louisiana. Troop G is headquartered in Shreveport and Troop F is headquartered in Monroe.

Bossier Parish operates a trunked radio system, as does the Louisiana State Police.

The Magnolia State

Mississippi is home to many great Americans such as William Faulkner and Kermit the Frog. Vicksburg boasts a wonderful Civil War park. The Jackson metropolitan area slowly gives way to the open road of eastern Mississippi. Other points of interest in the state are the Natchez Trace Parkway and the Gulf Islands National Seashore.

I-20 passes through six counties: Warren, Hinds, Rankin, Scott, Newton, and Lauderdale. Hinds and Rankin counties, which include and surround Jackson use or plan to use Motorola trunked systems while the city of Jackson has chosen an EDACS trunked system. Warren County and Vicksburg use a Motorola ASTRO trunked system. Since it's digital, today's scanners will be unable to monitor it. The Mississippi Highway Patrol districts 1 and 6 lie in the path of I-20 and use a statewide low-band system.

The Heart of Dixie

What other state would revere a late college football coach, produce the likes of Jimmy Buffett, and have a city, brought into the 20th century by German rocket scientists, where ice hockey is king? Welcome to Alabama.

Expect to hear a lot about Paul "Bear" Bryant, the University of Alabama football coach who passed away in 1983. A choirboy from Mobile named Jimmy would find his home in Key West and serenade millions with songs about "Margaritaville." After the Second World War, the United States government recruited German rocket scientists and brought them to a remote town in the hills called Huntsville. Today Huntsville boasts a high-tech community with the NASA Marshall Space Flight Center, the U. S. Army Missile Command, and home to electronics firms such as SCI. It's also home to the University of Alabama at Huntsville, a formidable opponent in college ice hockey.

I-20 runs through eight Alabama counties: Sumter, Greene, Tuscaloosa, Jefferson, St. Clair, Talladega, Calhoun, and Cleburne. The Birmingham Police Department uses SouthLinc. It's a

radio system owned and operated by the Southern Company out of Atlanta. It uses Motorola iDEN radios, exactly like the ones used by Nextel, and cannot be monitored by a scanner. Jefferson County uses a Motorola trunked system.

The Alabama Department of Public Safety started to implement a statewide EDACS trunked system. However, the system has not been completed, and along I-20 they use conventional VHF frequencies. I-20 runs through Troops C and B.

Table 1: Tips for Travelers

All three states provide full service welcome centers. If you cross the state line during most daylight hours, be sure to stop in. You'll find free maps, free Cokes, and lots of tourist brochures. All three states offer a wealth of historical and cultural sites. Two of the states have casinos for the grown-ups and two have beautiful Gulf coast beaches for the whole family.

Table 2: Tips for Scannists

Keep your eyes on the road! Ambulances could be responding to your vehicle if you're not careful. Cellular telephones have been singled out as a driving distraction and banned from use while driving in parts of the country. Truth is anything can distract a driver and this includes your scanner.

I suggest you program your scanner ahead of time. Should you need to reprogram it during your drive, pull over. If you absolutely need to fiddle with the scanner while driving, have someone else drive so you can focus on what you're doing.

Additionally, know the law and practice common sense. I am not an attorney. However, I do know mobile use of a scanner may be illegal or require a permit. If you're unsure check **http://www.afn.org/~afn09444/scanlaws/** or contact the appropriate police agency. Regardless of the law, you should use common sense. If you are stopped by law enforcement, turn the scanner off. I know it's tempting to hear your information broadcast over the air. But don't. Nothing can ruin a police officer's day like hearing his Dispatcher's voice from your vehicle. Or worse yet, picking up a hideous feedback squeal when he uses his handheld while standing by your window.

Table 3: Tracking the Trunks

The Uniden BC780XLT has a powerful feature called Control Channel Only scanning. A countywide trunked can have twenty or more frequencies. A statewide system might use hundreds. However, the number of frequencies used as trunked control channels is usually much less. Simply programming only the control channel frequency from each repeater can program the entire Louisiana State Police system into one bank. You are of course limited to 100 entries in your scan list, but you can operate the scanner in search mode and listen almost seamlessly from one corner of the state to the next.

A frequent question I see on many Internet lists is "Can I program more than one trunked system into a single bank?" The answer to this is "Yes you can, with a caveat." Trunk tracking scanners operate by monitoring the control channel, then sending the radio to the appropriate voice frequency. As long as the scanner sees only one control channel in a bank, this works fine. If there is more than one, the scanner will lock-on to the first one it comes to. If for some reason the control channel is lost, it'll lock onto the next. This could have undesired consequences.

You could have two systems, physically located hundreds of miles apart, in one bank. Frequencies programmed for the distant trunked system could possibly be used in the local area, and start tracking a local system. You could go from hearing an exciting police chase to hearing towing services or tree trimmers. The solution is to lock-out the frequencies of the system you do not wish to monitor. Remember to unlock those frequencies before you enter the new area. If you know the control channel frequencies ahead of time, you can enter just those. It's less to lockout.

EDACS systems do not mix well. These systems require the frequencies be entered in "logical channel number" (LCN) order. Because of this, multiple systems cannot be entered into one bank since both will want to use LCN-1, LCN-2, etc. You can combine an EDACS and Motorola system into one bank. Enter the EDACS system first, then the Motorola frequencies. Make sure you change the trunk type on the scanner.

By carefully choosing your banks, you can fit virtually everything along I-20 into a Uniden BC780XLT. Hopefully we'll start seeing more scanners with control-channel-only modes become available.

Table 4: Louisiana Scanner Frequencies

All frequencies and CTCSS tones, if known, are listed.

Caddo Parish

Caddo Parish Sheriff's Office
- 453.050 MHz (127.3 Hz)
- 453.350 MHz (127.3 Hz)

Shreveport Police Department
All CTCSS tones are 186.2 Hz
- 453.900 MHz – Channel 1
- 453.800 MHz – Channel 2
- 453.950 MHz – Channel 3
- 453.825 MHz – Channel 4
- 453.450 MHz – Channel 5
- 453.550 MHz – Channel 6
- 453.650 MHz – Channel 7
- 453.700 MHz – Channel 8
- 453.500 MHz – Channel 9

Shreveport Fire Department
- 154.310 MHz – Channel 1
- 154.400 MHz – Channel 2
- 154.355 MHz – Channel 3
- 154.445 MHz – Channel 4

Bossier Parish

Bossier Parish TRS
Motorola Type II analog
- 856-860.7375 MHz
- 57360 Bossier Parish Sheriff's Office
- 57680 Bossier Parish Sheriff's Office

Webster Parish

Sheriff's Office
- 155.415 MHz

Cullen Fire Department
- 158.820 MHz

Minden Police Department
- 154.115 MHz

Minden Ambulance
- 155.355 MHz

Advanced Ambulance of Minden
- 155.385 MHz

Bienville Parish

Bienville Parish Sheriff's Office
- 158.850 MHz (107.2 Hz)

Lincoln Parish

Lincoln Parish Sheriff's Office
- 155.505 MHz
- 155.610 MHz

Lincoln Parish Fire Protection District
- 154.205 MHz

Ouachita Parish

Ouachita Parish Sheriff's Office
- 854.9625 MHz
- 855.2375 MHz

Monroe Police Department
- 158.790 MHz - Channel 1
- 154.785 MHz – Channel 2
- 155.010 MHz – Channel 3
- 155.430 MHz – Channel 4

Monroe Fire Department
- 154.205 MHz

Richland Parish

Richland Parish Sheriff's Office on the State Police TRS. Talkgroups unknown.

Madison Parish

Madison Parish Sheriff's Office on the State Police TRS.
- 16432 – MPSO (?)
- 16752 – MPSO (?)
- 16752 – MPSO (?)
- 16880 – MPSO (?)

Louisiana State Police Troop F

*(* indicates control channel)*
Cnase: 853.9375, 856.4375, 857.4375, 858.4375, 860.9375 MHz
Columbia: 854.9875, 856.2125, 857.2125, 860.4875* MHz
Farmerville: 852.0625, 852.6625, 853.1375, 856.4875, 860.4375 MHz
Holly Ridge: 856.4375, 856.9875, 857.4375, 857.9875, 858.4375, 858.9875, 859.4375, 859.9875, 860.4375, 860.9875 MHz
Jonesboro: 857.2375, 858.2375, 859.2375, 860.2375* MHz
Marion: 856.7375, 857.7375, 858.7375, 859.7375, 860.7375* MHz
Ock Grove: 856.2375, 857.4625, 858.4625*, 860.7125 MHz
Tallulah: 857.2375, 858.2375, 859.2375, 859.4375, 860.2375* MHz

Talkgroups
3216 Troop F Dispatch 1
3248 Troop F Dispatch 2
3344 Troop F Car-to-Car
3376 Troop F Gaming
3408 Troop F CID
3440 Troop F CID
3472 Troop F Executive Security
3504 Troop F Department of Public Safety
3536 Troop F LSP-1

3568 Troop F LSP-2
3600 Troop F Coordinate Call
3632 Troop F Talk-1
3664 Troop F Talk-2
3984 Troop F Car-to-Car

Louisiana State Police Troop G

(* *indicates control channel*)
Bellevue: 857.2625, 858.2625, 859.2625, 860.2625* MHz
Homer: 857.4375, 858.4375, 859.4375, 860.9625* MHz
Plain Dealing: 856.9625, 857.9625, 858.9625, 859.9625* MHz
Ringgold: 856.7625, 857.7625, 858.7625, 859.7625, 860.7625* MHz
Shreveport: 856.4625, 858.4625, 859.4625, 860.4625*, 866.3875 MHz

Talkgroups
3856 Troop G Dispatch 1
3888 Troop G Dispatch 2
3984 Troop G Car-to-Car
4016 Troop G Gaming
4048 Troop G Criminal Investigations
4080 Troop G Criminal Investigations
4112 Troop G Executive Security
4144 Troop G Department of Public Safety
4176 Troop G LSP-1
4208 Troop G LSP-2
4240 Troop G Coordinate Call
4272 Troop G Talk-1
4304 Troop G Talk-2
4368 Troop G Office of Motor Vehicles
4400 Troop G State Fire Marshals

Table 5: Mississippi Scanner Frequencies

All frequencies and CTCSS/DCS tones, if known, are listed.

Warren County

Warren County TRS
Motorola ASTRO
854.9625, 855.2375, 856.9375, 857.9375, 859.2625, 860.7625 MHz
Mercy Regional Medical Center of Vicksburg
155.175 MHz

Hinds County

Clinton Police Department
155.370 MHz (107.2 Hz)
Jackson TRS
EDACS analog
1=855.2125, 2=855.4875, 3=855.7375, 4=856.2125, 5=856.4875, 6=856.7375, 7=857.4875, 8=857.7375, 9=858.4875, 10=858.7375, 11=858.9375, 12=859.4875, 13=859.7375, 14=859.9375, 15=860.4875, 16=860.7375, 17=860.9375, 18=860.4625, 19=860.9625 MHz
Talkgroups
04-021 Jackson PD – Precinct 1 Dispatch
04-041 Jackson PD – Precinct 2 Dispatch
04-061 Jackson PD – Precinct 2 Info
04-082 Jackson PD – Precinct 3 Car-to-Car
04-025 Jackson PD – Precinct 3 Information
04-081 Jackson PD – Precinct 4 Dispatch
06-xxx Jackson FD talkgroups

Rankin County

Rankin County TRS
Motorola Type II analog
852.5125, 852.8125, 852.9375, 853.3125, 853.5875, 853.6375, 856.4625, 856.7625, 857.9625, 859.9625, 860.4375 MHz
Talkgroups
560 – Rankin County SO Dispatch
880 – Rankin County SO
912 – Rankin County SO TAC
1712 – Rankin County SO Talk

Brandon Police Department
155.550 MHz (141.3 Hz)

Scott County

Scott County Sheriff's Office
155.490 MHz

Newton County

Newton County Sheriff's Office
159.150 MHz
Newton County Fire Control
153.815 MHz (186.2 Hz)

Lauderdale County

Lauderdale County Sheriff's Office
154.830 MHz (D223)
Meridian Police Department
460.125 MHz (131.8 Hz)

Mississippi Highway Patrol

42.02 MHz – Car-to-Car
42.08 MHz – District 6
42.12 MHz – District 1

Table 6: Alabama Scanner Frequencies

All frequencies and CTCSS tones, if known, are listed.

Sumter County

Sumter County Sheriff's Office
155.655 MHz

Greene County

Greene County Sheriff's Office
155.010 MHz
155.550 MHz

Tuscaloosa County

Tuscaloosa County Sheriff's Office
155.610 MHz – Channel 1
155.670 MHz – Channel 2
Tuscaloosa Police Department
158.730 MHz (110.9 Hz) – Channel 1
154.845 MHz (110.9 Hz) – Channel 2
154.950 MHz – Channel 3
155.970 MHz – Channel 4
Tuscaloosa Fire Department
154.400 MHz (110.9 Hz)
University of Alabama Police Department
159.150 MHz

Jefferson County

Jefferson County TRS
Motorola Type II analog
856.2375, 856.4625, 856.7375, 856.9625, 857.2375, 857.4625, 857.7375, 857.9625, 858.2375, 858.4625, 858.7375, 858.9625, 859.2375, 859.4625, 859.7375, 859.9625, 860.2375, 860.4625, 860.7375, 860.9625 MHz

Talkgroups (courtesy Steve Taylor, KD4LCY)
Sheriff's Department
400-0
400-2
400-3
400-4
400-5
400-6
400-12
400-14
300-8
600-4
11504

Transit Buses
10480
10512
10544

8868 County Highway Dept
8816 County wastewater or sewer dept
(see http://members.aol.com/scanbirmingham for more)

Birmingham Fire Department
154.190 MHz (100.0 Hz) – Channel 1
154.130 MHz – Channel 3
154.235 MHz – Channel 4
Fairfield Police Department
155.715 MHz
Homewood Police Department
460.125 MHz (156.7 Hz)
Hoover Police Department
460.350 MHz (127.3 Hz)
Hueytown Police Department
460.025 MHz (123.0 Hz)
Mountain Brook Police Department
155.920 MHz

St. Clair County

Saint Clair County Sheriff's Office
154.040 MHz (186.2 Hz)
Pell City Police Department
159.090 MHz

Talladega County

Talladega County Sheriff's Office
155.010 MHz

Calhoun County

Calhoun County TRS
Motorola ASTRO
855.7125, 856.2625*, 859.2625, 859.7625, 859.9375, 860.2625, 860.7625, 860.9375, 866.0500, 866.0750, 866.3000, 866.5750, 866.8750, 867.1875, 867.6750, 867.7000, 867.7500, 868.1625, 868.6125, 868.8625 MHz
Calhoun County Sheriff's Office
155.670 MHz

Cleburne County

Cleburne County Sheriff's Office
155.535 MHz

Alabama Department of Public Safety
154.920 MHz – Troop B
155.010 MHz – Car-to-Car
155.505 MHz – Bureau of Investigations
158.790 MHz – Troop A

The History and Future of Radio – Part 2

By Dr. John F. Catalano

Last month we saw how radio started its evolution as the quirky, black magic mix of homemade parts. We saw how radio's development was inextricably tied to the development, standardization and commercialization of electronic components, such as the vacuum tube.

It has been a fact of life in the communications industry that it is "technology limited." In other words, most communications users can conceive of new, more flexible and convenient methods of radio communications. But, as we saw last time, until the advent of the vacuum tube amplifier, radio communications remained in the dark ages. Armstrong's superheterodyne radio circuit was only made possible by the commercial and technical development of the vacuum tube industry.

Let's look at an updated version of our radio time line from last time:

RADIO TIMELINE

1876 Bell invents telephone
1883 Edison invents the Edison effect
1886 Hertz produced and detected electric waves
1894 Lodge invents Coherer with 200 mile range
1897 J.J.Thompson discovers electron
1900 Poulsen invents Poulsen Arc
1901 Marconi sends signal from UK-Newfoundland
1903 DeForest invents triode
1906 Catwhisker crystal detector invented
1906 RF Continuous-wave alternator developed
1912 Armstrong invents RF generator
1918 Armstrong invents superheterodyne
1924 RCA superheterodyne hits stores in March
1933 Armstrong invents F.M.
1955 Wadley Loop – Racal RA 17
1956 Germanium transistor commercialized
1976 Personal Computer Market Born
1981 Consumer Synthesized Receiver-Sony IC-2001
> *YOU ARE HERE — At the End of Part 1*
1986 Cellular Phone Becomes International Business
1995 Digital Signal Processing Receiver
2001 First Software Radio Chips
??????????????????

The major effect that the development of the component called the coherer made on radio is clear. I'm sure that in 1901 Marconi would have given us no argument. Then it was the development of the crystal detector that pushed radio. And finally, vacuum tube technology development led the way as radio communications developed, until the last part of the 20th century.

However, even looking at radio's most recent past clearly shows that component and manufacturing technologies have dictated the resulting radio communications products.

Notice that for Part Two of this feature, we have added three items to the time line in 1956, 1976 and 1986. We've added these items in part two because they are the "drivers" of radio technology of today. We believe that they will continue to define radio for the foreseeable future.

As we concluded last time, the advancements in digital electronics, coupled with the almost unbelievable developments in microcircuit technology, led receiver design into the entirely new design concept of digital signal processing (DSP).

But DSP owes its very existence to the Personal Computer industry. Let's go back to around 1950 and see how today's DSP radio technology owes its being to a totally unconnected industry.

The year is 1948 and people at Bell Labs show the world that a cool, small lump of solid material can perform the functions of a hot, bulky vacuum tube. Bell Telephone was looking for a replacement for their much-used mechanical relay. Most people who read the *New York Times* report of that lump, later called the transistor, did not realize its long-lasting significance as an electronic component. Far fewer realized that it was about to introduce true mass production methods to electronic component manufacturing.

But physicists had been predicting the possibility of just such a solid state amplifying device for over thirty years. In fact, the famous 1906 cat's whisker lead/galena detector was later shown to function because of similar junction mechanisms that allowed the 1948 Bell Lab's transistor to function.

By the mid-1950s a number of these transistor researchers established businesses to commercialize the newly developed transistor technology. The going was hard. Due to impurities in the materials, instabilities and inconsistent components resulted. Not exactly the stable, repeatable product that is required for a profitable business!

The work continued nonetheless, though it sometimes felt like black magic as all the talented scientists and engineers struggled to learn about the critical effects of ultra cleanliness and material purity in manufacturing. Additionally, they were still trying to electrically tame the transistor. After a change of material from germanium to the better-behaved silicon, the transistor forces at last began to win battles over the entrenched vacuum-tube empire.

In the late 1960s, after stable manufacturing of single transistors at last became the norm, transistors began to replace tubes in many applications. Transistor companies started to look for ways to expand transistor and associated manufacturing technology to new products. Companies like Texas Instruments proposed fabricating more than just a single transistor: They attempted to fabricate whole functioning circuits.

Here, instead of each transistor being made and packaged as a single device, the idea was to manufacture a number of transistors and resistors on the silicon. Then, using the same micro-sized "wire," connect them all together to form an operating circuit, such as an amplifier. It was called the Integrated Circuit, or IC for short. Thus the concept of today's microchip was born.

As the years went by the IC industry fine-tuned their technology and manufacturing. The result was the ability to cram many smaller devices on the same amount of silicon. This had a two-fold effect. First, more and more complex circuits were becoming possible. But, just as important, was the fact that since the amount of basic material used was relatively constant, and many circuits could be made at once, the costs did not go up directly with circuit complexity. In fact, cost per function went down!

For years this industry – now called the semiconductor industry after the class of material used to fabricate these devices – just kept making standard devices. Major semiconductor IC products until 1980, listed by production volume, included: simple logic gates, operational amplifiers, power amplifiers, clocks, frequency synthesizers, timers and phase lock loops.

Meanwhile, the semiconductor companies kept their researchers working on making smaller, higher device density ICs, while increasing their operational speeds. At the time, it was a technological answer, looking for a question. There was no product need for a large number (millions) of devices on a chip.

The PC – The Semiconductor Industry's Dream

In the mid-1970s home computers such as the Apple and Atari began to hit the market. These computers utilized the first of a new type of IC called the microprocessor. Early microprocessors were developed by expanding and combining digital logic ICs. Although not a trivial matter, the first processors were made by a relative small new company, MOS Technology. Most people who bought these early computers confessed to not having a real need for them and initial quantities were too low to attract the big semiconductor companies. But things were about to change.

When IBM announced the PC, it caught many people in the semiconductor industry by surprise, except for another relatively new company – Intel. Intel had been working away at microprocessor architecture for a number of years and was IBM's choice. The first IBM PC had an 8086 microprocessor, running at less than 10 MHz. But the race was on.

History shows that for almost the next twenty years, a human effort hundreds of times greater than getting a man to the moon was directed at microprocessor development. By the

last decade of the 20th century, processor speeds have become so fast that they approximate real-time calculations. In other words, to the user, complex calculations could be performed with little perceptible delay. In fact, not just calculations, but full emulation of electronic circuit functions were now possible. Could these special processors be used in place of real component-based circuits?

Audio DSP – A Reality

The answer demonstrated first by Texas Instruments and now many other companies including Analog Devices was – Yes! However, since the required speed of the processor is directly related to the frequency of the signal being processed, the first Digital Signal Processing (DSP) chips targeted audio applications where the speeds were limited to the 20 kHz range.

Figure 1 shows a typical block diagram of a receiver using DSP audio applications. Once the analog audio signal is digitized by an Analog to Digital converter (A/D), all audio filtering can be performed by mathematical functions. For example, a low pass filter function can be emulated by the processor if the stop frequency and response curve is defined by a formula and stored in the processor's memory.

By changing the formula, you can instantly convert the DSP to a different type of audio filter, say bandpass. By changing the coefficients of the variables in the formula, parameters of the filter can be adjusted. This is made simple by storing all the various filter parameters in memory. Then it is a simple matter of calling them up by filter name when needed. The result is like having a bank of razor sharp audio filters at your disposal. The only difference is the tiny size and cost of the DSP.

Audio DSPs became commonplace in many military and professional communications equipment. This led directly to a whole generation of PC sound cards based on the same DSP chips. Today, the capabilities of these DSP-based PC sound cards have been greatly expanded. Be assured that if you purchased a PC in the past few years you have been using a digital signal processor without even knowing it.

Another very useful function of DSP chips can be the relative easy way they can be used to decode various forms of digital signals. By plugging in RTTY, SITOR, AMTOR or any other digital mode, these DSP chips become small, inexpensive, flexible decoders. Not bad for an almost free added extra.

Why Not RF DSP?

Not known for their slow thinking, the semiconductor companies launched an all-out attempt to extend the DSP function from the slower audio stages to the faster RF signal stages. In this way the majority of any receiver could be reduced to a DSP chip, or chips. Great benefits in operational flexibility, cost and manufacturing could be realized. Since Armstrong's superheterodyne circuit is still widely used with intermediate frequencies (IF) of 70 MHz, 10 MHz and 455 kHz, these became the initial target speeds for DSP device developers.

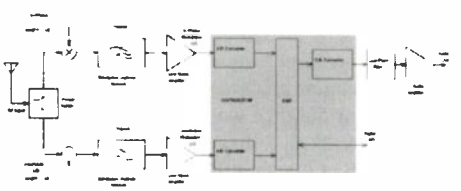


Figure 1 – Block Diagram of Receiver Using DSP In Audio Stages

Figure 2 is a block diagram of a full DSP receiver. The same A/D approach is used as with the audio DSP. However, this A/D converter's performance must be much higher in order to follow the higher frequency rf signal. This DSP now allows the same razor sharp, completely user-definable filtering for the rf stages, as we saw (or heard) in the audio DSP application. The use of DSP in the rf stages allows us to cut out co-channel interference, a major operational need given our over-crowded VHF/UHF radio spectrum. All this at a very low cost!

In addition, due to it being DSP throughout its design, it can accommodate, via software, a multiple of signal types including TDMA, CDMA, GSM and AMPS!

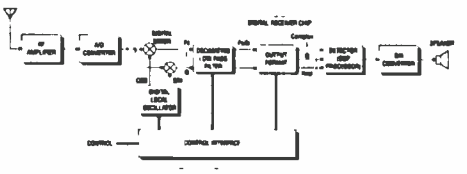


Figure 2 – Block Diagram Full DSP Receiver from www.pentek.com

The first DSP chips used in the RF circuits created enough digital noise to greatly limit their usefulness except in strong signal environments. Since then much work has been done to isolate and reduce digital clock signals from getting in the way of the intended target signals. Also there is an ongoing effort to increase the resolution and speed of the A/D converters.

The Software Radio Chip

With the lure of the ever-expanding cellular phone market, semiconductor manufacturers have set their goal for the 21st Century on a totally software reconfigurable radio. Their logic goes like this: A number of different frequencies, modulation methods and standards are used throughout the cellular phone/pager world. Their goal is to make a chip that can be used for any and all systems by just a software programming effort. This would allow cellular phone companies to make tens of millions of one radio. Then, depending on the country in which it is being sold, the radio can be software programmed to match the standards. No worry about where it is to be used, or even obsolescence.

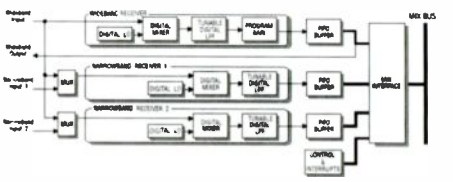


Figure 3 – Universal Soft Radio System Concept – Receiver on top – Transmitter on bottom.

Even wilder possibilities include fabricating "universal soft radio" receivers and transmitters. These then could be used for *any* radio application. See Figure 3. Move over, Captain Kirk! I'm sure that the soft radio concept has brought a smile to many telecom CEOs and CFOs.

But Is It Possible?

Companies and universities have been working on the soft radio concept since the middle 1990s. Figure 4 shows Pentek's 4272 Mutiband Digital Receiver which features: sampling rates to 70 MHz, one wideband and two narrow band receivers, dynamic range of 70 dB and 0.008 Hz tuning resolution. Check the free audio/slide seminar on their website **http://www.pentek.com** for a very good technical treatment of software radio design. Many of the semiconductor companies named at this site for functional block chips are working on a totally integrated software radio solution.

Although not yet fully integrated into a single package, its major functions should be available in a chip set by the end of 2001. A number of companies are hard at work to meet their announced product goal of 4th quarter 2001. Even if they miss by a year, when it does happen, this next technology leap promises to revolutionize radio communications and make products that are only today's dreams, into realities … and probably commodities.

Welcome to the 21st Century and the future of radio.

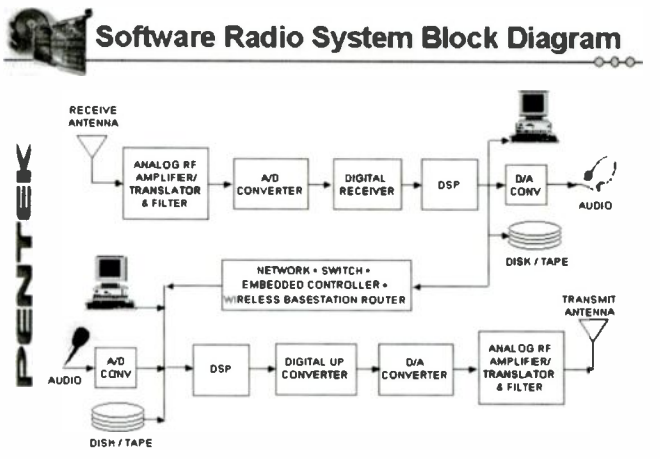


Figure 4 – Pentek's 4272 Multiband Digital Receiver Block Diagram

Some Tough Questions for Bob

Recently I had the opportunity to level some pretty hard questions to our own Bob Grove. Bob, always at the ready with the straight stuff, gives us his unique quarter of a century perspective as a mover and shaker of the radio industry. My questions are labeled JC, John Catalano, & Bob Grove's replies are BG.

JC: Bob, since you started Grove Enterprises over a quarter of a century ago, radio monitoring has changed greatly. As a business professional, can you tell us during these twenty five plus years, what technical advances in receiver design, capability or added features, had the most impact on radio monitoring?

BG: High quality products at lower cost; digital signal processing (DSP); circuit integration which has allowed a multitude of features in a small case and reduced the costs of designing and assembly; wide-spectrum receivers; computer-hosted receivers; computer databases; Internet publishing and informational exchange; spectrum displays for receiving equipment; satellite broadcasting; trunk-tracking scanners.

JC: Can you recall specific radios, over the years, which single-handedly changed the radio paradigm with their introduction?

BG: Barlow-Wadley XCR-30: Introduced frequency synthesis to consumer radios. Sony ICF-2010: Synchronous detection and excellent performance at low cost among portables WiNRADiO WR1000: Introduced full-coverage, computer-hosted radios, with wide-span spectrum display. Drake R8: Became a benchmark for high performance at reasonable cost among communications receivers.

JC: In hindsight, which of these developments/radios had the longest lasting effect on monitoring?

BG: The Barlow-Wadley XCR-30. Crystal stability combined with tuning agility is an unbeatable combination. It's had an impact on virtually every receiver and scanner to follow.

JC: Has there been any technical/product "dead ends" which you have witnessed?

BG: As a relatively small company compared to the volume production of offshore manufacturers, we discovered what many other entrepreneurs have found out: We simply couldn't compete. Our preamps, tuners, speakers, converters, antennas, and other Grove products were moderately successful, but the small numbers that were sold didn't pay for the effort.

Perhaps the most dramatic dead end was the Grove receiver, originally to be sold as the SR-1000, then the SW100. After nearly a half-million-dollar investment and years of development, we actually had a nearly-finished product, but were unable to go into production. We finally closed our manufacturing division.

We will be introducing – or even re-introducing – products in the future, but they will be made at other U.S. locations and private labeled for us.

JC: From a business point of view, how has your operation changed to accommodate the move from a ten tube receiver to a microprocessor-controlled receiver crammed with custom integrated circuits? In your sales approach? In equipment servicing?

BG: Microprocessor control is a two-headed monster. The ability of every imaginable adjustment being made by a teensy chip is amazing, but few bench techies know how to troubleshoot radios that use them. Analyzing a digital-pulse-train algorithm is an imposing task for the newcomer to electronics theory.

But we are in a plug-and-play generation; many consumers don't know a cathode from an emitter, and don't care. They do recognize buzz words like "microprocessor" and "chip," but just so long as their contrivance has them, they're satisfied. Today, marketing is different, but not because of the contents of the product, but because of the impact of the Internet.

The emergence of pushbutton control over rotary knobs has been a revolution, but many of us "old timers" resent it. I recall asking when I first saw an imported, no-knob radio, "Don't the Japanese have thumbs?"

In general, we've seen a move away from component-level servicing, toward modular replacement. This began in the TV industry after vacuum tubes were replaced by transistors. Subcircuits were on replaceable cards, and if there was trouble with the vertical height, instead of making component tests, you simply replaced the entire circuit card. It's easier, but more expensive from a component standpoint. But if the boards are small enough, their replacement cost can be less than the labor required to find a defective component on the board.

JC: We know you have been asked to testify before Congressional committees on various radio topics. Other than frequency restrictions, are there any laws which restrict specific receiver features, performance or demodulation capability for radios sold to the open retail market?

BG: Other than frequencies and services which civilians are forbidden to receive, no one may own, make, sell, buy, or use a descrambler unless it's part of his own system. The key to the law here is whether the encoding system is for the purpose of efficiency or privacy. If it's for privacy, you can't decode it.

JC: Can you share with us the "top ten" receiver feature wants of the 1980's radio monitor? Then, can you give us a top ten list for the 2001 monitor?

BG: In the 1980s the "wants" list was topped by: Wider frequency coverage, more memory channels, faster scanning, smaller size, signal strength meter, and a built-in descrambler capability.

Now in 2001, we find most of our wants are available, at very affordable prices. However, with the crowding of the scanner frequencies to accommodate many new services, a major 2001 request is better intermod rejection. Thinking about it, I'd have to say that just about everything else that the market was asking for, is now here!

JC: If you had to pick one single factor as the most important for defining the future of radio receivers, what would that be?

BG: The big questions in my mind, and in the minds of many communications business professional are:

Concerning Shortwave - whether a large enough segment of the population remains interested in the "investigative" art of DXing, or will capitulate to the instant gratification of commercial entertainment.

Especially for scanning enthusiasts - whether there will be enough unscrambled communications remaining on the air to be of interest.

Bob, thanks for your candor and insightful responses.

The Radio of 2010

No one can say for certain the course that technology will take over the next decade. However, from today's historical vantage point, we have seen that breakthroughs in semiconductor technology have led the way.

Looking at what development is being done in semiconductors, the search for new materials still tops the list. Organically based devices that can be "grown" instead of manufactured, have been under constant development over the past thirty years. To my knowledge, this is still far from a reality.

The desire for smaller and more dense circuits has caused the light-exposed photomasking processing steps to be replaced with shorter wavelength x-rays. This could yield an instant doubling of circuit densities with a factor of ten a possibility. Smaller devices usually go hand-in-hand with faster devices.

During the 1970s and '80s many new transistor device types were developed: PMOS, NMOS, DMOS, VMOS, RMOS, BiPolar, CMOS and more. CMOS, with its low power consumption and circuit flexibility, became the clear winner over a decade, with BiPolar coming in a close second. We are overdue for a new family of devices. The next generation may rely on light coupling instead of conductors to connect elements on the silicon IC, in much the same way that fiber optic bundles have replaced wire cables in our neighborhoods. And, as in fiber optic bundles, the immediate advantage would be even higher circuit speeds.

If these developments happen, clock speeds in excess of 3 GHz may be come commonplace. The result would be DSP radio chips which are completely software-defined and cover the mythical "DC to light" frequency spectrum. OK, not quite light, but how about 10 GHz?!

Again I would like to thank Harve Simmons, radio and electronics historian extraordinaire, and Bob Grove for his insightful and frank discussion.

Ken Reitz, KS4ZR
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The Best Way to Learn Morse Code

Throughout the long history of amateur radio there has been a requirement to learn the International Morse Code, that confounding system of dots and dashes, the brainchild of portrait artist and inventor Samuel Finley Breese Morse. While the past ten years has seen the establishment of a "no-code" entry into the hobby, advancement (and access to the coveted HF voice bands) is earned only by mastery of the code. Luckily that mastery is confined to 5 words per minute (wpm). For those who came to the hobby earlier and have gone on to a more thorough knowledge of CW (as Morse code is known) this speed is agonizingly slow, but, for code beginners it can seem an insurmountable goal.

The strange thing about learning Morse code is that, while experienced teachers might insist there are proper ways to learn this language, the fact is that studying the code is really a personal affair. My own course of learning took in what amounts to a shopping list of every type of CW learning gimmick known. I wondered how others had learned and started asking.

One friend, Cory Koral, K2WV, told me he made "flash cards" with the Morse symbols printed on one side and the corresponding letter on the other and studied them until he had them memorized. It worked, and later he was able to get a job at the Border Patrol as a CW operator. Another ham I know used the ARRL code practice tapes and began listening in his car during his daily commute. Within a few months he progressed from 5 to 20 wpm and passed his Extra Class code exam.

I put the question of learning CW to a number of other veteran hams of note and asked them to share their methods with *MT* readers.

Learning from the Experts

Federal Communications Commission

Riley Hollingsworth, K4ZDH, FCC Special Counsel for Amateur Radio Enforcement: "...I learned 5 letters at a time, and kept the practice sessions short, ten minutes or so...I was 13 and working at a grocery store, so when I'd walk by a large sign or ad in the store, I'd do the letters in my mind in Morse code, numbers as well. Then later an Elmer would send to me a few minutes every morning that summer of 1960..."

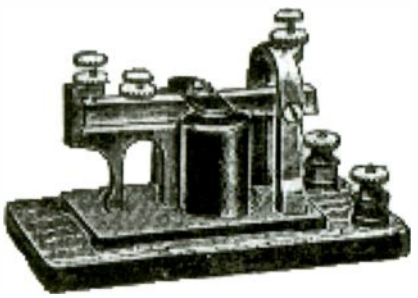
HEIL SOUND

Bob Heil, K9EID, developer of Heil Sound microphones, got his start in the late '50s "...I started out with a high school buddy and we started listening to a 33-1/3 RPM record (I still have it!) with code practice on it. We got up enough speed just sending back and forth across the kitchen table for several months to take our technician class license test. In 1956 you could LIVE the meaning of the license – I went crazy, learning about the technology, how to design and build a transmitter...It became my college education – learning to build, test, experiment, etc..."

Waldo Boyd, Secretary of the Society of Wireless Pioneers, wrote, "...I learned Morse telegraphy as a youngster age 10 to 12 years, 1928-30, ...going down to the local Rock Island depot to practice listening to the clickity-clack of the operator's sounder. Then came CW. Practiced listening on the airwaves with a regenerative detector built from Crosley home radio parts...converted the wire to my neighbor friend's [house] to handle CW and we two practiced that way, with the chart of Continental Morse before each of us. The Navy...sent me to San Diego Navy Radio School after boot camp...went to sea, practiced as destroyer radio op, including 50-wpm newscasts to ships at sea. Achieved receiving at 55 wpm, sending 30-35 with bug, 25 with hand key, but Navy did not allow us to send 'fast'....Currently happy as a bug in his rug at 83 years of age, using the latest technology (digital)....I'm a 100 wpm typist even yet..."

GROVE

Bob Grove, W8JHD, publisher, electronic designer, and shortwave guru enjoyed a similar beginning, "I simply memorized the code from a printed list going 'dit-dah-dit" while sitting on a couch in our home at the age of 13 in 1951. I had borrowed a code-practice oscillator from my "Elmer" (Dave Crossley, W8BCO, now a silent key). The Novice Class license had just been established, and I was so nervous that I had to take the code test three times before I could pass it! At that time we had to go to the local Federal Building (Cleveland, OH) to take the test from an FCC examiner; this one was notorious for setting the code speed too high. At least that's what we all thought!"



Keith LeBaron, W9KGY, Secretary of the Morse Telegraph Club, a national organization promoting the history and use of Morse telegraphy was yet another "kid ham." He tells us, "When I was a kid of nearly 12 years of age I started hanging around a railroad interlocking plant, and telegraphy, with American Morse code, was being used.....When I started high school I took Introduction to Electricity. The teacher...Dick Falley, W9ZKU (now W7WT)...promoted amateur radio in high school.

The first year he was there he got the school board to buy a Collins 32V1[transmitter], Collins 75A1 [receiver] and a 1kW home brew amplifier...I started learning international code at that time...In my sophomore year a bunch of us went to Chicago on the train and took our Class B exams. After holding the Class B ticket for a year I went back into Chicago with another group of classmates and I took my Advanced Class exam...

"Still, CW is my interest although I do not get on the air too much. Right now I am spending a lot of my time demonstrating the Morse Telegraph (with American Morse and a sounder and bug). One of the members of the Morse Telegraph Club developed a system where we could use 300 baud modems to connect between each other via the telephone. Further development by members lead to what we call 'hubs'...We can dial into the hub and get on the 'wire' just like we had it 50 or more years ago. You have to keep your key closed, as you did on regular telegraph circuits, and only open it to send. It is a lot of fun to do that. The oldest guy I talk with on the telegraph hub is 100 years old..."

Harry Dannals, W2HD, past President of ARRL (American Radio Relay League) and QCWA (Quarter Century Wireless Association), found himself in a real jam as a kid. After injuring himself playing with a neighbor, Harry was grounded by his Dad (W2GG).

"My life had ended! What could a lad of ten do when he wasn't allowed to play Tarzan?...Well, I had two new Postal Telegraph sets, the kind that blinked, clicked and buzzed when the simulated telegraph key was depressed. My friend Warren (later W2VKS now a silent key) and I hooked one to the other and put them in two rooms, closed the door and sent Morse code messages. The code was printed on the cover...In two days we had all 26 letters, the ten numbers and assorted punctuation marks in our memories. There is always plenty of room in the brain of a youngster...no bills to worry about..no food expenses...nothing but time (when you can't play Tarzan!). It wasn't long before we were up to ten words per minute and then more...My ability with the code kept improving and I moved beyond 25 wpm in short order...My interest in radio and CW provided me with enough experience so that my days in WWII as a Navy radio operator were quite successful. I use Morse code today and it still a lot of fun..."

Bottom Line

Taking these examples it's easy to develop a formula for learning Morse code: You need to be about 12 years old, have a friend or "Elmer" to do it with and have a burning desire to learn. After that the rest is routine.

But, what if you're not exactly a kid anymore? Can "old dogs" learn CW? Yes! At age 38 I was determined to get my Novice ticket and drafted my 12 year old daughter (the perfect CW age) to join me in becoming hams. First, we listened to the ARRL practice bulletins on League station W1AW (see chart). Then we bought the ARRL code practice tapes and a code practice oscillator. Two grueling months later we got our tickets.

The next year we tried for the General Class 13 wpm (no longer required) and did basically the same thing. But by then the home computer had arrived on the scene and with my Commodore C-64 and Microlog SWL cartridge I used the built-in 5 character random generator to augment the W1AW bulletins, code tapes and practice oscillator. It worked.

Four years later, in1999, I learned that future code requirements would be drastically reduced and that Extra Class would require no code test if you were already a General Class licensee. Driven by a stubborn unwillingness to be known as a "5 wpm Extra" I dusted off the C-64, code tapes, and W1AW schedule. This time around I fortified my efforts with a copy of PC-based Morse Academy and Morse Tutor Gold as well as (gasp!) actual on-air QSOs! Six tedious weeks later I found myself in the now all-too-familiar testing room with the actual 20 wpm exam. It was not my finest moment. Suffice it to say that I did stagger to the finish line with the bare minimum required to pass. It only took 11 years to go from 5 to 20 wpm! My neighbors, a father/son combo, did it in 11 months.

So, if you're a 12 year old, go find yourself an "Elmer" and start studying the code. If you're an older person get one of your kids to learn with you. If you don't have kids, find a friend and get cracking. But, regardless of who you learn with or what study aid you use, if you don't have the determination to see it through, you'll never do it. It's that simple. The best way to learn the code is to begin. And, don't believe any of the old timers who tell you (as the Volunteer Exam Coordinator for my Novice exam told me) that your code score will be printed on your license. It won't be.

Code Practice Chart #1

W1AW Slow code practice bulletins (all times ET):
Mon. 7 PM
Tues. 4 PM, 10 PM
Wed. 9 AM, 7 PM
Thur. 4 PM, 10 PM
Fri. 9 AM, 7 PM
Frequencies (MHz): 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21, 0675, 28.0675
Practice is sent at 5, 7.5, 10, 13 and 15 wpm.
Complete schedule at **http://www.arrl.org**

Code Practice Chart #2

Code Study/Practice Sources
Your Introduction to Morse Code $15 (cassettes or CDS) from ARRL 888-277-5289
Morse Tutor Gold (software for IBM PCS 3.5" diskettes) $30 from ARRL
Gordon West WB6NOA's 6 long play audio cassettes 0-5 wpm $30 W5YI Group, Inc. 800-669-9594
Code Quick "5 wpm in 12 days" 800-782-4869
Codemaster V for IMB PC $30 from Morse Express 800-238-8205 **http://www.MorseX.com**
Learn Code by Hypnosis 800-425-2552
Ameco CW Practice Oscillator (requires key & 9v battery) $20 kit $25 wired from Amateur Electronic Supply 800-558-0411
MFJ Deluxe Morse straight key and practice oscillator $20+$8 shipping from MFJ Enterprises **http://www.mfjenterprises.com** 800-647-1800
Links to on-line Morse code study: **http://www.arrl.org/FandES/ead/learncw**

Ask Bob

Bob Grove, W8JHD
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More on the R390 Audio Transformer

In our August column we discussed the difficulty in finding a suitable speaker to match the 600 ohm output of the popular surplus classic, the Collins R390 receiver. We suggested a make-do approach with inexpensive audio output transformers. But Chuck Rippel, an expert in R390 restoration, has an even better answer.

A custom transformer made with the R390 in mind is available for $18.35 (stock number P-T119DA) from Antique Electronic Supply (phone (480) 820-5411). The 1.8 lb. transformer is a perfect match for the 600 ohm audio output of the radio, and can be used with either 4 or 8 ohm speakers. It is capable of 12 watts of audio, and has a flat 30-20,000 Hz frequency response. Now that's a transformer!

For more information on Chuck's restoration services, visit his web site at **http://www.avslvb.com/R390A/index.html**, and to see some of Chuck's nice restorations, visit **http://www.avslvb.com/R390A/html/shackhamktour.htm**.

Thanks, Chuck.

Whither DCS?

In our September issue, a reader asked what a number of radio abbreviations meant; one was DCS. While this is commonly heard among members of the Defense Communications System, sharp-eyed reader Brain Cathcart suggested it's more likely digital coded squelch since the inquiree was using mostly VHF/UHF references. I agree.

Q. I'm situated between several NOAA weather stations and would like to erect three identical beam antennas so I can home in on SAME alerts of my selection. Any suggestions for homebrew antennas? B. Williams, Peoria, IL)

A. Sounds like an easy task if you're handy with simple tools and have some aluminum around; I'd suggest old TV antennas for elements and insulators. Let's make a three-element Yagi. The elements will all be in a vertical plane, equally separated from one another.

The center of the three is the driven element – the one to which the coax will be connected. It must be insulated from the mast, and the two halves insulated from each other, just like on a TV antenna. Make the two halves 17" each, or a total, tip-to-tip span for both halves of about 34".

The reflector should be about 37-1/2" long, and it can be mounted right against the metal boom, 17" behind the driven element. The forward director, 30" long, can also be mounted right against the boom, 17" ahead of the driven element.

You should get about 6 dBd gain with this home-made antenna, and if it's made durably, it should withstand strong winds and heavy ice for many years. If you wish another dB or two of gain and slightly sharper directivity, mount a second director in front of the first, length and separation the same.

Q. If a car radio is turned on during a lightning storm, does this increase the likelihood of being hit by lightning? (Donald Michael Choleva, Cleveland, OH).

A. No. The small shift in electrical charge which the radio causes is inconsequential when compared to the enormous voltage developed between the earth and clouds. The conductivity, height, and resistance to ground of the vehicle are the determining factors.

Q. I recently felt a shock when I was touching a "hot" wire and my elbow brushed a gas pipe. Was the pulsating feeling due to the AC? What would I have felt if it had been DC? (Mark Burns, Terre Haute, IN)

A. Yes, the "buzzing" sensation was the 60 Hz repetition rate of the alternating current, successively contracting and releasing the muscles; it is also the sensation of the 60 Hz firing the pain receptors of your nervous system. Had this been DC, you would have felt a strong "clamping" sensation. But I wouldn't keep on experimenting if I were you!

Q. According to the signal-strength meter, shortwave reception on my Sony ICF-2010 is strong, but I get a lot of background noise which interferes with the signals. Is this a sign of an ineffective antenna? (Gerald Silver, Tamarac, FL)

A. It certainly is a sign of electrical interference, either from nearby appliances or the power line. If you are using the built-on whip, you need to change the location of your radio; take it outside on battery power and see if the noise goes away. This will let you know if the noise is locally generated.

If you are using an outside antenna, you may not be connecting it with coaxial cable to the radio; this shielding is necessary to avoid – or at least reduce – the unwanted pickup referred to above.

After you determine the source of the noise, it is easier to determine the steps to take to reduce it.

Q. Is Project HAARP in Alaska likely to be jamming signals around the globe? Is there any connection between this project and Area 51 in Nevada? (Donald Michael Choleva, Cleveland, OH)

A. No and no. The transmissions are carefully timed so as not to interfere with busy frequencies, and the powerful beams are directed overhead, not toward the horizon. Any effects on the ionosphere are temporary. And the HAARP project isn't even remotely connected to experimental flight tests at Area 51.

Q. If I accidentally insert AA cells into a radio with the wrong polarity on the contacts, am I likely to cause damage?

A. No. Modern silicon transistors have a reverse breakdown voltage well in excess of what they would experience from such reversed polarity. And if such an occurrence could cause problems, engineers include what they call an "idiot diode," a simple rectifier diode in series with the battery wiring to prevent such accidental misalignment from allowing reverse current to flow.

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

Getting Started

Bright Ideas

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As you read this, it is time to flip the calendar over to November. Then it hits you; the Holiday Season is rapidly approaching. This month I offer more bright ideas, many of which would make some great gifts. (Suggest you highlight your favorites and leave it lying around the house.)

69 Last summer was another bad year for forest fires. I again observed that USFS hand crews were using radio chest packs. This keeps the radio out the way, but still handy for use. Some can even carry two radios. Well, I just had to have one. How can you monitor an airshow or other special event without this accessory? Packs also carry extra batteries, paper and pen, telescoping or rubber duck etc. They cost in the $24-45 range plus shipping. Here is a list of website vendors:
http://www.gear911.com/page1.htm
http://cases-r-us.com/chestpack.asp
http://www.eaglegear.com/acc2.htm
http://www.green-woods.com/
http://www.mittenmountain.com/king_radio.html
http://www.lonepeakpacks.com/radio.html
http://www.emte.com/winter_gear.htm
http://www.qwk.net/~thielsen/cgi-bin/store/commerce.cgi?product=rg

70 LED Flashlights are all the rage these days. The LED (bulb) never breaks or burns out. And they last many more times what you can get from the standard 2AA-battery size. There are also many watch battery versions. These are in a small plastic case about the size of a quarter. I find these helpful for nighttime operations on radios without backlit keys.

Some adventurous folks are retrofitting their radio displays with these newer and brighter LEDs. Bright white LEDs are best for overall use, for nighttime operations consider red. It's the perfect project if you have an old scanner whose backlight has long since died. Check out the PAL lights. Anticipated life on one 9-volt battery is two years. They are ALWAYS on. I point mine at the scanner and it is great for night vision. Here are some websites to explore:
http://www.flashlightavenue.com/illuminator.html
http://www.theledlight.com/flashlightindex.html
http://www.shoplite.com/osp_sapphire.htm
http://www.id-idecs.com/photon/index.html?source=goto
http://store.yahoo.com/karst/flashlights.html
http://www.lightechnology.com/history.htm
http://www.jademountain.com/lightingProducts/solarflash.html
http://www.tek-tite.com/LED_Light/led_light.html
http://www.action-electronics.com/lw2k.htm
http://www.geoduck.com/epicenter/order.cgi?page=led_and_baygen_windup_flashlights.html&cart_id=

Camera accessory bags/pouches work well with micro radios.

71 If you are viewing this in the *MT Express* downloadable version, just click on the URL. If you are not familiar with this form of *Monitoring Times*, check out this website for your FREE copy. **http://www.groveenterprises.com/mtexpress.html**

72 The new *2002 Police Call* directory is a real price saver. I needed two regional books, one for Washington State and another for Idaho. With each I received a nationwide CD version of *Police Call*. I didn't need the duplicate CD, so I gave it to a friend. My generosity cost me nothing and cemented a good friendship.

73 Reader Larry Shaunce WD0AKX offered this tip: "I had an idea many years ago and it has saved me a lot of time and trouble over the years. It is getting a filing cabinet and labeling a folder in it with every letter of the alphabet, A-Z. I file every owner's manual for practically everything I purchase, including non-radio-related items. Along with each owner's manual, I also staple the receipt on the back page. Now, whenever I have a problem with a piece of equipment, or if I decide to sell something I know exactly where the manuals will be, and don't have to search the whole house over!"

Thanks Larry.

74 At Staples Office Supplies, I found a small black case for eyeglasses. It fits my Icom T7A perfectly. While the outside is black Cordova denim, the inside is a hard plastic shell with a cloth liner. It comes with a standard belt loop, and a self-closing snap. I can lay it in the van, and not worry about accidentally sitting on the case, thus damaging the radio. Take along your radio to see if it will fit your radio/scanner. Camera accessory bags are also worthy of a trip to the camera store.

75 Looking for a good bargain on a refurbished Pryme AT-200 VHF transceiver? How is $99? Check this website: **http://www.prymebattery.com/index2.html**. Also check out their belt clip and HT antennas. Bargain hunters should also bookmark Bob's Bargain Bin at **http://www.grove-ent.com/hmpgbbb.html**

Follow-up:

A couple of columns ago I suggested carrying a cheap, one time use camera in your vehicle. If you stumbled into any big emergencies, you could safely stop and shoot a few frames. Well that created an avalanche in my inbox. I had written the idea from my own experiences and frame of mind. I would never respond to the scene based on what I heard on the scanner, nor would I get too close and impede the emergency personnel on scene. Well, I had failed to point out these subtle details, assuming everyone had enough common sense. I heard from several firefighters and EMS professionals who were upset that I had encouraged some brain dead, scanner heads from showing up on scene. I hope not, as that was not my intent.

I also heard from a "stringer" who pointed out that he makes his living as a free lance photojournalist. He wanted me to acknowledge that some people have legitimate reasons for stopping and shooting news photos. For these people, taking pictures is their livelihood. But they are probably the only ones entitled to take close-up photos. If in doubt, just keep driving. I hope this will put all those concerns to bed.

I also received much mail about the disposal or discarding of old batteries. These contain dangerous chemicals that can leach down into the water aquifer. Not good for the environment or our drinking water. Well, it seems that many of you do not have a local repository. Few Radio Shack stores heed the company's advice and accept old batteries. My local clerk said they throw batteries in the same dumpster with everything else.

Well, here is my next bight idea. If there is no local place in your community, call the local Sanitation Department and ask for a mail letter type drive-thru disposal bin. I bet they can scrounge one from somewhere. Here in Spokane, there is a special drive up box for batteries at the North Colbert Transfer Station. Get involved; make that call. And try **http://www.rbrc.org/consumer/**

Robert Wyman
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The Florida Connection and Cleveland Rocks

You're reading this report at the end of October or beginning of November, but I'm rewriting parts of it as Peter Jennings and Ted Koppel and the worldwide ABC News staff are discussing the worst tragedy America has ever experienced...the terrorist attack that is the subject of much of this month's *Monitoring Times*.

Even 36 hours after the incident a surprising series of developments was once again turning the spotlight on South Florida. My friends and associates know of my fascination with the "South Florida Connection," the term I coined for those news stories that start out far removed from our lives down here, but end up in our backyards. Remember headlines concerning refugees, riots, political turmoil, drug wars, spies, immigration cases (Elian), and funky Presidential election ballots? Now we have the dubious distinction of housing and training the terrorists for the last year or so.

Consider this little factoid: the terrorists were engaged in their flight training while the ballot box fiasco was headline news. Flight training was in Vero Beach; the ballot boxes were less than a hundred miles south in West Palm Beach. A very strange juxtaposition, indeed, and an ominous historical note for both Mr. Bush and Mr. Gore.

Beyond these items, the attack has brought something new to our scanners and our skies: Combat Air Patrols or CAP flights. With all civilian air traffic still grounded at this time, and with most of the population staying home to watch developments on TV, the "background noise" of the city has diminished to a level reminiscent of Hurricane Andrew's immediate aftermath. Near silence.

Except for the unusual and constant "whoosh" of high altitude fighters and tankers and AWACS jets. The noise is strange in its consistency. One cannot detect a flight path nor a particular orbit, just a constant presence overhead...and a series of radio calls on the scanner that have a different sound to them. That is, the pilots and radio operators are speaking in a more matter-of-fact manner, using frequencies not logged before in this part of the country. Larry Van Horn and other columnists will be discussing the radio details elsewhere in this issue.

Now we'll return to more traditional *Scanning Report* news and features, but feel free to e-mail me with your stories and observations concerning the attack. Frequency lists can be addressed to me as well, or to the columnists specializing in particular communication subjects (trunking, MilCom, FedCom, aircraft band, HF, etc.).

◆ Maps and Freqs

A website for your "Top 10" list is **http://www.maptech.com**. You can choose a city, zip code, or map coordinates and see a topographic map, an aeronautical chart, a marine chart, and an aerial photograph of the location you've chosen. This is a convenient way to check on frequencies that are published within the aero and marine charts.

◆ Bank Number One

Our ongoing discussion of wireless microphones and low power radios has taken yet another turn. An anonymous Indiana reader saw a courtroom bailiff carrying a handful of "interesting looking devices" down the hall. Upon inspection, these units turned out to be Assistive Listening Devices (ALD) that are used in the courthouse to ensure that legal proceedings are easily understood by those with hearing impairments.

ALDs are covered in the American's with Disabilities Act (ADA) and can be researched further by checking out the websites listed at the end of this column. Generally speaking, though, the ADA requires that government and (some) private assembly areas provide a mechanism that allows participation by those with hearing disabilities.

"Individuals who are deaf or hard of hearing are unable to participate in government-sponsored events or public meetings and unable to benefit from city programs and services when they are not provided with appropriate auxiliary aids and services," according to the U.S. Justice Department, which handles ADA enforcement activities.

The frequencies allocated for ALD use (classified as "auditory assistance devices" by the National Telecommunications and Information Administration -NTIA) are between 72.0-76.0 MHz. Anyone who uses these systems or has further information on operating modes is invited to write in.

Frequencies listed for the ALDs observed in the courthouse were:

72.1, 72.3, 72.5, 72.7, 72.9, 74.7, 75.3, 75.5, 75.7, 75.9

◆ On-Scene Commander

As discussed above, Miami certainly has its share of political dramas. While we lost the Latin Grammy Awards show, we kept The Source Hip-Hop Awards Show, and Jan Fine was there. Jan monitored the following channels near the Jackie Gleason Theater in Miami Beach, Florida. All were used for on-site security and show coordination:

461.5625, 464.5625, 464.9500, 466.2375, 466.8875, 468.7125

◆ Who's Listening?

"Cleveland Rocks" according to Drew Carey's popular TV show. As far as scanning is concerned, Cleveland and the Northern Ohio area "rock" with a great variety of interesting subjects, all of which are monitored by spotlight hobbyist Mike Fink.

Mike runs the **ohioscan.com** website and enjoys sharing his information with hobbyists worldwide. "The more people who are interested in the hobby...the better the hobby gets," according to Mike. "Computer control and the Internet saved scanning," he believes. The convergence of scanning and the Internet revived a dying hobby and motivated equipment manufacturers to continue research, development and production of scanners.

"I'm looking forward to a digital scanner," he continued. But, some systems may still be out of reach. "There's very little FedCom in Cleveland now. Almost everyone has switched to Nextel."

Mike is a regular participant in the MilCom, FedCom, and TrunkCom listservers, as well as several Yahoo Groups dealing with radio communications. AirNav, printed versions of aeronautical charts, and military equipment websites such as *Jane's* are used for additional research. All frequency information gleaned from these sources is saved in a Microsoft Works database.

Current equipment includes a Pro 2006 with OptoElectronics board and ScanStar software, a Uniden BC-780 with TrunkStar software, and an Icom R8500 with Icom's software. Nil-Jon Omni-Wide antennas are used with LMR-400 high quality cable. A 100-ft. wire is used for HF work as well, and Mike hopes to bolster his SatCom receiving capabilities soon.

He regularly monitors Cleveland and Indianapolis Air Route Traffic Control Centers, mili-

tary aviation traffic from bases throughout Ohio, and cross-country aircraft traffic using nearby ranges, Military Operating Areas (MOAs) and aerial refueling routes.

Mike was introduced to scanning by his father, who purchased a Regency unit many years ago to monitor his own company. Mike's dad also had some Sheriff's Office crystals installed, and that was the hook. From that point, Mike purchased a variety of handheld and desktop units, antennas, cables, research books and computers. He's owned the Drake SW-8, Uniden BC-9000, BC-235, BC-245, BC-895, Icom PCR-1000, Yupiteru MVT7100, MVT9000, and Radio Shack Pro 43.

"My first computer was purchased in the early 1980s. It was an 8088 machine, and I used CompuServe, Delphi and Prodigy to find frequency information." Aircraft frequencies, military units and law enforcement channels were of interest.

One memorable experience was attending an international armament convention. "Quite a number of characters there. Young guys in slick clothing looking to purchase the latest weapons, very proper British representatives calmly demonstrating their innovative devices, and U.S. agents roaming the hall looking more like NFL players than police officers!"

What happens during those times when there's just no interesting MilCom or FedCom or local activity? "There's always Mall Security...and never a shortage of shoplifters, parking problems, lost kids and amusing communications."

Look for Mike's extensive frequency list at the end of this column.

◆ On the Keyboard

We're planning to look at some Urban Search and Rescue communications, local trunked systems and more of your mail and information.

Links of Interest from this column:

MapTech: http://www.maptech.com
ADA: http://www.usdoj.gov/crt/ada/adahom1.htm
NTIA: http://www.ntia.doc.gov/osmhome/osmhome.html
Mike Fink's Ohio Website: http://www.ohioscan.com
AirNav: http://www.airnav.com
Jane's military information: http://www.janes.com and http://catalogue.janes.com/index.shtml

Mike Fink's Northern Ohio Frequency List

(more details available on his website)

MILCOM

Ohio Air National Guard, Springfield-Beckley Airport, Ohio
138.275, 138.450, 138.750, 139.625, 139.700, 139.975, 142.125, 143.425, 143.925, 261.100, 269.900, 281.400, 290.275, 290.500, 301.600, 324.700, 327.100, 335.800, 343.900, 351.800, 383.100, 383.300, 399.900

Ohio Air National Guard, Toledo Express Airport, Ohio
138.050, 138.100, 138.425, 139.625, 139.750, 139.975, 141.600, 143.850, 141.875, 307.000, 317.550, 338.900, 343.800, 379.200

Rickenbacker Air National Guard Base, Columbus, Ohio
119.150, 120.200, 121.850, 123.800 ,124.600, 132.300 ,132.700, 132.750 ,139.875, 236.600 ,252.100, 257.800 ,267.900, 273.500 ,275.800, 279.600, 286.200, 311.300

Wright-Patterson AFB, Dayton, Ohio
118.850, 122.850, 126.500, 126.900, 138.025, 138.900 , 139.250, 236.600, 251.025, 291.000, 317.750, 327.100, 349.400, 372.200

Indiana Air National Guard, Baer Field, Fort Wayne, Indiana
138.050, 138.100, 138.300, 139.750, 243.000, 251.100, 255.400, 260.600, 269.450, 284.600, 289.300, 317.800, 318.200, 321.100, 343.000, 348.600, 349.000, 350.350, 362.300, 363.800, 370.850, 383.300, 385.700

Indiana Air National Guard, Hulman Field, Terre Haute, Indiana
138.100, 138.150, 138.250, 138.300, 138.925, 139.725, 139.800, 140.425, 141.725, 148.475, 280.500, 288.150, 392.200

Grissom AFB, Peru, Indiana
120.000, 121.050, 133.700, 139.900, 252.100, 271.800, 275.800, 290.450, 321.000, 324.300, 351.100, 354.200, 363.800, 372.200, 376.100, 379.300

Michigan Air National Guard, Selfridge ANGB, Michigan
138.200, 138.650, 139.850, 142.200, 143.925, 143.950, 148.525, 292.000, 259.950, 275.800, 293.100, 307.800, 314.400, 315.200, 338.800, 340.700, 363.800, 388.200, 391.900, 395.900

Additional Range, Maa, Air-To-Air
138.350, 225.700, 257.000, 259.400, 267.800, 269.325, 301.600, 314.600,316.125

AERIAL REFUELING

AR 217, 218, 219, and 220 all run from the Toledo area east to mid-Pennsylvania.

AR-217
282.700, 283.900, 306.300, 317.400

AR-218
269.300, 282.700, 307.100, 352.600

AR-219
282.700, 288.300, 363.100, 366.300

AR-220
282.700, 307.100, 317.400, 352.600

AR-206H
282.700, 323.000, 348.900, 354.100

AR-206L
235.100, 282.700, 307.800, 323.000

LOCAL GOVERNMENT

Southwest Regional Communications Network
866.2375, 866.6000, 867.0625, 867.5500, 868.0750, 868.3750, 868.7125

Brookpark Police

16	Brookpark Dispatch
48	Brookpark Detectives "Bureau"
80	Brookpark Tac
112	Brookpark Surveillance?
144	Brookpark Supv.
176	Brookpark Aux "Ap"

Brookpark Fire

8208	Brookpark Fd Disp.
8240	Brookpark Fd Fireground
8272	Fire Supervisor

Brookpark Works

16496	Brookpark Works
16560	Brookpark Building Dept.
16592	Brookpark Parks
16646	Brookpark Service Dept.

North Royalton Fire

8496	N.Royalton Fd Ch1 Disp.
8528	N.Royalton Fd Ch2 Fireground

Parma Heights Police

208	Ch1 Parma Heights Pd Disp.
528	Ch2 Parma Heights Aux
432	Ch? Parma Heights Pd Tac
464	Ch3 Parma Heights Pd
496	Parma Heights Senior Cntr.

Parma Heights Fire

8204	Parma Heights Fd Fireground
8304	Parma Heights Fd Disp.
8592	Parma Heights Fd Tac-1 Fireground

Parma Heights Gov

16424	Parma Heights Works
16624	Parma Heights Works
16688	Parma Heights Citywide

Strongsville Police

336	Ch1 Strongsville Pd Disp.
368	Ch2 Strongsville Pd
656	Ch3 Strongsville Pd "Traffic"
688	Ch4 Strongsville Pd "Detectives"
720	Ch5 Strongsville Pd "Tactical"
752	Ch6 Strongsville Pd "Spec Ops"
784	Ch7 Strongsville Pd "Surveillance"
17008	Ch8 Strongsville Pd City Mutual
16432	Systemwide\Regional Mutual Aid

Strongsville Fire

8432	Ch1 Strongsville Fd Disp.
8439	Ch1 Strongsville Fd Page Outs
8528	Strongsville Fd Tac-1
8560	Ch3 Strongsville Fd Tac-2
8592	Strongsville Fd Fireground/Inspectors
8624	Ch2 Strongsville Fd Spec-Ops

Strongsville Gov

16944	Strongsville Service Dept.
16976	Strongsville Building Insp.

Cuyahoga Metropolitan Housing Authority

453.775	Ch1
453.825	Ch 2
453.950	Ch 4
453.975	Ch 3

Cuyahoga County Sheriff's Department

423.050	Ch 1
423.175	Ch 2
423.300	Ch 3

John David Corby, VA3KOT
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Scanning the West Coast

Last month we discussed monitoring Air Traffic Control and navigation systems at Canada's largest airport in Toronto. This month we begin a cross-Canada check-in at the nation's major airports, starting on the west coast in British Columbia (BC). BC is a mountainous province that richly deserves its license plate slogan "Beautiful British Columbia."

The standard VHF marine band frequencies are very active here. Private amphibious tour aircraft taking off and landing alongside these ships, a helipad and the "Seabus" ferry (156.45, 156.60 MHz) to North Vancouver make this a busy spot for the scanner owner.

On a recent visit to Vancouver – BC's largest city – *ScanCan* monitored many of the frequencies listed below for Vancouver and Victoria airports.

Table 1: Vancouver harbour, BC

(Helicopters)	(CBC7)
ATIS	126.8
Tower	118.4, 301.1
Unicom	122.35

Table 2: Vancouver Int'l Airport, BC (YVR)

Air Traffic Control	
Radio	123.15, 126.7
ATIS	124.6, 124.75
CLNC DEL	121.4
Ground	121.7 (south), 127.15 (north), 275.8
Tower	118.7 (south), 119.55 (north), 124.0 (outer), 226.5, 236.6
Terminal	125.2
Arrivals	128.6 (south), 133.1 (north), 352.7
Departures	126.125, 132.3, 363.8

VHF navigation beacons

VOT		114.8
VORTAC	YVR (-.— …- .-.)	115.9
DME/ILS	IVR (.. …- .-.)	109.5
DME/ILS	IFZ (.. ..-. —..)	109.5
DME/ILS	IMK (.. — -.-)	111.1
DME/ILS	IRD (.. .-. -..)	110.55
DME/ILS	ITL (.. - .-..)	110.55

Table 3: Victoria Int'l Airport, BC (YYJ)

Air Traffic Control	
ATIS	118.8
CLNC DEL	126.4
Ground	121.9
Tower	119.7 (inner), 119.1 (outer), 239.6
ATF	119.7
Terminal	127.8, 133.85, 308.4
Military 443 Squadron Stinger Ops	349.3

VHF navigation beacons

VOT		115.7
VOR/DME	YYJ (-.— -.— .—)	113.7
DME/ILS	IKH (.. -.- ….)	108.7
DME/ILS	IYJ (.. -.— .—)	108.7

Victoria (BC's provincial capital) is located on Vancouver Island, at quite a distance from Vancouver (on the mainland). However, *ScanCan* could clearly hear the Victoria VOR/DME beacon from inside my hotel room near the Vancouver airport, using just a handheld scanner and telescoping whip antenna. The signal can probably be heard from nearby Seattle in Washington State as well. Perhaps *MT* readers in northern Washington can confirm that.

Table 4: Aviation Abbreviations

ATIS – Automatic Terminal Information Service
ATF – Aerodrome Traffic Frequency
CLNC DEL – Clearance Delivery
DME – Distance Measuring Equipment
ILS – Instrument Landing System
VORTAC – VHF Omnidirectional Range/Tactical Air Navigation
VOT – VOR Receiver Test Facility

Calgary Emergency Services

In December we will move east into Alberta and take a look at Calgary International Airport. Meanwhile, *Monitoring Times* reader John Atwood kindly sent the following trunking frequency information for the City of Calgary EMS / Fire / Police trunked radio system (Motorola) to *Scanning Canada*. John informs *Scanning Canada* that by monitoring the Central Zone you will hear 95% of the activity.

Table 5: Calgary Emergency Services

(V indicates active with voice.)

Central Zone
868.537500 V, 868.187500, 868.037500 V, 867.687500 V, 867.537500 V, 867.187500 V, 867.037500, 866.687500 V, 866.537500, 866.187500 V, 866.037500 CC

NW Zone
868.612500, 868.112500, 867.612500, 867.112500, 866.612500, 866.762500, 866.262500, 868.262500, 868.237500, 867.737500, 867.237500

NE Zone
866.537500, 866.237500

SW Zone
868.562500, 868.062500, 867.562500, 867.062500, 866.562500, 866.712500, 866.212500, 868.212500

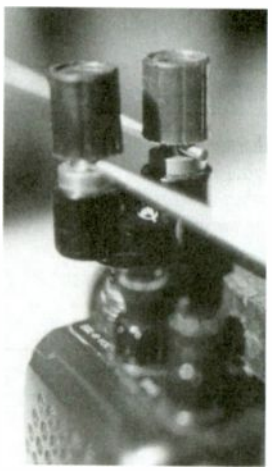
SE Zone
868.637500, 868.137500, 867.787500, 867.637500, 867.287500, 867.137500, 866.787500, 866.287500, 866.137500

Monitoring the Media

Hopping back to *ScanCan*'s home province of Ontario, one of my most interesting hits in recent months has been Toronto radio station CFRB's "Skywatch Traffic" aircraft on 162.33 MHz. Piloted by CFRB reporter Guy Valentine, it broadcasts live traffic reports during the morning and evening rush hours. The broadcast is made live from "air-to-air," so to speak. It is much more interesting to listen to the report on a scanner instead of an AM broadcast band receiver (CFRB can be heard on 1010 kHz). Guy Valentine switches from a slick, professional, radio voice to an informal conversational style as he exchanges information, off-air, with a female assistant back in the studio. Very interesting and well worth listening to.

Another media stop on *ScanCan*'s band search is Toronto area FM station Z103.5. Transmitting from a tower in the hills northwest of Toronto [43 54 39N, 79 56 19W], it can be heard on its assigned frequency of 103.5 MHz in the FM broadcast band. *Scanning Canada* readers may be much more interested to monitor the second and third harmonics with a scanner on 207.0 MHz and 310.5 MHz. The harmonics can be heard within about a kilometer of the tower. This simple trick can be used with many powerful broadcast and VHF/UHF utility transmitters. It is a clever way to identify which of the many towers spread alongside highways and in rural fields, is the source of a signal you are hearing. Of course a frequency counter will do the same job, but why spend the money when you can use your scanner or car radio?

Scanning Canada will use that harmonic trick often in its travels throughout the Great White North. It is useful to know where a signal is coming from in order to help identify it. At other times you may need a directional antenna to separate signals coming from different transmitters, and you'll need to know which direction to point your antenna.



Track down those signal sources with a simple dipole antenna.

ScanCan carries a BNC-to-binding post converter from an old oscilloscope. The BNC end pops onto the scanner antenna connector and a couple of thick wire, quarter-wave elements (cut from surplus car antennas, but coat hanger wire will do just fine) are slipped into the binding posts and hand-tightened (see figure 2). I carry elements cut for the major VHF and UHF bands with me. This setup makes for a very inexpensive and effective dipole antenna for adding a bit of gain to weak signals, and determining a rough direction for signal sources.

Until next month, 73 from north of the border.

GROVE

UNIDEN

BC780XLT	SCN 49	$349.95
BC245XLT	SCN 35	$199.95
BC895XLT	SCN 9	$194.95

ALINCO

DJ-X2T	SCN 3	$269.95
DJ-X10T	SCN 1	$349.95
DJ-X2000T	SCN10	$499.95

AOR

AR8200IIB	SCN 50	$559.95
AR3000AB-DS	SCN 26	$1062.95
AR8600	SCN 8	$899.95

YAESU

VR-500	SCN 6	$324.95

ICOM

R10	SCN 4	$289.95
R2	SCN 5	$169.95
R3	SCN 7	$399.95

Sale ends 12-31-01

ANTENNAS

Austin Condor	ANT 14	$29.95
Grove Scanner Beam	ANT 1	$74.95*
800 MHz Portable w/straight conn.	ANT 22	$29.95
800 MHz Portable w/right-angle conn.	ANT 23	$34.95
OMNI II Scanner	ANT 5	$29.95*
Professional Wideband Discone	ANT 9	$99.95*
2 1/2" Long Close Range	ANT 18	$15.95
Scantenna + 50' coax	ANT 7	$54.95*
Stealth Mobile Monitoring	ANT 30	$34.95
H800 Skymatch Active	ANT 15	$129.95*
Active Duck	ANT 36	$39.95
Select-A-Tenna	ANT 21	$59.95
Super Select-A-Tenna	ANT 40	$189.95
AOR DA3000 Aerial Discone	ANT 11	$129.00
AOR MA500 Wide Range	ANT 12	$99.00
AOR SA7000 super-wide receiving	ANT 39	$199.95
Range Extending Mobile Mag Mount	ANT 3	$24.95
WiNRADiO AX-31B Active UHF Ant.	ANT 4	$119.95
Grove Universal Telescoping Whip	ANT 6	$19.95
Nil-Jon Super-M Superior Mobile Ant.	ANT10	$79.95
Create CLP51301N Log-Periodic Ant.	ANT16	$429.95
Create CLP51302N Log-Periodic An.	ANT17	$299.95

ACCESSORIES

UNIDEN BC SCANNERS		
Computer interface cable for BC895	ACC 15	$29.95
Scanner Master Reaction Tuner	ACC 22	$69.95
BP-180 Uniden battery pack	BAT 5	$19.95
BP120 spare battery & charger	BAT 24	$25.95
BC235/245 hard leather case	CAS 3	$29.95
DC cord	DCC 7	$15.95
Uniden BP1200 Nickel Hydride Batt.	BAT 1	$29.95
Scanner Master Winscan 780 Software	SFT 1	$69.95
ALINCO SCANNERS		
EBP-34N Longlife NiCd battery	BAT 21	$79.95
EBP-37N Standard battery	BAT 21A	$39.95
EDH-16 battery case, 4 "AA"	BAT 22	$9.95
DJ-X10T soft case	CAS 19	$12.95
EDC-36 car lighter cable w/filter	DCC 14	$23.95
AOR SCANNERS		
Extended memory card for AR8200II	ACC 27	$79.00
AR8200II leather case	CAS 21	$24.95
AR8200II soft case	CAS 25	$12.95
Tape recording lead for AR8200II	CBL 7	$61.00
Computer control lead for AR8200II	CBL 8	$109.00
AC adaptor for AR8200II	PWR 24	$21.95
CTCSS squelch & search card	ACC 24	$96.00
Tone eliminator (256 steps) card	ACC 25	$58.00
Chip based recording & playback card	ACC 26	$77.00
BP8600 Ni-Cd Battery Pack	BAT 2	$59.95
MM8600 Mobile Mounting Bracket	BRK 1	$65.00
DC8600 DC Lead	DCC 1	$12.95
AA8600 AC Adapter	PWR 1	$43.00
YAESU SCANNERS		
VR-500 cloning software and cable	SFT 25	$39.95
ICOM SCANNERS		
R3 battery pack	BAT 4	$46.95
R2 soft case	CAS 20	$29.95
R3 leather case	CAS 2	$19.95
R3 Cigarette Adaptor	DCC 18	$24.95
R3 drop-in charger	PWR 15	$69.95
R2 CS-R2 cloning software	SFT 7	$12.50
R3 software for Windows 95/98	SFT 14	$19.95
OPC-478 Computer Interface (PC to radio)	ACC 3	$44.95
MISCELLANEOUS ACCESSORIES		
50' of RG-6U cable	CBL 50	$19.95*
100' of RG-6U cable	CBL 100	$24.95*
Universal Cigarette Adaptor	DCC 3	$12.95
GRE Super Amplifier	PRE 1	$49.95
Scancat Gold for Windows	SFT 2W	$99.95
Scancat Gold for Windows SE Upgrade	SFT 2SE	$59.95
Grove FTR-100 Scanner Filter 90-174MHz	FTR 100	$49.95
PAR VHF Intermod Filter 152MHz	FTR 152DS	$69.95
PAR VHF Intermod Filter 158MHZ	FTR 158DS	$69.95
PAR VHF Intermod Filter 462MHz	FTR 462DS	$69.95
FM Trap Filter 88-108MHz	FTR-FMDS	$69.95
Professional Mobile Speaker	SPK 1	$19.95
Drake MS-8 External Speaker	SPK 2	$48.95

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SITFAA: New Life for an Old Net

SITFAA is a Spanish-language acronym, which we can loosely translate to "Inter-American Air Forces Telecom Network." Its mission is to provide reliable, interoperable, voice and data communication for air forces in the Western Hemisphere, using the long-distance capabilities of high-frequency (HF) shortwave radio.

SITFAA is one of the older US military radio networks. It was established in 1964 by the 18 members of SICOFAA, another Spanish acronym which translates to "System of Cooperation Among the American Air Forces."

SITFAA's member nations include Argentina, Bolivia, Brazil, Canada, Chile, Colombia, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Paraguay, Peru, Venezuela, the United States, and Uruguay. Languages used are English, Spanish, and Portuguese. Because the network is multilingual, its computer and human translation services are sometimes called upon by other Air Force personnel, or even local public safety agencies.

SITFAA's Master Network Control Station (MNCS) is at Andrews Air Force Base (AFB) in Maryland. An alternate net control station is at Davis-Monthan AFB in Arizona. Personnel from these two operations also provide technical assistance to the stations operated by member nations.

While SITFAA is listed as voice and data, it has for many years been pretty much a radioteletype (RTTY) net. There have also been experiments in the use of "packet radio" to create a more Internet-like user interface. The US Air Force has largely gone to satellites for its most important communications, but several of the member nations still consider HF to be an important capability. Thus SITFAA is very much alive and well, and it is evolving as the century changes.

SITFAA meets Scope Command

As we know from previous columns, Scope Command is the US Air Force plan to modernize most of its high-power, HF radios. Everyone knows that the Global High-Frequency System (GHFS) is included in the Scope Command upgrade, and many also know that it includes the "Mystic Star" system used by aircraft carrying the President, Vice-President, and some other important persons.

What isn't as well known is that SITFAA is also currently involved in a Scope Command upgrade. We're hearing some big changes on the air.

Keep in mind, as always, that Scope Command is just what it says it is – an equipment upgrade. Though all the networks being modernized get new control centers at Andrews, they maintain their separate identities and missions. Nothing is going away as a result of Scope Command, and some new things are coming in.

The most audible of these is the global implementation of Automatic Link Establishment (ALE). ALE is an automated system that allows radios to determine the best HF frequencies without human intervention. They do this by exchanging data bursts in a sophisticated, digital mode that uses eight-tone multiple frequency-shift keying (MFSK).

ALE was not in the original Scope Command plans, but it has since become a key feature. Already, it has been used for phone patching and some voice communication by the GHFS stations. Its bloopy-sounding transmissions are now a common sound all over HF.

More recently, in summer of 2001, listeners began finding new ALE frequencies. These were clearly Air Force, but not GHFS. They turned out to be SITFAA. Most commonly seen are the two net control stations, using the ALE identifiers of STFADW for Andrews, and DAVISM for Davis-Monthan.

SITFAA Honduran Activity

Another ALE identifier being heard quite frequently at present is SOTOAB, for Enrique Soto Cano Air Base in Honduras. This base, which also houses the Honduran Air Force Academy, is headquarters of the US military's Joint Task Force Bravo (JTF-B).

JTF-B was established by US Southern Command as a forward military presence during the Central American crises of the 1980s. It continues to stage exercises, medical readiness tests, and contingency operations relating to such things as hurricane relief.

Since the closing of bases in Panama, activity at Soto Cano has picked up. We've seen some support for assets involved in the "War On Drugs." However, the Honduran constitution does not allow a permanent US presence here, and various Pentagon studies have deemed the base of only marginal usefulness.

What's interesting for us, though, is the use of SITFAA. The ALE from Soto, as it contacts the control points, has revealed many new frequencies. Better yet, voice contacts have been heard for the first time in years. One good logging comes from Jack Metcalfe, who found Soto working HD1FAE in voice on 18370.5 kilohertz (kHz). HD1FAE, in Quito, Ecuador, is using one of those amateur-style callsigns common on similar nets in the past.

Jack also saw technical chatter being exchanged within the ALE transmissions. This is a common Air Force practice. It's passed in the Automatic Messages of the Day (AMD) field, a kind of catch-all function which displays messages on the receiving station's ALE controller panel.

Here's the complete list of what we know about SITFAA. Good hunting!

SITFAA

Sistema de Informatica y Telecommunicaciones de las Fuerzas Aereas Americanas

Frequencies (kHz; * = ALE)

4503.5	4764.0*	5743.5	7317.0*	7320.0
7929.0				
7932.0	7935.0*	8059.0	8061.0*	8064.0
8067.0*				
9043.5	11547.0*	13217.0*	13897.0*	13918.0
13921.0*				
14640.0*	14643.0*	14646.0*	14649.0*	15675.0*
18367.5*				
18370.5*	18373.5*	18376.5*	19497.0*	19500.0*
20597.0				
20600.0	20860.0*	23066.5	24860.0*	

ALE Identifiers:

DAVISM	Davis Monthan AFB, AZ (Alternate net control)
HD1FAE	Quito, Ecuador
HOTR	Unknown, might not be SITFAA
JTA	Unknown
SITFAA	Unknown
SOTOAB	Soto Cano AB, Honduras (JTF-B)
STFADW	Andrews AFB, MD (AFA; Primary net control)
STFPR	Probably Puerto Rico but not part of the original

Numeric IDs such as 812257 may be aircraft.

Utility World

Utility Logs

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

Abbreviations used in this column

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
CAMSLANT	Communication Area Master Station, Atlantic
CIA	US Central Intelligence Agency
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Agency
DX	Distant Transmitter
E3	British MI6/SIS "Lincolnshire Poacher," Cyprus
E4	British MI6/SIS "Cherry Ripe," possibly Guam
E5	US CIA "Counting" numbers station
E10	Israeli phonetic numbers station
EAM	Emergency Action Message
FAX	Radio Facsimile
FEC	Forward Error Correction teleprinting system
FEMA	Federal Emergency Management Agency
FSK	Frequency-Shift Keying
JSTARS	Joint Surveillance Target Attack Radar System
LSB	Lower Sideband
M16	8BY, French intelligence, CW numbers
MARS	Military Affiliate Radio System
MFA	Ministry of Foreign Affairs
MXC	Russian single-letter markers in clusters
NAVTEX	Navigational Telex, automated Sitor-B bulletins
Pactor	Packet Teleprinting Over Radio
PR	Puerto Rico
PSK	Phase-Shift Keying
RSA	Republic of South Africa
RTTY	Radio Teletype
SITFAA	Inter-American Air Forces Telecom Net
Sitor-A	Simplex Teleprinting Over Radio, ARQ mode
Sitor-B	Sitor, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
V2a	Cuban "Atencion!" numbers, 3-message format
VOLMET	Flight Weather (loosely from French)
XSL	"Slot Machine," weird Asian noisemaker

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.

1767.0 Unid-loudest frequency for unknown stations with fixed-length digital FSK databursts, also heard other times on 1712, 1717, 1722, 1727, 1732, 1736, 1776, and 1792 kHz. (Jason A. Stroll-Ohio) *I don't have any clue what this is. Anyone else know? -Hugh*

1782.0 LFQ-Orlandet Radio, Norway, with a phone patch at 2153. (Ary Boender-Netherlands)

2582.0 ZBM-Bermuda Harbor Radio, with Marine Information Bulletins, at 0437. (Mid-Atlantic DXer-MD)

3058.0 Unid-Slot Machine Station (XSL), with video-game noises in pulsed PSK idlers, also on 3075, 4231, 4291, 5643, 6417, 6445, 6500, 6693, 6768, 8588, and 8704, not always a full simulcast, and heard at different times of day. (Anonymous-Japan) *This greatly increases our knowledge of this odd, Asian network. Thanks. -Hugh*

3137.0 PLA-US Air Force, Lajes Field, Azores, with ALE sounding, also on 3059, at 0341. (MADX-MD)

3415.0 ART-Israeli phonetic numbers station (E10), AM callup at 2200. (Boender-Netherlands)

3840.0 YHF-Israeli phonetic numbers station (E10), AM callup at 2200. (Boender-Netherlands)

4218.0 OST-Oostende Radio, Belgium, CW identifier in ARQ idlers, at 0306. (Herb Newberry-GA)

5696.0 Coast Guard 20C-US Coast Guard, on a drug interdiction operation with DEA, reporting airborne from Panther (DEA operations, Bahamas), at 0106. (Ron Perron-MD)

5841.0 Panther-DEA operations, Bahamas, working Coast Guard 13C and Coast Guard 61A, on a drug operation, at 0117. (Perron-MD)

6482.0 CLA-Havana Radio, Cuba, with CW markers and frequencies at 0449. (Newberry-GA)

6604.0 New York VOLMET, NY, with flight weather at 0344. (Newberry-GA)

6739.0 Offutt-US Air force, with a 22-character EAM at 0301. (Jeff Haverlah-TX)

6768.0 Cuban Atencion numbers (V2A), AM female voice in progress at 0434. (MADX-MD)

6959.0 British Lincolnshire Poacher numbers (E3), callup 82290, at 2100. (MADX-MD)

7632.0 3524-Unknown US military calling Offutt at 1326. Chalice Foxtrot-US Air Force, calling unknown station at 1622. (Tom Sevart-KS)

7657.0 Atlas-DEA, Cedar Rapids, IA, calling a station at 0042. (MADX-MD)

7684.5 NNN0MDC-US Navy-Marine Corps MARS e-mail system, calling NNN0CLL in slow Pactor-II (100/200) at 2200. (MADX-MD)

7685.5 NNN0MDC, calling various US Coast Guard cutters in slow Pactor-II, at 1207. (MADX-MD)

7710.0 VFF-Canadian Coast Guard, Iqaluit, with a FAX ice chart at 0525. (MADX-MD)

7880.0 DDK3-Hamburg Meteo, Germany, with FAX weather chart, an unlisted schedule, at 0832. (Day Watson-UK)

8010.0 Cuban Atencion numbers (V2a), AM female voice at 0611. (MADX-MD)

8040.0 GFA-Bracknell Meteo, UK, weather FAX at 0508. (Newberry-GA)

8080.0 CIA "Counting Station" (E5), tune-in, group count, and message at 2100. (Boender-Netherlands)

8094.5 FDC-French Air Force Metz, with CW markers at 0408. (Newberry-GA)

8097.0 Cuban Atencion numbers (V2a), AM female voice at 0533. (MADX-MD)

8246.0 November Oscar-US Navy, working Foxtrot and Lima in a Link-11 control net, at 0224. (Sue Wilden-IN)

8496.0 CLA-Havana Radio, Cuba, with CW marker at 0241. (Wilden-IN) CLA20-Havana Radio, with CW marker and frequencies at 0539. (Newberry-GA)

8670.0 IAR8-Rome Radio, Italy, with CW identifier at 0416. (Newberry-GA)

8674.0 CAMSLANT Chesapecke-US Coast Guard, Portsmouth, VA, with voice synthesized weather at 0442. (Newberry-GA)

8764.0 NMO-US Coast Guard, Hawaii, with high seas weather at 1222. (MADX-MD)

8906.0 Santa Maria, confirming the proper spelling of waypoint LADOX with an unknown aircraft, at 0505. (Brent Davenport-CO)

8921.0 Speedbird 208-British Airways, with a patch to Medlink regarding a patient on a flight enroute to London, at 0421. (Sevart-KS)

8971.0 Hunter 01-British Royal Air Force on a joint operation with US in the Caribbean, making radio checks with Blue Star, Roosevelt Roads, PR, at 0037. Hunter 01, working Blue Star again at 0200. (Perron-MD)

8983.0 CAMSLANT-US Coast Guard, VA, working Coast Guard 2109, at 1729. (MADX-MD)

8992.0 Efficient-US military, with a 28-character EAM at 1625. (Haverlah-TX)

9016.0 Billy Boy-US military, probably Nightwatch net, working uncopyable ground station (WAR46?), at 0237. (Haverlah-TX)

9025.0 Unid-Unknown US Air Force aircraft, making a phone patch at 1737. (Sevart-KS)

9062.0 Cuban Cut Number Station (M8), with numbers in progress at 0427. (MADX-MD)

9122.5 WUE6-US Army Corps of Engineers, Hendersonville, TN, calling WUG at 1443. WUG, working WUI6, Ft. Worth, TX, at 1524. (Sevart-KS)

9145.0 Ghostrider Base-Unknown military, working "189" at 2034. (Sevart-KS)

9323.0 Cuban Atencion numbers (V2a), AM female voice in progress at 0417. (MADX-MD)

9440.0 Unid-Weird, encrypted RTTY, sounds like US military only slower than usual, probably from California, possibly explaining last month's FSK Morse station on the same frequency, which then wouldn't be Russian/ex-Soviet at all. Direct simulkey on 5345.8, 7985, and 9085, all at 1700. (Hugh Stegman-CA)

10051.0 New York VOLMET, with flight weather, signed and replaced by Gander VOLMET, Newfoundland, at 0449. (Newberry-GA)
10200.0 Unid-Ukrainian station sending a coded "kriptogramma" in 3rd-shift Cyrillic RTTY (50/250R), at 1923. (Watson-UK)
10204.0 Absorbing-US military, with a 22-character EAM at 1506. (Haverlah-TX)
10225.0 Unid-US military signal-intelligence training, with simulated CW radio traffic at 1750. (Sevart-KS)
10248.0 8BY-French Intelligence (M16), with CW markers, cut abruptly at 0500. (Newberry-GA)
10284.7 RFTJD-French Forces, Libreville, Gabon, with ARQ messages at 1953. (Watson-UK)
10314.0 SNN299-Polish MFA, Warsaw, with FSK Morse markers, at 1433. (Watson-UK)
10355.2 NOJ-US Coast Guard, Kodiak, AK, calling in slow Pactor-II (100/200), no time given. (MADX-MD)
10493.0 WGY908-FEMA Region 8, CO, taking an LSB check-in for the quarterly National Emergency Coordination Net test, at 1407. (MADX-MD)
10520.0 FDG-French Air Force, Bordeaux, with CW marker at 1040. (Watson-UK)
10581.0 S93-Swedish Embassy, Havana, sounding in ALE at 1054. (Watson-UK)
10588.0 FC8FEM-FEMA Region 8, Denver, CO, ALE sounding at 0350. (MADX-MD) FM6-FEMA Region 6, Denton, TX, sounding in ALE at 0847. (Watson-UK)
10780.0 Razor 35-US military JSTARS aircraft, working Cape Radio, Cape Canaveral Air Force Station, FL, at 1516. (Allan Stern-FL)
10991.7 RFFVAY-French Forces, Sarajevo, with 2-channel ARQ markers at 1544. (Watson-UK)
10995.0 TNS-Algerian Embassy, Tunis, calling MAE (Algiers), in ALE at 1245. MAE-Algerian MFA, Algiers, calling TNS, Tunis, at 1252. (Watson-UK)
11023.0 Unid-Ukrainian military, sending encrypted "kriptogrammas" in 3rd-shift Cyrillic RTTY (50/250N), at 1920. (Watson-UK)
11039.0 DDH9-Hamburg Meteo, with RTTY weather at 0616. (MADX-MD)
11086.5 GYA-British Royal Navy, Northwood, with FAX weather chart at 0624. (MADX-MD)
11125.0 HZN-Jeddah Meteo, Saudi Arabia, with RTTY weather at 1635. (Bob Hall-RSA)
11175.0 RAFAIR 7485-British Royal Air Force, Caribbean, patching Roosevelt Roads via Andrews for weather in PR and Hato, Curacao, at 0143. (Perron-MD) Offutt-US Air Force, NE, with a Skyking message at 0436. Reach 922T- US Air Mobility Command transport, with patch to Andrews via Thule Air Base, Greenland, for arrival arrangements and weather, at 0438. (Davenport-CO)
11181.0 Stargate Bravo-US Air Force, calling Stargate Alpha, then working Stargate Charlie, starting at 1525. (Haverlah-TX)
11220.0 PACAF 01-US Pacific Air Force commander, working McClellan Global at 0411 and 0424. (Haverlah-TX)
11226.0 Reach 981-US Air Mobility Command, with a patch to Hilda Meteo at 1218. (Sevart-KS)
11244.0 Andrews-US Air Force, Andrews AFB, with a 27-character EAM, at 0157. (Haverlah-TX)
11253.0 British Royal Air Force VOLMET, with flight weather at 0418. (MADX-MD)
12087.0 NGB3-US National Guard, working NGB37 at 1315. (Sevart-KS)
12375.0 URL-Sevastopol Radio, Ukraine, with CW identifier at 2014. (Newberry-GA)
12600.5 HEC23-Bern Radio, Switzerland, with CW identifier in ARQ idlers, at 0542. (Newberry-GA)
12602.5 IAR-Rome Radio, Italy, with CW identifier in ARQ idlers, at 0544. (Newberry-GA)
12673.5 CLA20-Havana Radio, Cuba, with CW markers and frequencies at 2005. (Newberry-GA)
12771.0 7TF8-Boufarik Radio, Algeria, with CW identifier at 2020. (Newberry-GA)
12789.9 NMG-US Coast Guard, New Orleans, tropical weather FAX at 0614. (Watson-UK)
13155.0 Nakhodka 10-Possibly UAI, Russia, taking phone patches from many Russian ships, at 0620. (MADX-MD)
13264.0 Shannon VOLMET, Ireland, with flight wx at 2044. (Newberry-GA)
13464.0 CRM4-Venezuelan Army, calling CLC44 in ALE, then exchanging data with a serial modem, at 0121. (MADX-MD)
13476.0 Montecano-Venezuelan military, calling CDDA, Ciudad Guayana, in ALE at 2238 and 2305. (MADX-MD)
13570.0 HLL2-Seoul Meteo, typhoon warning FAX at 0805. (Watson-UK)
13882.5 DDK6-Hamburg Meteo, Germany, with global weather chart FAX, an unlisted schedule, at 0844. (Watson-UK)
14350.0 Israeli phonetic numbers station (E10), with English AM female voice in progress, signed "End of message, end of transmission" at 0518. (MADX-MD)
14422.0 NKT-Algerian Embassy, Nouakchott, Mauritania, calling BKO, Bamako, Mali, in ALE at 0909 and 0911. NKT, calling GAO, Garoua, Cameroon, at 1121. 055-Unknown station in different net, sounding in ALE at 0608, 0751, and 1436. This second net also uses ALE on 8972, 10119, 10238, 12297, 13442, 14535, 14731, 14913, 18336, 19043, 19309, 19554, 20107, 20266, 22769, and 23428. (Watson-UK) *Wow! Wonder who it is. -Hugh*
14467.3 DDH8-Hamburg Meteo, with RTTY markers at 0457. (MADX-MD)
14731.7 RFVITT-French Navy, Le Port, with ARQ messages to new routing code RFFPET, the French Forces participating in Kosovo and Macedonia, at 1550. (Hall-RSA)
14867.7 kdadkrfr-Egyptian MFA, Cairo, Arabic ARQ traffic, at 1624. (Hall-RSA)
15016.0 Andrews-US Air Force, with a 136-character EAM at 0230. (Haverlah-TX)
15682.0 SNN299-Polish MFA, Warsaw, with FSK Morse markers, at 0900. (Watson-UK)
15730.0 MOSCRIP-US Naval Mobile Construction Battalion 7, Camp Moscrip, PR, calling BAHAMAS, NMCB7 Andros Island, Bahamas, in ALE at 2356. (MADX-MD)
16035.0 9VF252-Kyodo News, Singapore, with a Japanese newspaper FAX (120/576), poor copy at 0915. (Watson-UK)
16141.7 kwfk-Egyptian Embassy, Accra, Ghana, with Arabic ARQ message to Cairo at 1650. (Hall-RSA)
16161.7 Unid-Egyptian MFA, Cairo, with Arabic ARQ message to Berlin at 1405. (Watson-UK)
16223.7 Unid-Egyptian MFA, Cairo, with Arabic ARQ message at 1604. (Hall-RSA)
16631.7 dlkgmk-Egyptian Embassy, Luanda, Angola, with an ARQ message in Arabic to Cairo at 1520. (Hall-RSA)
16803.0 "Pareng/George"-Unknown station resending Philippine news in English, Sitor-B at 1600. (Hall-RSA)
16814.5 HEC-Bern Radio, Switzerland (Globe Wireless), with command help and traffic list in Sitor-B, then to markers at 1430. (Watson-UK)
16961.5 FUF-French Navy, Martinique, testing in RTTY at 1750. (MADX-MD)
17430.0 9VG235-Kyodo News, Singapore, with a Japanese newspaper FAX (60/576), at 0800. (Watson-UK)
18003.0 Reach 981-US Air Mobility Command, with a patch to "Base Ops" at 1439. (Sevart-KS)
18220.0 JMH5-Tokyo Meteo, with FAX weather charts at 0641. (Watson-UK)
18238.0 ZSJ-South African Navy, Cape Town, with quad FAX weather chartlets, an unlisted schedule, at 0811. (Watson-UK)
18370.5 DAVISM-US Air Force SITFAA Alternate Net Control Station, Davis Monthan AFB, AZ, working HD1FAE, Quito, Ecuador, in ALE at 1823. (Sevart-KS)
18376.5 SOTOAB-US military, SITFAA net, Soto Cano Air Base, Honduras, calling DAVISM in ALE, at 1424. (MADX-MD)
19692.5 ZSC-Globe Wireless, Cape Town, RSA, with bulletins in Sitor-B at 1805. (MADX-MD)
19677.0 PE1-US Federal Bureau of Investigation, calling CE1 (Charlotte) in ALE at 1938. (Sevart-KS)
20633.7 RFVI-French Forces, Le Port, with ARQ messages to Paris, in code and text, at 1530. (MADX-MD)
21866.0 British Cherry Ripe numbers (E4), with tune and 5-figure groups in AM, at 1311. (MADX-MD)
23370.0 HZN-Jeddah Meteo, Saudi Arabia, with RTTY weather at 0920. (Hall-RSA)
23522.9 JMH6-Tokyo Meteo, with FAX weather charts, noisy, at 0647. (Watson-UK)
24370.0 RFGW-French MFA, Paris, with a long FEC message to N2G, at 0940. (Hall-RSA)
25120.0 "15"-Algerian or Moroccan station calling "01" in ALE, at 0857. (Hall-RSA)

Utility World

Digital Digest

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The Digital Signals FAQ

This month we look at an upcoming update of the Digital Signals FAQ, look at recent developments in the amateur digital world, and feature a newly discovered ALE network from Romania.

◆ The Digital Signals FAQ

One of the most useful spin-offs of Internet culture has been the idea of the FAQ (short for Frequently Asked Questions) – a document that usually accompanies some piece of hardware or software and attempts to answer the users' most basic questions about its functions or helps with troubleshooting.

A few years ago, we decided to gather all the publicly available knowledge we could muster about digital signals in one document, which became known as the Digital Signals FAQ. The document has a brief description of the characteristics of most every signal that a listener is likely to encounter on HF:

- synchronous & asynchronous FSK (continuous and block) systems
- PSK systems
- Packet-like and asynchronous data block systems
- FAX-like systems
- SSTV (Slow Scan TV) systems
- ALE and selective calling systems
- Vocoders (Voice encryption) systems
- Ionospheric sounding and other propagation measuring systems

It also collects all the parameters (speed, tone shifts, autocorrelation, likely users, etc.) of each system in a handy reference table. Thanks to Mike Agner's diligent research, the FAQ also provides an overview and feature list of all decoding equipment (software or hardware) that we've come across. The FAQ will remain available for all to use at the WUN (Worldwide Utility News) website: **http://www.wunclub.com/digsigfaq.html**

It's been about two years since we revised the document, but at the time you read this column we hope to have version 6 available. The process of updating the document has really brought home the extent of the migration from FSK to high-speed PSK systems. Although we haven't removed the "legacy" systems from the document (who knows which organization might pick up some cheap surplus gear and appear on HF with it?) many systems are pretty much extinct. Some examples:

- ROU-FEC (Romanian Diplomatic system replaced by MIL-188-110A 2400bd modem)
- SI-ARQ (Austrian Diplomatic system replaced by Echotel 1800bd modem)
- SWED-ARQ (Swedish Diplomatic system replaced by MIL-188-110A 2400bd modem)
- 4+4 (Chinese Diplomatic system replaced by MIL-188-110A 2400bd modem)

As we've mentioned before, this fact makes a lot of the currently available decoders (including the high-end, semi-professional machines) practically useless – that impressive long list of decoding modules now being a testament to obsolescence and by-gone age of "old-fashioned" digital systems.

However, the flip side of FSK's demise is that the PSK section of the document now rivals the FSK section in size with a huge number of systems profiled, including many of previously unidentified PSK signals.

Other updates to the document include links to Leif Dehio's excellent digital signals audio clips library for nearly all the systems featured in the FAQ. Now readers can both read about the system in addition to hearing it, and in many cases, seeing the signal's audio spectrum.

◆ Amateur Experimentation Continues Apace

In updating the FAQ, since we don't discriminate between amateur and commercial systems, it's also apparent that the amateur radio world has paralleled the FSK to PSK shift in its own way. The availability of cheap DSP (digital signal processing) hardware kits, free and easy to use programming software, and the rise of powerful DSP-based PC soundcards has fuelled an explosion in experimental modes on the amateur bands. Since AX.25 Packet Radio, Clover, GTOR and PacTOR have all enjoyed particular success in the commercial world, who knows if this won't also apply to some of these new modes?

There's quite some polarization in the amateur world, though, between narrow bandwidth and wide bandwidth signals. Since spectrum is at a premium for radio amateurs (most HF amateur bands are only a few hundred kHz wide) there has been a struggle to accept wider signals even though there is a genuine recognition that higher speed data transfers won't be possible without wider bandwidth signals.

Here is a quick run-down of three of these new modes...

PSK31: The first narrowband PSK system to gain wide acceptance, PSK31 uses simple PC soundcard-based software and provides a robust keyboard-to-keyboard chat mode at the relatively slow speed of 31.25bd but occupying a incredibly tiny 31.25Hz of spectrum. Tuning around 14070 kHz at any time of day will usually yield many of the slowly warbling signals.

MFSK16: MFSK using 16 tones with a relatively narrow tone spacing of 15.625 Hz to provide a net throughput of around 62.5bd in a total of around 316Hz. Forward error correction (FEC) is by a convolutional encoder. This mode is very similar in concept (and on-air sound) to Coquelet and Piccolo.

MT63: Is another FEC system using 64 tones again spaced at 15.625 Hz.

A number of radio amateurs are also experimenting with STANAG4285-based and MIL-188-110A PSK modems in addition to our old friend MIL-188-141A ALE.

◆ New Romanian Network

Leif Dehio and a few others spotted a new ALE network with stations based in the capitals of the Romanian counties or "judets" (see the map in Figure 1). The network is likely a military or internal security operation as indicated by May 2001 press releases on the Harris Corporation website concerning equipment sales to Romania's Ministry of Defense. The IDs have now been spotted on a number of frequencies as follows:

4110 6770 6945 8005 8010 8015 8190 10375 10640 10645 kHz USB

The identifiers and the corresponding locations are:

ALX	Alexandria
ARA	Arad
BIS	Bistrita
BMA	Baia Mare
BOT	Botosani
BRA	Braila
BSV	Brasov
BU1..4	Bucharest
CON	Constanta
CRA	Craiova
DEV	Devo
DRO	Drabeta-Turnu Severin
GAL	Galati
GIU	Giurgui
PIT	Pitesti
PNM	Piotra Neamt
PLS	Plaiesti
RES	Resita
SLA	Slatina
SLO	Slabozia
SUC	Suceavo
TAR	Targoviste
TIM	Timisoara
TMU	Targu Mures
TUL	Tulcea
VAS	Voslui

The ALE triggers traffic using MIL-188-110A PSK serial tone and 39 tone modems in addition to Harris AVS (Advanced Voice System) voice encryption. Interestingly, a number of the IDs sport suffixes like B1, 2, 3, 4, 5 and 11. The purpose of these is yet unknown.

Until next month enjoy the digital DX.

Resources

"Official" PSK31 Homepage:
http://aintel.bi.ehu.es/psk31.html

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www.angelfire.com/ok/worldofradio

The NASB Agenda

From the newsletter of the National Association of Shortwave Broadcasters, representing many, but not all private US SW stations, its new president Ed Evans writes:

NASB members object to the FCC requirement that license-renewal notices must be broadcast, maintaining that this is useless and unnecessary in the case of international broadcasters. NASB's legal representative, Shaw Pittman, has petitioned the FCC for a blanket waiver.

Frequency hour fees have increased substantially from the original $35 imposed in the early 1990s. Shaw Pittman thinks we may appeal this, though repealing them will be difficult, as they were instituted as an Act of Congress.

World Radio Conference 2003 issues: it has been proposed to add "digital" as a broadcast method and make it the exclusive mode for all new bands. We plan to recommend that the expanded bands be open to *all* accepted modulation techniques. Further, we will propose that the restrictions placed on DSB emissions be removed. We have data showing there is also need for new spectrum, especially below 10 MHz.

NASB Members: Adventist World Radio, Assemblies of Yahweh, Family Stations, Inc., Far East Broadcasting Company, Herald Broadcasting Syndicate, High Adventure Ministries, LeSea Broadcasting Corporation, Radio Miami International, Trans World Radio, World Christian Broadcasting, World Wide Catholic Radio. NASB Associate Members: Antenna Products, Continental Electronics Corporation, George Jacobs and Associates, Harris Corporation, HCJB World Radio, IBB, TCI/Dielectric, Thomcast/Thales.

Web Site: **http://www.shortwave.org** Ed Evans can be reached at (803)-625-5551 or email at evansc@wshb.com (NASB via Dan Elyea, via Wolfgang Büschel, WWDXC)

AFGHANISTAN Immediately following the attack on the US, SWLs became greatly interested in monitoring V. of Shari'ah: 7086.6, presumed at 1600 (Richard Lam, Singapore, Sept 11, *Cumbre DX*) 7087v from 0125 tune in to 0245*, domestic service in Pushtu until 0217 when programme in Dari began. Mostly men talking about the Taliban and Osama bin Laden. Drifted from 7089.7 to 7087.6, good, but from *0242 to 0357* QRM from the Voice of Iraqi Kurdistan on 7090.0 in Arabic. External service: *1530 English, 1545 Arabic, 1600 Turkmen, 1615 Uzbek, 1630 Urdu, 1650-1710* Russian. Drifted from 7087.0 to 7086.8. Much QRM from European hams (Anker Petersen, Denmark, *DX Listening Digest*) Taliban radio is quite easy to hear on 7085-7090v AM. English 1530-1550 (Jem Cullen, Australia, ARDXC) *0058 on 7092v, anthem, Qur'an and talks about Osama bin Laden. During next two hours drifted downwards to 7088, when at *0245 Kurdistan 7090 blocked (Robertas Petraitis, Lithuania, *Clandestine Radio Watch*) So Afghanistan varies mostly below 7090, but sometimes abave, while Kurdistan stays on 7090 (gh)

[non] The US-based opposition Azadi Afghan Radio is very much active at **http://www.afghanradio.com/** (Andy Sennitt, swprograms)

Site of the Afghan resistance: **http://www.afgha.com/index.php** in English and French, with numerous reports and links (Sheldon Harvey, *Radio HF Newsletter*)

ALASKA For the B-01 season from Oct 28 to March 30, KNLS in English: 0800-0900 on 11765; 1300-1400 on 11765, but from Nov 25 to Jan 26 on 9615 instead (KNLS via Thomas Schweder, Germany, A-DX via Wolfgang Büschel)

ANGOLA [non] Rádio Ecclésia [via Germany] on 13810 one Sat at 2010 with political manifestos, while their morning transmission at 0500 [15545] concentrates on Catholic religious matters (Sarmento Fernandes da R. Campos, Rio de Janeiro, *radioescutas*) The evening is at 1900-2000, running later on Sats; frequencies may change for B-00 from Oct 28 in this and many other cases not yet known at presstime (gh) das Ostras in Rio got a QSL for report sent to: Rua Comandante Bula 118, C.P. 3579, Luanda (Rudolf Grimm, *radioescutas*)

ANTARCTICA Newspoper reports say Esperanza and some other Argentine bases will be closed, putting LRA-36 off the air. Then government officials denied the reports; should stay on at least until early next year (Nicolás Èramo, *DX Listening Digest*) Yes, everything is up in the air. One thing is certain: the current contingent will be at Esperanza until mid-January, so we should have the signal on 15476 at least until then. The people at the base know even less than we do about the situation. If Esperanza is closed, LRA36 might be moved to Marambio or another outpost (Gabriel Iván Barrera, Argentina, *Conexión Digital* and *Cumbre DX*) Phone number and E-mail in each ID: 08102220770 and LRA36@infovia.com.ar (Juan Francisco de la Torre Pérez, Argentina, *Conexión Digital*) President de la Rua denied reports that Argentine bases would be closed so that Britain in return would support Buenos Aires as the permanent HQ of the Antarctic Treaty. The Secretary of Defense acknowledged that some realignment was being considered, but not a closure of the Antarctic bases. The British ambassador said there is no bilateral agreement with Argentina concerning the bases (Gabriel Iván Barrera, Argentina, *Conexión Digital*)

BELGIUM RVI's B-00 schedule is somewhat modified, but reception should be better as well-situated relays replace the Wavre site in Belgium itself (Jean-Michel Aubier, **http://perso.wanadoo.fr/jm.aubier**) Frans Vossen said that RVi would continue shortwave broadcasts, adding more relay time while ending all transmissions from Wavre from Oct. 28. The aging transmitters will not be upgraded or repoired (Joe Hanlon, *DX Listening Digest*) Some RVI transmissions were already transferred to Jülich; this and perhaps extended usage of Russia can ensure even better service for Europe (Kai Ludwig, Germany)

BIAFRA [non] The Voice of Biafra International started Sept 1, in Igbo and English towards Nigeria, Saturdays only 1900-2000 on 12120. Behind the broadcasts is The Biafra Foundation, Washington, D.C. More info at **http://www.biafraland.com** (Ludo Maes, TDP) *1900 Sat on 12120 has good and improving signal (Gabriel Iván Barrera, Argentina, Conexión Digital) S9+20 here (Zacharias Liangas, Greece, DX Listening Digest) 35433 (Samuel Cássil, Brazil, radioescutas) 55444 here, tentatively from Russian site (Observer, Bulgaria) That fits with non-reception here, beamed from Russia toward Nigeria, onward to South America, with NAm off the side. Feedback form is at site and e-mail address of biafraland@biafraland.com (gh) Judging from Russian interval signals I heard in the same transmission on 12120 just before and after VOBI at 1859 and 1959, transmitter is probably in Russia or CIS. Biafra anthem at outset is to tune of Sibelius' *Finlandia*! (Mika Palo, Portugal, *hard-core-dx*) E-mail from Oguchi Nkwocha, MD, A Biafran Citizen, oguchi@pocbell.net in response to my e-mail reception report said changing to 12125 (Palo, *CRW*) Excellent here in Wales (Graham Powell, Sept 8, *shortwavelistening* yahoogroup) Listening to Graham's recordings, address announced is 733 15th St NW, Suite 700, Washington, DC 20005, probably a maildrop (gh) Produced by the US-based Biafra Actualization Forum which states its aims as the "peaceful actualization of the Igbo nation as a sovereign independent state". (© BBC Monitoring)

BOLIVIA R Ayopaya, 3343v, verified a Swedish listener by e-mail. Signer is Jorge Aquino, culayo@supernet.com.bo (Henrik Klemetz, Sweden, *Freeze DX Forums*)

BURUNDI R. Burundi reactivated, slightly off-channel, on 6140.2, which may aid in IDing it. This has been erratic for many years, particularly recently. Audio low and highly irregular, so even in Nairobi reception remains unreliable (Chris Greenway, BDXC Communication) No reports yet from elsewhere

CANADA CRTC Public Notice shows licence renewal for CBC's CKCX Sackville, from 1 September 2001 to 31 August 2008. CKCX rebroadcasts the programs of Radio Canada International and CBC North Québec (via Ricky Leong, QU) So now we may officially call RCI Sackville plant CKCX! As RCI never does. Back in the '60s, each frequency had a different callsign, and this was one of them, for 15190 (gh) Sackville uses no fewer than 11 frequencies in the 0100-0200 UT time period, evidently keeping old transmitters going along with new ones (Ricky Leong, QU, *DX Listening Digest*)

CHNX, 6130, per Mark Olson, station engineer, "We are not on the air. The transmitter finally died. We have no replacement and no money in the budget for operating." (Hans Johnson, *Cumbre DX*)

CENTRAL AFRICAN REPUBLIC Per Mike Kuenzli, they are still only on FM, but they hope to receive a shortwave transmitter next year (Hans Johnson, *Cumbre DX*)

CHAD On 6165, at 1826, Radio Tchad, in Arabic(?) ID, strong but distorted; 1833 French during Croatian

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-01=winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

silence (Jari Savolainen, Finland, *hard-core-dx*)

CHINA Xinjiang Renmin Guangbo Diantai (Xinjiang People's Broadcasting Station). Address: 84 Tuanjie Lu, Urumqi, Xinjiang 830044; Tel: +86 (0) 991 2860008; Fax: +86 (0) 991 2866523; Web Site: **http://www.xjbs.com.cn** Mandarin service: 2330-0800 daily 6100; 0800-1100 Su/M/W/F/Sa 5960; 1100-1800 6100; alternatives: 7385, 4500. Kazakh service: 2330-1800 daily on 5440 or alt-4330. Mongolian/Kyrgyz Service all on 5060: 0330-0530 Daily KYRGYZ; 0530-1030 Daily MONGOLIAN (off air Tu.Th.0800-1030); 1030-1230 Daily KYRGYZ; 1130-1800 Daily MONGOLIAN; 2330-0330 Daily MONGOLIAN. Alternative: 4980. Uygur Service: 2300-0800 5800, 0800-1100 9595, 1100-1800 5800. Alternatives: 3990 4735 7195.

"Hunan renmin guangbo diantai" (Hunan People's Broadcasting Station). Address: 27 Yuhua Lu, Changsha, Hunan 410007; Tel: +86 (0) 731 5547202; Fax: +86 (0) 731 5547220; SW portion of schedule, in Mandarin: 2130-1700 on 4990.

Guangxi Foreign Radio Station, 75 Minzu Dadao, Nanning, Guangxi 530022, broadcasts to Vietnam on 5050 and 9820 daily: 2300-0100, 1000-1200, 1400-1600 in Vietnamese; 1200-1400 in Cantonese (© BBC Monitoring)

[non] RCI dropped its longtime frequency 9755 at 0100, which had interference problems, but Sackville then found on 9790 instead relaying CRI in English. And the Cuba relay at same time shifted from 9570 to 9580 avoiding Budapest; audio quality of the two relays could not be more different, and Cuba runs a sesquisecond behind (gh) 9790 is 250 kW beamed 277 degrees; 13680 is 250 kW at 285 degrees (Ricky Leong, QU)

Ying Lian at CRI says they have replaced 13650 via Canada in the mornings with 9790 at 0100 and 13680 at 2300. BTW, Ying Lian (essentially "English Letters") is a collective pseudonym used in all correspondence by the Letters and Correspondence department (who make great tea and have a warehouse of CRI items to give away if you visit), and not a real individual (Daniel Say, BC, *swprograms*)

13680 is very good with RCI-style audio processing, much better than Cuban relay at same time on 5990, a sesquisecond behind, and actually under Brazil (gh, OK)

Another CRI relay, French Guiana at 0400 on 9730, for several nights took CCTV-9 audio feed instead; someone not paying attention? (Daniel Say, BC, *swprograms*)

CONGO DR The UN Department of Peacekeeping Operations is starting its biggest ever radio operation, a network of six radio stations, headquartered in Kinshasa, plus 5 regional stations, both in government- and rebel-held territory, on FM and shortwave. The SW transmitter at Kinshasa HQ will be much more powerful than our previous R. Minurca operation in the Central African Republic, so we expect lots of DX reports. Jointly sponsored with the Swiss NGO Fondation Hirondelle, the station has yet to be named. The regional stations in Goma, Kisangani, Mbondaka, Kananga and Kalemie will relay Kinshasa part of the time, and break for local programming mornings and evenings. FH will be fund-raising mainly with European governments, for equipment; UN will handle the salaries of the staff. Target date: Like to have Kinshasa running by mid-to-late November, then travel to each area in order above, the entire process taking about 20 weeks, so entire operation on the air by Northern spring. I will be mainly behind the scenes, but expect will do the same as previously in Bangui to let off steam, a world music/variety show Saturday evenings. Once SW is up and running, will certainly welcome reception reports and have QSLs printed; E-mail: smithd@un.org (David Smith, as interviewed by Sheldon Harvey and Bill Westenhaver on CKUT *International Radio Report*)

COSTA RICA Debra and Gil visited Taiwan, formalized a collaboration with Central Broadcasting System, which will bring learners to Radio For Peace International for training in peace studies, language and broadcasting. This and other educational collaborations will provide a constant revenue stream for RFPI. It is our intention to have 10-week courses with 12-25 students operating on a regular basis by January 1, 2002 (RFPI)

CUBA RHC adopted new frequencies in Spanish to Europe 2100-2300, 17750 and 15120, the latter barely modulated (gh)

[non] Contrary to last month's report, La Voz de la Fundación continued on WHRI while CANF debated if SW was the only way to reach Cuba; but Ninoska is no longer the host (Jeff White, FL, *Cumbre DX*)

CZECH REPUBLIC R. Prague broadcast a special anniversary program Sept 2. David Vaughan of the English service says it will be on demand indefinitely at the website **http://www.radio.cz** (Kim Elliott, VOA *Communications World*)

ECUADOR 5559.93, HCEA5, Radio Tropicana, Cuenca, 0220. "Canal 13-90" harmonic, 4 x 1389.98 (Björn Malm, Quito, Ecuador, *SW Bulletin*)

ETHIOPIA [non] Voice of Tigrayans from North America via WWCR, 15685, Thu 2100-2130 in Aug and Sept, but introduced as "Radio Tigray, broadcasting in Ethiopian" (gh) Opposition web site **http://www.geocities.com/malula86/** said would broadcast Sats 1700-1800 on 12110 (presumably from a Russian site) (Chris Greenway, Kenya, *World Of Radio*) Half hour program run twice at 1659 and 1729 Sat on 12110; ID *'dimsti Tengaru kab semien America'*, commentaries, Horn of Africa music at the close (Ed Kusalik, Alberta, *Cumbre DX*)

Via DTK Jülich, Germany, Voice of Oromo Liberation in Oromo 1700-1800 Wed, Fri, Sun on 15715, 140 degrees (Ivo and Angell, *Observer*, Bulgaria) Two separate half-hour language blocks now make up the hour (Hans Johnson, *Cumbre DX*)

FINLAND In an attempt to be of service to YLE Radio Finland's listeners abroad, I have made a set of coverage maps (forecasts). The receiver is supposed to be a portable with a whip antenna. Five colours on the maps illustrate reception quality in all target areas, best being red. **http://www.uwasa.fi/~jpe/rfinland/oct01/** Disclaimer: Please note that these do NOT represent the official view of YLE (Jari Perkiömäki, Vaasa, Finland, *Hard-Core-DX*)

GUATEMALA LV de Nahuala heard on 10080, 3 x 3360, at 0330. Also audible at stronger level was 2nd harmonic on 6720. Fundamental strong and somewhat distorted. Central American folk mix and ads (David Hodgson, TN, *harmonics yahoogroup*)

GUINEA Radio Television Guinéenne, PO Box 391, Conakry; Tel: +224 411401/411410/451408; Fax: +224 411410; E-mail: l.conde@caramail.com (director). Schedule: 0555-0800 except Sun 0800-1200; daily 1200-2400 including news in French at 0645, 1945, 2200, on 7125. Frequencies used in past but not currently heard include: 4900 6155 9650 15310, all variable (© BBC Monitoring)

INDONESIA 7171.43, RRI Serui, weak at 0730-0812*, clear ID (Roland Schulze, Philippines, BCDX)

4777.1, RRI Jakarta, 1940 Aug 22, reactivated after a long absence. Fair signal though some audio distortion. Male host taking phone calls (Paul Ormandy, New Zealand, *World Of Radio*) RRI Jakarta Address: Jl. Medan Merdeka Barat No 4-5, Jakarta 10110. E-mail: nastami@yahoo.com Web Site: **http://www.rrionline.com** Programa 3, news, information and politics. 24h on 15125, irregular on 4777. Programa 5, entertainment and education. 24h on 9680. Programas 1, 2, 4 and 6, not on SW (© BBC Monitoring)

Voice of Indonesia, Medan Merdeka Barat 4-5, PO Box 1157, Jakarta, Indonesia. E-mail: nastami@yahoo.com (Information Officer). Web Site: **http://www.rrionline.com** includes English Daily: 0100-0200 AsAm 9525 11785, 0800-0900 AsAu 9525, 2000-2100 EuME 15150 (© BBC Monitoring) The 0100 broadcast to Am, tho in our prime time for ages, is hardly ever audible here due to VOI's lack of understanding of basic SW propagation, frequencies too low (gh)

IRAN [non] A clandestine on new 17520 *1529-1730 with jamming. Very precise operation, clean and stable signal indicating Central or Western Europe site (Olle Alm, Sweden) The next day at 0800 on 17520 Pakistan was mixing with something in Persian interspersed with RFI in French; perfectly confusing. Then at 1530 sign on of V of Iran. The transmitter signed on as usual, obviously under computer control. However, someone was fumbling with the programme switch, so during the first few seconds there was a programme in Romanian, apparently RFI (aired on 11670). Maybe what I heard at 0800 was instead RFI testing for the afternoon transmission before going off. Issoudun, France also seems to match propagation variations, so there's a good chance that we now have the solution to this mystery (Olle Alm, Sweden, *Cumbre DX*)

IRAQ Radio Iraq International in English with Iraqi music and comments about UN sanctions, 1909 on 11787; quality variable between SIO 322 and 311 (Vitor Carneiro, Portugal, *Signal*) Radio Baghdad in Arabic 1600-1900 on new 9887.0 instead of 9687.0 \\ 11787.0, both strong (Observer, Bulgaria)

ISRAEL [non] Shortly following the Sept 11 attack on the US, WRMI began temporary relays of Kol Israel in English, UT M-F 0230-0300 on 7385 (DXLD)

KENYA The filling up of FM has been matched by an emptying of the local SW band. Since arriving back in Nairobi at the end of July I have not heard any shortwave broadcasts from Kenya at all, not even 4885 listed at KBC website. Quite a change from the early 1990s when the KBC used to transmit on four SW frequencies simultaneously (Chris Greenway, BDXC *Communication*)

KUWAIT I listen to the Tagalog language program Radyo Pinay, from 1000 to 1200 on 17885. SIO is 333 from Quezon City. Similar to what I hear on MW stations in Metro Manila, a little slice of home for my compatriots in the Middle East (Paul Santos, Philippines, *DX Listening Digest*)

LIBERIA Radio ELWA is a Christian broadcaster operated by Sudan Interior Ministry (SIM). It resumed broadcasting on shortwave in February 2000. Address: PO Box 192, Monrovia; Tel: +231 888 330745. 0600-1200 and 1730-2200 Daily ENGLISH (Religious programming - no news) on 4760 and FM 94.5 (© BBC Monitoring)

Radio Liberia International is a SW station operated by Liberia Communication Network (LCN) which also runs Kiss FM in Monrovia, believed to support Charles Taylor's National Patriotic Party, in English and vernaculars. Address: PO Box 1103, Monrovia. Tel: +231 226855. Daily 0600-1800 6100; 1800-2400 5100. News, also on Kiss FM, at 0700-0715, 0900-0915, 1900-1930, 2100-2145 (© BBC Monitoring)

The Catholic Church in Liberia has filed a lawsuit against the government for banning its radio station, Radio Veritas, from broadcasting on SW. The case could be an important test of the judicial system. (© Radio Netherlands *Media Network*)

LIBYA V. of Africa, 15435, heard with new language, Hausa at 1423-1448 (Manfred Reiff, Germany, *DX Listening Digest*)

MALAYSIA Observed schedule of external service Voice of Malaysia (Suara Malaysia), includes English 0600-0825, preceded by expanded Voice of Islam at 0300-0600, all on 15295 to Au/NZ, 6175 and 9750 to Indonesia (Alan Davies, Malaysia, *Cumbre DX*)

MÉXICO One unfortunate result of the arrival of the new Fox presidential administration has been a reduction in resources for RMI, making attempts to improve and expand the service very difficult (Ana Cristina del Razo, XERMX, via John Killian via WRMI)

MONGOLIA 4850, Khokh Tengel, 1100-1200 in Mongolian. News from Ulaanbaatar R. until 1108, then original program, American hit pops including Michael Jackson. English name "Blue Sky Radio" mentioned (Oguma, Japan, *Cumbre DX*)

NICARAGUA R. Miskut, 5770 reduced carrier USB, 0000-0156* Spanish ballads, a lot of Sponish talk, abrupt s/off; fair (Brian Alexander, PA, *DX Listening Digest*)

PAKISTAN R. Pakistan: **http://www.radio.gov.pk/** Hear live radio broadcasts, read news bulletins, special reports, etc. from this country thrust into a precarious position between Afghanistan and the rest of the world (Sheldon Harvey, *Radio HF Newsletter*) The scheduled 1100-1105 English newscast on 21465, 17520 may begin almost five minutes early (John Figliozzi, NY, *swprograms*)

PERÚ R. Unión, Lima, nominal 6115, previously on 6315v, came back around 6350v, 0140 ID, lots of drift, both up and down, with warble to carrier. Buried in utility QRM. Fairly good signal strength (David Hodgson, TN, *DX Listening Digest*) also

at 0934-1101 on 6349.8v, poor modulation (Takayuki Inoue N., Japon, *Relámpago DX*)

Radio Imperio, Chiclayo. 8777.90 harmanic, at 1030 from 4388.95 kHz (Björn Malm, Quito, Ecuador, *SW Bulletin*)

PHILIPPINES [non] What is this station, V. of the Lord, heard until 1959* on 15750? (Samuel Cássio, Brazil, *DX Listening Digest*) Closing announcement at 1955 says it's at 1700-2000 from "KAF", shofar@i-manila.com.ph or P O Box 2194-10, Makati Central Post Office, Metro Manila, Philippines. The latest DTK, Germany relay schedule via WWDXC shows this for Voice of Hope, daily from 1 July to 28 Oct: 15750 1700-1959 to zones 39,40 Middle East, 115 degrees (gh) E-mail reply: Hi, Paul. The programs are canned in Manila, and sent to Jerusalem from where it is transmitted Mid-East wide through SW transmitter in Germany. We're on the Hotbird Satellite. Thanks for communicating the feedback. We appreciate it. —Marisa (Maria Luisa Albert, V. of the Lord, via Paul Ormandy, NZ, *DXLD*) And she answered more questions from us: KAF stands for Kol Adonai Foundation. Kal Adonai is Hebrew for Voice of the Lord. KAF is an independent Bible-based, born-again broadcast ministry which airs on High Adventure Ministries' frequency (Marisa Albert, KAF, *DXLD*)

RUSSIA VOR announced three new features, two of them quizzes: *Shall We Go To Russia? Destined By Fate* and *Harmony: Russia And World Culture* (Sergei Sosedkin, *DX Listening Digest*)

R. Sakhalin, 11840-USB, 0200-0300, Russian talk and local pops. According to **http://www.gtrk.ru/** this is for sailors & fishermen in Pacific (Hironao Oguma, Tokyo, *Japan Premium*)

Nagoya DX Circle has a compilation of foreign relays on SW through facilities in the CIS, including a number of clandestines whase sites may be in question: **http://www2.starcat.ne.jp/~ndxc/relay.htm** (gh)

SOMALIA R. Baydhabo was first heard by BBC Monitoring in January 2001. It supports the Rahanwein Resistance Army (RRA), hostile to the transitional government in Mogadishu. It is believed to broadcast from the town of Baydhabo (alternative spelling Baidoa) in southern Somalia, 140 miles northwest of Mogadishu. ID in Rahanwein dialect: *"Radio Baydhabo, odka ururka RRA"* (Radio Baydhabo, Voice of the RRA). Web Site: **http://www.arlaadi.com** Daily 1500-1800 on 6810v, including news in Somali at 1730 (© BBC Monitoring)

SUDAN [non] V. of Hope, via Madagascar, now has a QSL card, designed by my wife Gayle dos Anjos, without compensation for the good of the hobby. Will verify reports with 1 IRC or US$1 sent to Jane Namadi, Radio Voice of Hope, P. O. Box 33829, Kampala, Uganda (Marcelo Toniolo, NY, *Radioescutas*) R. Voice of Hope weekly from 0430 UT Sat, heard on 15320; very nice mbira-like musical interludes among items in English. 0514 full ID, more music, 0519 news about the war in Sudan, more music until ending at 0526 without announcement. Good signal but some flutter (gh, OK)

Voice of Freedom & Renewal, 6985, 0330-0430 and 1500-1600. I sent an e-mail reception report to infosaf@eol.com.er which also has the postal address: The Sudan Alliance Forces, Secretariat of Culture and Information, Asmara, State of Eritrea. Three days later had e-mail reply: You could not imagine how much we were glad to have such a message. Voice of Freedom & Renewal (*Thawt Alhuria Wa Altajdeed*) Voice of the New Sudan (*Thawt Alsudan Aljadeed*) broadcast its programmes against the Islamic Fundamentalist dictator regime in Sudan from 6.30 to 7.30 am and 6.00 to 7.00 pm (SLT), the power of our station is 10 kW, and is located in the liberated area in East Sudan just North of Kassala Town near the Eritrean border. We broadcast mainly in Sudanese Arabic and other Sudanese Local languages, we call for a new secular Sudan based on democracy, equality, and the civil rights of all citizen irrespect of their religion, ideology, culture. From now you are SAF friend!! Regards, SAF SCI (Anker Petersen, Denmork, *Clandestine Radio Watch*)

TAIWAN RTI *Mailbag Time* hosts said that the "government would be interested to know if anyone is listening, or else there may be another budget cut", then giggling, but it's a red flag for me (Bill KA2EMZ Bergadano, *swprograms*)

TAJIKISTAN Radio Tojikistan World Service, Dushanbé very good on 7245 at 1645-1700 in English on their 10th Anniversary of Independence. Broadcast repeated at 0345, they said. Phone number 27 76 67 (Johan Berglund, Sweden, *DX Listening Digest*)

TANZANIA R. Tanzonia is on bath 5050 and 5985 all day, tho 5985 is unreliable. 7280 not heard and appears replaced by 5985 (Chris Greenway, Kenya, BDXC-UK *Communication*)

TIBET [non] Voice of Tibet complains of jamming and gives schedule: 1215-1300 on two simultaneous frequencies: 15670 or 15635 and 21560/21570; and 2315-2400 on 11815/11525 (Oystein Almø, project manager, Voice of Tibet, St. Olavs gate 24, 0166 Oslo, Norway; Email: voti@online.no Website: **http://www.vot.org** Voice For The Voiceless via Martin Schöch, Germany, *DXLD*)

TURKEY VOT had to cancel 9445 because of finoncial problems at TRT, still on 9460 and 11885 (Sedef Somaltin, TRT via George J. Poppin) What a shame, 9445 their best here for Turkish music (gh) 9445 had been to Eu/NAm, 500 kW, 313 degrees at 2100-0655 (Ivo and Angell, *Observer*, Bulgaria) Twice recently I dared to try to listen to VOT on their webcast; once I got nothing but a screwed-up screen as the VOT site somehow knocked it off-center, not easily restored. The next time I got some scratchy audio and the same tampering with my computer! So I must advise everybody to avoid it, back to SW-only (gh)

UKRAINE On 17004.037 kHz USB, R Omega-polis, Sevastopol', with local pops, then ID, at 1238 (Tim Bucknall, UK, *DX Listening Digest*) Another Murmansk-like maritime operation? (gh)

U A E UAE Radio has been renamed, extremely strong on 15395 at 1555-1710, *"Idha'at-ul Imarat min Dubai"* which means "Emirotes Radio from Duboi" or "Radio of the Emirates from Dubai" with English at 1600-1615 features, 1630-1633 news (Manfred Reiff, Germany, *DX Listening Digest*) They continued a long-running Anti-Zionist feature following the attack on US (gh)

UNITED KINGDOM Salama Radia, 15475 at 1900-2000, is becaming part of my regular listening because of all the local music it plays. It comes from across Africa and is just fantastic. I have heard very little religious programming. Nice signal just about every day. They seem to be reaching out to all of Africa, not just Nigeria (Hans Johnsan, WY, *Cumbre DX*)

[nan] From **http://radioezra.members.easyspace.com/** Radio Ezra carries the Water Into Wine Ministry, new series until Dec 30 on 12110, Suns 0900-0930 via Tavrichanka (Vladivostok), Russia with 100 kW at 140 degrees to Australasia (John D. Hill)

U S A Anticipated *World Of Radio* as timeshifted from Oct 28: WBCQ, 7415, UT Wed 0030 and 0515; WWCR: Thu 2130 15685 (Dec-Feb 9475); Fri 1030 9475; Sat 0300 3215; Sun 0330 5070; 0730 3210; Mon 0100 3215; Tue 1200 15685. See our website for latest info.

WFCR? World For Christ Radia: Could this be America's newest shortwave station? The brainchild of Charles Riddle, who says he has no transmitter, no antenna, or construction permit (CP). He does have a plan to purchase a 500 kW transmitter and broadcast Christian programs to Central and South America. He has purchased land for a station in Green Mountain, North Carolina, but is also considering West Virginia or Maine. In spite af the glut of Christian stations in the American SW market, Riddle believes he will be able to sell airtime for Christians wanting to reach Latin America at $90 per half hour. He estimates his statian is two years away. Further details at **http://www.worldforchristradio.com/** (Hans Johnson, *Cumbre DX*) Including a frequency af "17.5 Mega Hz". WFCR calls are already long in use by Massachusetts public radio station, Five College Radia (gh)

WJCR, Upton, Kentucky, has been sold to Rev. Bob Rogers of Evangel Tabernacle, awner and operator of WBNA-TV 21, WJIE-FM 88.5, and WJIE-AM 680 of Louisville (*Cumbre DX*)

According to FCC records, the exact location of Blue Ridge Communications' new SW station (allegedly called WWCV) is about halfway between Manchester and McMinnville TN. Morrison itself is in Warren caunty, but not far southwest of it is the Coffee county line, previously reported location of this: SITE1 6755 Shady Grove Rd Morrison TN 37357 35° 37' 27 N 86° 0' 52 W. The CP is for five transmitters and eight antennas (Glenn Hauser, *World Of Radio*) WWCV will anly broadcast Christian programming, no patriot, no political talk, no controversial matter, 501C3 non profit. We hape to have Arabic, Hebrew, Farsi. Comer reflector antenna to ME and Af has 28 dB gain (Roadranger, rec.radio.shortwave via John Norfolk)

Clandestine, 6900, United Patriot Radio now has a website as announced by Steve Anderson. Includes a very revealing mission statement and email address. **http://www.posse-comitatus.org/unitedpatriotradio/** (Hans Johnson, WY, *Cumbre DX*) i.e. anti-Semitic. BTW, Anderson topped RFPI's list of hate broadcasters. Example from website: *"Death to the satanic seed line and their jew world order!"* (gh) Anderson's illegal broadcast site is closer to Mount Vernon, KY, than Somerset (Dexter Alexander, WA4FSE, really Somerset, *swprograms*) *From America, With Hate* by James Latham, RFPI. In the Fall 2001 issue of Intelligence Report, of the Southern Poverty Law Center. Subtitle: "Powerful, U.S.-based shortwave radio stations are broadcasting extremist propaganda around the world" —**http://www.splcenter.org/intelligenceproject/ip-4s8.html** (Dennis Frado, NY, *DX Listening Digest*)

URUGUAY Current SW stations:

6125	1000-0300	Radio	SODRE Montevideo
6140	1000-1630	Radio	Montecarlo de Montevideo
6155	0100-0300	Radio	Banda Oriental, Sarandí del Yi
9650	1000-0300	Radio	Ciudad de Montevideo

(Victor Castaño, Uruguay, via Johno Wright, ARDXC)

Mrs Nora San Martín, manager af "Banda Oriental", 6155 kHz, says it is a non-commercial SW service of CW155 R Sarandí del Yi intended for listeners abroad and aired daily at 0100-0300 with selections of popular music from Uruguay and the River Plate area (Henrik Klemetz, Sweden, *DX Listening Digest*)

UZBEKISTAN Radio Tashkent added 11905 for English at 2030 and 2130 (Iva and Angell, *Observer*, Bulgaria)

VATICAN A study by an international ponel found no connection between electromagnetic emissions from Vatican Radio transmitters in a town outside Rome and leukemia rates in the area, Italy's health minister said. Residents near the transmitter in Santa Maria di Galeria have said they suspect some local leukemia cases may be linked to the emissions from Vatican Radio. The report from the five-month study, conducted by investigators from Italy, Britain and Germany and released by Health Minister Girolamo Sirchia, found that leukemia rates in and around Sonta Maria di Galeria were no higher than rates in Rome (AP via Mike Cooper)

VENEZUELA Observatorio Cagigal, Caracas, YVTO on 5030 instead of 5000, heavy QRM from University Network, Casta Rica, 5029.06 (Graham Powell, South Wales, *DX Listening Digest*) One evening they were switching back and forth between 5010 and 5030 every few hours. So much for a precision timesignal station (Brian Alexander, PA, *DX Listening Digest*)

VIETNAM [non] From Voice of Khmer Kampuchea-Krom Radio site: **http://radio.khmerkrom.org/index.php** Fridays on 15690 to Kampuchea Krom and South East Asia. From Washington DC and a contact address in New Jersey (Pentti Lintujärvi, Finland, *hard-core-dx*) NDXC schedule of foreign relays via CIS sites (see RUSSIA) shows Alma Ata for this one: AA 1400-1500 (gh)

High Adventure, Palau, has a Vietnamese program at 1330-1430 on 15750, *Chan Troi Moi*, which appears to be as "clandestine" as other Vietnamese broadcasts via religious stations. I don't see much difference between what it is carrying and what Vietnamese-exile programs such as Que Huong and Radio Free Vietnam carry. Address for reception reports is P.O. Box 48 Nishi Yodogawa, Osaka 555-8691, Japan (Hans Johnson, WY, *Cumbre DX*)

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

Global Forum

Broadcast Logs

Gayle Van Horn
gayle@webworkz.com

0000 UTC on 11615
CZECH REP.: Radio Prague. English service. Interval signal to ID and report on accident in Prague. (William McGuire, Cheverly, MD) 0009 on 11615, male/female commentary to contest info. (Harold Frodge, Palmer, AK)

0000 UTC on 15385
SPAIN: Radio Espana. Promotional for *Radio Club* and request for reception reports. Segment on opera. SINPO 252+. (Frodge, AK) *Intermezzo* features the culture of Madrid. (Fraser, MA)

0013 UTC on 6797.5
PERU: Radio Ondas del Rio Mayo. Spanish pop and easy listening tunes to promotional and greetings to listeners. Peruvians logged during 1000 as **Radio Huanta** 4746.6, 1005-1011 in Quecha to Huaynos music; **Radio Sicuani** 4826.3, 1020-1026 included messages to regional listeners to chat about folk festival in Marangane. (Arnaldo Slaen, Buenos Aires, Argentina)

0056 UTC on 4939.5
VENEZUELA: Radio Amazonas. Romantic music to Spanish ID at 0058. SINPO 24432. Two additional Venezuelan's audible as **Radio Tachira** 4830, 0110 with IDs and ads for San Cristobal businesses. **Radio Ecos del Torbes** 4980, 0105 with fair signal quality. (F.Hillton, Charleston, SC)

0100 UTC on 11800
ITALY: RAI. News item on cloning humans and the opposition by Italy. (Bob Fraser, Cohasset, MA)

0100 UTC on 11705
USA: VOA. *News Now* segment with Radio Havana faintly underneath. (Fraser, MA) 0400 on 9530 Germany relay with Middle East news report; 1940 on Morocco relay 15410 with African service. (McGuire, MD)

0155 UTC on 6034.9
COLOMBIA: La Voz del Guaviare. Spanish. Very mine romantic ballads from the '60s era. Advertisements for electric household goods to slogan as, "la voz del Guaviare, radio con participacion." SINPO 43323. (Michael Schnitzer, Hassfurt, Germany) **La Voz del Llano** 0850-0905 on 6114.9. Station promotional with fair reception and fading. (Bob Montgomery, PA/*Cumbre DX*)

0402 UTC on 17675
NEW ZEALAND: Radio New Zealand Int'l. World and national news to extended NZ weather. (Frodge, SD) Audible 0610-0630 on 11725 with *What's Going On* feature on *New Zealand Festival of the Arts*. Station ID at 0630 to Alistair Cooke's *Letter From America*. (Frodge, Prince George, BC Canada)

0451 UTC on 6240.45
PIRATES (EUROPE): Radio Casanova. German pop songs plus John Fagerty's *The Old Man Down the Raad*. Frequent German announcements, many IDs, snail mail address, phone number, greetings. Phone call taken at 0516, noting this was the strongest signal on 48 meters. Some RTTY interference observed. Additional Euro pirate heard as **Classic Rock Radio** 7470USB, 0529-0550; **UK Radio** 6266.55, 0556-0559; **Laser Hot Hits** 6395, 0603-0606. (Dave Valko, PA/*Cumbre DX*)

0530 UTC on 5995.2
PERU: Radio Melodia. Poor-fair signal in the clear with extended conversation with mention of Radio America in Buenos Aires, all over back to back Latin pops. Slight unidentified interference on frequency. (Paul Ormandy, Oamaru, New Zealand/*HCDX*)

0557 UTC on 5965
8RAZIL: Radio Nova Visao. Portuguese. Station relaying **Radio Trans Mundial**, poor-fair signal with station identification. Programming heard past 0700 with mix of religious segments and music. Not usually heard here at this time. Station noted on // 9530, no sign of // 11735. (Ormandy, NZ/*HCDX*) **Radio Pioneira** 0900 on 5015. Station ID to newscast. 8razilian carnival music mixed with talk. Fair signal with moderate fading. (Gary Froemming, AZ/*Cumbre DX*)

0629 UTC on 15794.85
EUROPE-PIRATES: Radio Borderhunter. Very weak signal with music. Signal did not seem to improve by 0704 recheck. **Swinging Radio England** 6276.37, 0633 extremely weak. **Radio Ozone Int'l** 7434.10, 0654 with live rock concert to ID break at 0650. Mention of rain and Mr. Ozone visiting the local watering hole. Decent signal. **Alfa Lima Int'l** 15069.95, *2207-2300. Sudden music up at 2209. Opening identification at 2227. Station ID, address and phone number as well as pirate schedule. Signal not very strong, with 100% copy. (Valko, PA/*Cumbre DX*)

0810 UTC on 15270
ARMENIA: Radio Yerevan. Fair signal through slight flutter, with full English transmission schedule, followed by feature on life in Armenia. (Ormandy, NZ/*HCDX*)

1000 UTC on 4389
PERU: Radio Imperio. Spanish religious format from male host. SINPO 24332. Peru's **Frecuencia Lider** 4421 at 2311; **Rado Norandina** 2320 on 4461.2; **Radio Frecuencia VH** 2325 on 4485; tent.ID on **Radio San Francisco Solano** 1035 on 4749.7. (Slaen, ARG)

1016 UTC on 5952
BOLIVIA: Radio Pio XII. Program, *Un Dios, un Pueblo* in Spanish and Aymara to Andean music. SINPO 43433. (Slaen, ARG)

1115 on 6120
CANADA: Radio Japan relay. *Asia Top News*. (Fraser, MA) Canadian relay 2200 on 6110 with "NHK" identification to national news. (McGuire, MD)

1135 UTC on 9580
AUSTRALIA: Radio Australia. Life Matters segment on child care centers. (Fraser, MA)

1145 UTC on 15220
ASCENSION ISLAND: BBC relay. *Football Extra* chat. (Fraser, MA) 0100 on 5975 report on Israel to ID; 2200 on 11835 to ID and report on Macedonia. (McGuire, MD)

1230 UTC on 4970
INDIA: AIR-Shillong. English service from male host including Indian music. **AIR-Srinigar** 4950, 1135-1340 with subcontinental music under prominent Chinese station. Signal was on the edge of audibility. India's **AIR-Kohima** presumed to be on 4850, 1219-1240 with announcer's regional language to sub continental music. (Don Nelson, Portland, OR/*Cumbre DX*)

1333 UTC on 9155
TURKMENISTAN: Radio Turkmenistan. (Tentative) Regional folk music heard two consecutive days, followed by an ID type format. (Liangas, GRC/*HCDX*)

1543 UTC on 6150
SINGAPORE: Radio Singapore. Pop music from male host including tune, *I Love You More Than I Can Say*, followed by additional pop music tunes. Station abruptly left the air at 1600. Signal fair with very low signal level. Station audible in possibly Malay language, 7235, 1552-1600. (Nelson, OR/*Cumbre DX*)

1615 UTC on 9650
URUGUAY: Emisora Ciudad de Montevideo. Spanish announcements about different music events in Montevideo. Commercials for Restaurante Panamericano and Ferreteria Martin to ID as "en su receptor CX42 Emisora Ciudad de Montevideo, Uruguay, transmitiendo n 1370 kilohertz, la frecuencia que se sintoniza con mayor frecuencia." SINPO 34443. (Slaen, ARG)

2006 UTC on 4845
MAURITANIA: RTM. Very good audio level for Arabic newscast. Signal S9. (Zacharias Liangas, Tetziki, Greece/*HCDX*)

2020 UTC on 21455
ECUADOR: HCJB. Signal S4 without amplifier for religious music. Noted briefly on // 21470. (Liangas, GRC/*HCDX*) 2030 on 17660 *Inspirational Classics-the Late Romantic Period* (1860-1920). (Fraser, MA)

Thanks to our contributors – Have you sent in YOUR logs? Send to Gayle Van Horn, c/o Monitoring Times (or e-mail gayle@webworkz.com)
English broadcast unless otherwise noted.

The QSL Report

Gayle Van Horn
gayle@webworkz.com

The Low Down on QSLing Beacons

Ever tuned down around 190-535 kHz and heard Morse code? If so, you're hearing low-powered beacons, known as *Non Directional Beacons* (NDB). Beacon signals transmit twenty-four hours using Morse code consisting of one, two or three letters or digits. NDBs guide pilots or mariners as they traverse across the globe.

By following the changes of propagation, long-wave DXers can log beacons from hundreds or even thousands of miles away, as signals change hour to hour or night to night. Oftentimes, signals may come in quite loudly, much to the elation of beacon hunters.

Adding to the excitement of the chase is to follow up by QSLing the beacons, seeking verification of their DXing efforts. Most "hunters" seek not only a verification of the beacon, but background information on the transmitting facility.

Many beacon QSLers use a generic form of addressing when sending their reception reports. In the United States, the basic address form is: Airport Manager, Flight Service, Name of Airport, City, State, Zip Code.

If the station is an FAA controlled facility, the generic address may be sent as: FAA Field Office, Name of Airport, City, State, Zip Code.

Reports must include a self-prepared QSL card. Cards may be typed, hand stenciled or designed on your computer. Basic information should include; station identifier, station location, frequency in kilohertz, date/time of reception, verification of reception statement, blank space/location for signature or station stamp and blank space for location transmitting power or antenna type. By including this information in a clear and concise manner, chances are your veri-signer will sign and return your card to you.

Return postage should be included as well as the long-standing tradition of enclosing a postcard souvenir of your area or perhaps a photograph of your listening post. Enclosing a self-addressed envelope is frequently used with success by DXers.

For additional information on beacon DXing, subscription to *The Lowdown* monthly publication, feature articles and more, visit the website of the *Longwave Club of America* **http://www.lwca.org** it's a great place to get the "low down".

GERMANY

Deutsche Welle, 9700 kHz. Full data card unsigned, plus station pennant. Received in 113 days for an English report and two U.S. dollars. Station address: Raderbergguertel 50, D-50968 Cologne, Hermany. (Joe Squashic, Wake Forest, NC)

Radio Netherlands via Wertachal, Germany, 9860 kHz. Full data card unsigned, plus station pennant and stickers. Received in 64 days for an English report and one IRC. Station address: P.O. 222, 1200 JG Hilversum, The Netherlands. (Sam Wright, Biloxi, MS)

ITALY

Radio Speranza, 6231.4 kHz. Verification letter signed by Padre Luigi Cordioli-Director, plus QSL card. Received in two weeks for an English report and one IRC. Station address: Largo San Giorgio 91-41100 Modena, Italy. Noted this is the only Italian catholic radio on shortwave. (Giampiero Bernardini, Milano, Spain/*HCDX*)

LAOS

Lao National Radio, 6130 kHz. Full data letter stamped with station seal, signed by Ms. Malivarn-English Section. Having no luck with my follow-up reports, my letter was hand delivered by a colleague of mine working for Canadian Hunter in northern Laos. Within two weeks I received a beautiful Laotian Red Border Guard neck scarf, a long friendly letter and a request for further correspondence. (Joe Talbot, Red Deer, Alberta, Canada/DXLD) *Joe, no indication of an address, may we assume the following for your initial letter? -ed.* Lao National Radio, B.P. 310, Vientiane, Laos.

MEDIUM WAVE

3LO, 774 kHz AM. Full data ABC map card after one follow up, plus stickers and personal note. Received in three weeks for an AM report and one U.S. dollar. Station address: 774 ABC Melbourne, GPO Box 9994, Melbourne, Victoria 3001. Station received during Greyland WA 2000 DXpedition. (Talbot, CAN/Cumbre DX) Additional address info for DXers - ed. Address: ABC Southbank Centre, Level 2, Melbourne, Victoria 3006. Website: **http://local.abc.net.au/melbourne/radio/default.htm**.

KGFX, 1060 AM kHz. Verification letter signed by Paul Rollie-Program Director. Received in twelve days for a taped report. Station address: 214 W. Pleasant Dr., Pierre, SD 57501. Medium wave QSL 2,763. (Patrick Martin, Seaside, OR)

WMIB, 1660 AM kHz. Full data QSL card signed by Phil Beckman-Operations Manager. Received in 65 days for an AM report and one U.S. dollar. Station address: 601 Elkcam Circle, Marco Island, FL 34145. (Daniele Canonica, Muggio, Switzerland)

RAI Caltanisetta 189 AM kHz. Full data QSL card unsigned. Received for an AM follow up report from 2000. Station address: Via del Parco Mirabellino 9 20052 Monza, Italy. (Canonica, SUI)

MOROCCO

RTV Marocaine, 15345 kHz. Partial data card for Nador transmitter site, unsigned. Received in eight months for an English report, two U.S. dollars and souvenir postcards. Station address: 1 rue al-Brihi, Rabat, Morocco. (Duane Hadley, Bristol, TN)

PERU

Radio La Hora, 4855 kHz. Full data QSL card signed by Carlos Gamarra Moscoso-Director. Mr. Gamarra is a DXer and notes the station is interested in receiving reception reports. Please address your reports to his personal address as; Av. Garcilaso N 411, Wanchaq, Cusco, Peru. He will also confirm reports for Peruvian stations; Radio LTC, Radio La Voz de la Selva and Radio Sicuani. (Canonica, SUI)

PIRATE (EUROPE)

Spaceman Radio, 6290 kHz. QSL card, info sheet, and *Greetings From Holland* sticker. Received in 20 days for a pirate report. Station maildrop: P.O. Box 73, NL 7160 AB Neede, The Netheralands. Email: **komopdeband@hotmail.com** (Bernardini, Italy/*HCDX*)

SLOVAKIA

Radio Slovakia Int'l, 5930 kHz. No data QSL plus letter signed by Oxana Ferjencikova, plus station pennant and sticker. Received in 78 days for an English report and two dollars. Station address: Mytna 1, P.O. Box 55, 81755 Bratislava 15, Slovakia. (Squashic, NC)

UTILITY

KPH Bolinas, CA, 8642 kHz CW. Partial data *RCA Marine Radiogram*, signed as, "the gang of KPH". Received in 34 days for a utility report and a SASE. Verification for special event broadcast of San Francisco Radio, to commemorate old RCA ship-to-shore radio stations. QSL address: T. Horsfall, 1862 Tulare Ave., Richmond, CA 94805. (Bill Flynn, OR/ODXA)

John Figliozzi
jfiglio1@nycap.rr.com

Programs on DXing, SWLing and the Media

It's time for our semi-annual review of media-related programs on shortwave. Since the last time we did this in May, **Radio Sweden** has ceased its broadcasts of ***MediaScan*** (though, like **Radio Netherlands'** ***Media Network***, it continues on the Internet in print form). This particular wave of change swept away the oldest continuously broadcast media program on radio. ***MediaScan*** began in 1948 as *Sweden Calling DXers*. A brief history of the program and its founder, Arne Skoog, can be read at the **Radio Sweden** Internet site **http://www.sr.se/rs/red/ind_eng.html**. The ***MediaScan*** newsletter also continues at this site and you can arrange there to receive it automatically every two weeks via e-mail.

A lesser-known program, ***Special Program for Radio Amateurs***, has apparently been dropped by **Radio Romania International**. I have to confess that I was not a regular listener to this program, but it no longer appears in the station's published schedule and I presume it is no longer broadcast.

There are many radio programs that remain and each has a somewhat different focus. ***Communications World*** casts the widest net, chronicling everything from shortwave to satellite to the Internet. ***World of Radio*** gives a comprehensive activities report on the HF broadcast bands, including frequencies, personalities, station and program information. ***DX Partyline*** attempts to serve both new and seasoned DXers and SWLers by providing a place for the clubs to impart information about their events and projects, and by reading reports from listeners around the world about what is being heard on the bands in their respective regions. ***DXers Unlimited*** tends toward light technical topics. ***DXing with Cumbre***, whenever possible, likes to emphasize new DX catches. ***The Media Report*** is unique for looking at the motivations behind the mass media and those who seek to influence it, both at home (in Australia) and abroad. A few, such as ***Ask WWCR*** and ***Feedback***, concentrate solely or primarily on information about their own respective stations. The rest, more or less, look at the hobby or at media from the point of view of those who are a part of it in their respective home countries.

For most stations refer to the *Shortwave Guide* pages for frequency information. (Some listings have frequency information to clarify which of the station's multiple services is carrying the program.) The one letter day abbreviations track that used in MT's *Shortwave Guide* section. Times are approximate and both times and frequencies are subject to change.

Special thanks to Ivan Grishin, Glenn Hauser, Marie Lamb and John Norfolk whose valuable work has been included in this month's column. If you have information that can add to this listing or correct an inaccuracy, please consider yourself obligated to step up and provide it.

Until December, good listening!

ASK WWCR:
On ***WWCR*** - **F** 2100 (15685); **A** 0945 (5070), 1415 (15685), 2145 (12160); **S** 0245 (5070), 1115 (9475), 1945 (12160); **M** 0545 (5070); **T** 0600 (5070), 1045 (7435).

CIDX REPORT:
On ***R. Canada Int.*** - **S** 0407, 0507, 1707, 2007; **M** 0107 (fortnightly within *The Mailbag* program). [**Note**: ***RCI*** is making major changes to its feature program line-up, but at last report the *CIDX Report* was to continue as part of the reconstituted letters program.]

COMMUNICATIONS WORLD:
On ***VOA News Now*** - **A** 0133, 0533, 0933, 1333, 1733, 2133.
On ***VOA*** (special ssb broadcasts) - **A** 0700 (6873ssb or 10869ssb); **S** 1400 (18275ssb).
On ***WWCR Tennessee*** - **S** 0300 (5070); **M** 0630 (3210); **W** 1030 (7435), **H** 1330 (15685).
On ***WBCQ Maine*** - **S** 2200 (7415).

CONTINENT OF MEDIA:
On ***R. for Peace Intl.*** - **F** 1900; **A** 0100, 0700, 1300, 1730, 2330; **S** 0530; **T** 2000; **W** 0200, 0800, 1400. (Note: Although heard weekly, program is updated monthly.)

DX BLOCKBUSTER:
On ***R. Budapest*** - **A** 2005, 2235; **S** 0205, 0335.

DX CORNER:
On ***Voice of Turkey***, fortnightly - **F** 2140; **A** 2310; **S** 0410.

DXERS' CORNER:
On ***All India Radio***, fortnightly - **M** 1840, 2130; **T** 2340

DX MAILBAG:
On ***R. Romania Intl.*** - **A** 1345, 2345; **S** 0245, 0445.

DX PARTYLINE:
On ***HCJB Ecuador*** - **F** 2310; **A** 0610, 0910, 1910; **S** 0110, 0410

DXERS SPECIAL:
On ***RAE Argentina*** - **W** 1945; **H** 0345

DXERS UNLIMITED:
On ***R. Habana Cuba*** (in two weekly editions) -
First edition - **A** 2105; **S** 0140, 0340, 0540.
Second edition - **T** 2105, 2305; **W** 0140, 0340, 0540.

DXING WITH CUMBRE:
On ***WHRI Indiana*** - **A** 0600 (5745 & 7315), 0830 (5745 & 7315), 1230 (9495), 1330 (6040), 1900 (13760), 2330 (9495); **S** 0400 (5745), 0530 (5745), 0730 (5745), 1530 (6040), 1600 (15105).
On ***KWHR Hawaii*** - **A** 0600 (17780), 1000 (11565), 1430 (11565); **S** 1300 (11565), 1600 (9930), 2230 (17510)
On ***WHRA Maine*** - **F** 2100 (17650); **A** 2130 (17650); **S** 0830 on 7435.

FEEDBACK:
On ***R. Australia*** - **F** 2105; **A** 0005, 0605; **S** 0305.

HAM RADIO TODAY:
On ***HCJB Ecuador*** - **T** 2330; **W** 0630, 0930, 1930; **H** 0130, 0430; **A** 2000; **S** 0200, 0500.

MAILBOX:
On ***R. New Zealand Intl.*** (fortnightly) - **M** 2135; **W** 1735; **H** 0305; **F** 1930

MEDIA REPORT:
On ***R. Australia*** - **H** 0130, 1030, 1530, 2330.

MULTIWAVE FEEDBACK:
On ***R. Korea Intl.*** - **S** 0835, 1135, 1305, 1635, 2035, 2205, 2235; **M** 0235.

RADIO BULGARIA CALLING:
On ***R. Bulgaria*** - **F** 2045; **A** 0045, 1245, 2245; **S** 0345.

RADIO WAVES:
On ***R. Exterior de Espana*** - **A** 2140; **S** 0040, 0140, 0540; **M** 2035.

RADIO WORLD:
On ***R. Vlaanderen Intl.*** - **S** 0700, 1030, 1130, 1730, 2235; **M** 0400.

SPECTRUM:
On ***WWCR Tennessee*** - **S** 0400 (5070); **M** 0800 (3210).

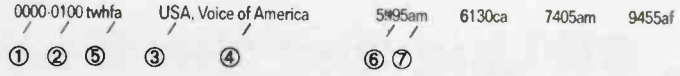
THE REAL AMATEUR RADIO SHOW:
On ***WBCQ Maine*** - **S** 0000 (7415).

VIVA MIAMI:
On ***WRMI Florida*** - **S** 0900 (9955), 1215 (15725), 1300 (15725), 1400 (15725), 1530 (15725), 2200 (15725); **W** 0230 (7385).

WAVESCAN:
On ***Adventist World R., Austria*** - **S** 0330, 0830, 1530, 2100
On ***Adventist World R. Italy*** - **S** 0830, 1230
On ***KSDA Guam*** - **S** 1000, 1300, 1330, 1430, 1600, 1730, 2130
On ***WRMI Florida*** - **S** 0900 (9955), 1230 (9955), 1500 (9955); **M** 0230 (7385).

WORLD OF RADIO:
On ***WBCQ Maine*** - **H** 0030 (7415), 0515 (7415).
On ***WWCR Tennessee*** - **H** 2130 (9475); **F** 1030 (9475); **A** 0300 (3215); **S** 0330 (5070), 0730 (3210); **M** 0100 (3215), 0600 (3210); **T** 1200 (15685).
On ***R. for Peace Intl.*** - **F** 1930; **A** 0130, 0730, 1330, 1800; **S** 0000, 0600, 1200; **T** 1900; **W** 0100, 0700, 1300.

How to Use the Shortwave Guide



Convert your time to UTC.

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

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

Find the station you want to hear.

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

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

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

In the same column 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.

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Program Highlights

John Figliozzi

Perspectives

The awful events of September 11, 2001, soberly remind us that we still live in a largely dangerous world where the differences that separate us, and the lack of knowledge and understanding among us foster a global situation that means we can be just a spark away from violence, disaster or conflict.

In this kind of world, is it not the height of folly to overly rely on information technologies that, in turn, rely on business and political relationships that can be severed at a moment's notice? In the alternative, is it not just as foolish to de-emphasize technologies that assure some additional measure of control over whether information ultimately reaches its intended recipients?

Shortwave thrives in a destabilized world. One sees the sad truth of that statement in the way that receivers nearly fly off the shelves when events that spawn military operations like Desert Storm and Enduring Freedom take place. But the reasons for the "popularity" of shortwave go far beyond its continued reliability. It's the opportunity to hear events as they happen – either first-hand or via reportage – from the perspectives of the diverse many, free of the filtering and distillation offered by so much of other media and delivery technologies.

At its core, it's all about news and it's all about perspective. For the past few weeks, I've been keeping a log of newscasts, writing down what I'm hearing about the current world crisis on Middle East stations like the **Voice of the Islamic Republic of Iran**, **Radio Cairo**, the **Voice of Turkey**, **Radio Pakistan**, **Kol Israel**, **Radio Kuwait** and **UAE Radio Dubai**, among others. When you write it down and compare what you're hearing from different sources, personal horizons and understanding are significantly broadened. Often what you hear first via one of these stations is reported a day or so later on **CNN** or **Fox News**.

You also learn that it's often not as simple as labeling one source as truth and another as propaganda. The truth and the propaganda are sometimes sprinkled throughout. Our differing perspectives make that so and challenge us to continually come to new realizations.

Perspective. We can never have enough of it. Shortwave remains a most unique and important source for it. Listen and learn. Our futures truly depend on it.

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

0000	0015		Cambodia, National Radio Of	11940as				
0000	0015		Japan, Radio	6145na	13650pa	17810pa		
0000	0027		Czech Rep, Radio Prague Intl	7345na	11615na			
0000	0030		Australia, Christian Voice	17850as				
0000	0030		Australia, Radio	9660pa	12080pa	15240as	15415as	17580pa
			17775as 17795va	21740va				
0000	0030		Egypt, Radio Cairo	9900am				
0000	0030		Thailand, Radio	9690va				
0000	0030		UK, BBC World Service	3915as	5965as	5975am	6195cs	7105as
			9410me 9590am	9915sa	11810as	11945as	11955sa	12095as
			15280as 15310as	15360as	17615as	17790as		
0000	0045		India, All India Radio	9705as	9950as	11620as	13695as	
0000	0056		North Korea, Voice of Korea	4405va	11460na	11710nc	13760na	
			15180na					
0000	0057		Canada, Radio Canada Intl	11895as				
0000	0100		Anguilla, Caribbean Beacon	6090am				
0000	0100	vl	Australia, ABC/Alice Springs	4835do				
0000	0100	vl	Australia, ABC/Katherine	5025do				
0000	0100	vl	Australia, ABC/Tennant Creek	4910do				
0000	0100		Bulgaria, Radio	11700na				
0000	0100		Canada, CBC Northern Service	9625do				
0000	0100		Canada, CFRX Toronto ON	6070do				
0000	0100		Canada, CFVP Calgary AB	6030do				
0000	0100		Canada, CHNX Halifax, NS	6130do				
0000	0100		Canada, CKZN St John's NF	6160do				
0000	0100		Canada, CKZU Vancouver BC	6160do				
0000	0100		Costa Rica, R for Peace Intl	15050va	21815usb			
0000	0100		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na					
0000	0100		Ecuador, HCJB	9745na	15115na	21455usb		
0000	0100	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0000	0100		Guyana, Voice of	3289do	5949do			
0000	0100		Japan, Radio	6145na				
0000	0100		Malaysia, Radio	7295do				
0000	0100		Malaysia, RTM Kota Kinabalu	5980do				
0000	0100		Malaysia, RTM Sarawak	7160do				
0000	0100	vl	Namibia, Namibian BC Corp	3270af	3289af			
0000	0100		Netherlands, Radio	6165na	6175na	9590na	9845na	
0000	0100		New Zealand, Radio NZ Intl	17675pa				
0000	0100		New Zealand, ZLXA	3935do	7290do			
0000	0100	vl	Papua New Guinea, NBC	9675do	11880irr			
0000	0100		Singapore, SBC Radio One	6150do				
0000	0100	vl	Solomon Islands, SIBC	5020do	9545do			
0000	0100		Spain, R Exterior Espana	15385na				
0000	0100		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
			6350va 6458va	6847va	10320va	10940va	12579vc	12689va
			13254va 13362va	16847va				
0000	0100		USA, KAIJ Dallas TX	13815va				
0000	0100		USA, KTBN Salt Lake City UT	15590na				
0000	0100		USA, KWHR Naalehu HI	17510as				
0000	0100	twhfa	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
			11695am 13740am					
0000	0100		USA, WBCQ Monticello ME	7415na	9330na			
0000	0100		USA, WEWN Birmingham AL	5825na	13615na			
0000	0100		USA, WHRA Greenbush ME	7580eu				
0000	0100		USA, WHRI Noblesville IN	5745va	7315am			
0000	0100		USA, WINB Red Lion PA	12160am				
0000	0100		USA, WJCR Upton KY	7490am	13595as			
0000	0100		USA, WRMI Miami FL	9955sa				
0000	0100		USA, WRNO New Orleans LA	7355va				
0000	0100		USA, WSHB Cypress Crk SC	7535am	9430am	15285sa		
0000	0100		USA, WTJC Newport NC	9370na				
0000	0100	sm	USA, WWBS Macon GA	11910na				
0000	0100		USA, WWCR Nashville TN	3215na	5070na	7435na	13845na	
0000	0100		USA, WWFV McCaysville GA	5085va	6890am			
0000	0100		USA, WYFR Okeechobee FL	6085na	9505na	15130na		
0000	0100	vl	Vanuatu, Radio	3945do	4960do	7260do		
0000	0100		Zambia, Christian Voice	4965do				
0030	0100		Australia, Christian Voice	17850as	21680pa			
0030	0100		Australia, Radio	9660pa	12080va	15240as	15415as	17580pa
			17750as 17755as	17795va	21740va			
0030	0100		Iran, VO Islamic Rep. of Iran	9022am	9835am	11970am		
0030	0100		Lithuania, Radio Vilnius	9875na				
0030	0100		Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as	
			15425as					
0030	0100		Thailand, Radio	15395as				
0030	0100		UK, BBC World Service	5965as	5975am	6195as	7105as	9410me
			9590am 9915sa	11810as	11955sa	12095as	15280as	15360as
			17790as					
0030	0100		USA, Voice of America	7215as	9770as	11760as	15185as	15290as
			17740as 17820as					
0030	0100	mtwhfa	Yugoslavia, Radio	11870am				
0045	0100	vl	Pakistan, Radio	11650as	15455as			
0045	0100		USA, WYFR Okeechobee, FL	15130na				
0050	0100		UK, International BC Tamil	11570as				
0055	0100		Italy, RAI International	9675na	11800na			

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

0100	0115		Italy, RAI International	9675na	11800na			
0100	0115		Pakistan, Radio	11650as	15455as			
0100	0125		Netherlands, Radio	6165na	9845na			
0100	0127		Czech Rep, Radio Prague Intl	5915na	7345na			
0100	0127		Vietnam, Voice of	9525na				
0100	0130	s	Germany, Universal Life	9435as				
0100	0130		Iran, VO Islamic Rep. of Iran	9022am	9835am	11970am		
0100	0130		Slovakia, Radio Slovakia Intl	5930na	7230ca	9440sa		
0100	0130	twhfa	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
			13740am					
0100	0130		Uzbekistan, Radio Tashkent	7190as	9375as	9530as	9715as	
0100	0145		Germany, Deutsche Welle	6040na	9640am	11810na	13720am	
0100	0145		USA, WYFR, Okeechobee FL	15130na				
0100	0156		North Korea, Voice of Korea	3560va	11734va	15230va	17735va	
0100	0159		Canada, Radio Canada Intl	5960am	9755am	13670am	13770am	
			15170am					
0100	0200		Anguilla, Caribbean Beacon	6090am				
0100	0200	vl	Australia, ABC/Katherine	5025do				
0100	0200	vl	Australia, ABC/Tennant Creek	4910do				
0100	0200		Australia, Christian Voice	21550as	21680pa			
0100	0200		Australia, Radio	9660pa	12080pa	15240as	15415as	17580pa
			17750as 17755as	17795va	21725pa			
0100	0200		Canada, CBC Northern Service	9625da				
0100	0200		Canada, CFRX Toronto ON	6070do				
0100	0200		Canada, CFVP Calgary AB	6030do				
0100	0200		Canada, CHNX Halifax, NS	6130do				
0100	0200		Canada, CKZN St John's NF	6160do				
0100	0200		Canada, CKZU Vancouver BC	6160do				
0100	0200		China, China Radio Intl	9580na	9790na			
0100	0200		Costa Rica, R for Peace Intl	15050va	21815usb			
0100	0200		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na					
0100	0200		Cuba, Radio Havana	6000na	9820na	11705usb		
0100	0200		Ecuador, HCJB	9745na	15115na	21455usb		
0100	0200	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0100	0200		Guyana, Voice of	3289do	5949do			
0100	0200		Indonesia, Voice of	9525as	11785as			
0100	0200		Japan, Radio	11860pa	11870me	11880me	15325as	17685pa
			17810as 17835sa	17845as				
0100	0200		Malaysia, Radio	7295do				
0100	0200		Malaysia, RTM Kota Kinabalu	5980do				
0100	0200		Namibia, Namibian BC Corp	3270af	3289af			
0100	0200		Netherlands, Radio	6175na	9590na			
0100	0200		New Zealand, Radio NZ Intl	17675pa				
0100	0200		New Zealand, ZLXA	3935do	7290do			
0100	0200	vl	Papua New Guinea, NBC	9675do	11880irr			
0100	0200		Singapore, SBC Radio One	6150do				
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do			
0100	0200		Spain, Radio Exterior Espana	15385na				
0100	0200		Switzerland, Swiss Radio Intl	9885am				
0100	0200		UK, BBC World Service	5965as	5975am	6195as	9410as	9590am
			9915sa 11835as	11955sa	12095as	15280as	15310as	15360as
			17790as					
0100	0200		Ukraine, Radio Ukraine Intl	5905eu	7320as	9640as	12040na	
0100	0200		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
			6350va 6458va	6847va	10320va	10940va	12579va	12689va
			13254va 13362va	16847va				
0100	0200		USA, KAIJ Dallas TX	5755va				
0100	0200		USA, KJES Vado NM	7555na				
0100	0200		USA, KTBN Salt Lake City UT	7510na				
0100	0200		USA, KWHR Naalehu HI	17510as				
0100	0200		USA, Voice of America	7115as	9635as	11705as	11725as	11820as
			13650as 15250as	17740as	17820as			
0100	0200		USA, WBCQ Monticello ME	7415na	9330na			
0100	0200		USA, WEWN Birmingham AL	5825na	13615na			
0100	0200		USA, WHRA Greenbush ME	7580eu				
0100	0200		USA, WHRI Noblesville IN	5745va	7315am			
0100	0200		USA, WINB Red Lion PA	12160am				
0100	0200		USA, WJCR Upton KY	7490am	13595as			
0100	0200	twhfa	USA, WRMI Miami FL	7385na				
0100	0200	sm	USA, WRMI Miami FL	9955am				
0100	0200		USA, WRNO New Orleans LA	7355va				
0100	0200		USA, WSHB Cypress Crk SC	7535na	9430am	15285sa		
0100	0200		USA, WTJC Newport NC	9370na				
0100	0200		USA, WWCR Nashville TN	3215na	5070na	5935na	7435na	
0100	0200		USA, WWFV McCaysville GA	5085va				
0100	0200		USA, WYFR Okeechobee FL	6065na	9505na	15060as		
0100	0200	vl	Vanuatu, Radio	3945do	4960do	7260do		
0100	0200		Zambia, Christian Voice	4965do				
0105	0110		Croatia, The Voice of Croatia	9925irrg				
0105	0110		Croatia, The Voice of Croatia	9925irrg				
0130	0145	vl	Libya, Voice of Africa	11815af	15415af	15435af	17725af	
0130	0200		Austria, Radio Austria Intl	9870na				
0130	0200		Lithuania, Radio Vilnius	11690eu				
0130	0200		Sweden, Radio	13625as				
0130	0200		UK, RTE Radio	6155co				
0130	0200	twhfa	USA, VOA Special English	9775am	7405am	13740am		
0130	0200	twhfa	USA, Voice of America	5995am	6130am	9455am		
0140	0200		Vatican City, Vatican Radio	9650au	12055au			
0145	0200		Albania, Radio Tirana Intl	6115na	7160na			

0200 UTC - 9PM E / 8PM C / 6PM P

0200	0230		Hungary, Radio Budapest	9560na				
0200	0230		Myanmar, Radio	7185do				
0200	0230	a	UK, Wales Radio Intl	9795na				
0200	0230		USA, KJES Vado NM	7555na				
0200	0245		Germany, Deutsche Welle	11965as	13710as	15370as		
0200	0256		North Korea, Voice of Korea	11845va	13650va			
0200	0256		Romania, Radio Romania Intl	11940na	15105as	15180as	15340na	
			17735as 17790pa					
0200	0257		Canada, Radio Canada Intl	15260as	17860as			
0200	0300		Anguilla, Caribbean Beacon	6090am				

SELECTED PROGRAMMING BEGINS ON PAGE 55

0200	0300	twhfa	Argentina, RAE	11710am				
0200	0300	vl	Australia, ABC/Alice Springs	4835do				
0200	0300	vl	Australia, ABC/Katherine	5025do				
0200	0300	vl	Australia, ABC/Tennant Creek	4910do				
0200	0300		Australia, Christian Voice	21550as	21680pa			
0200	0300		Australia, Radio	9660pa	12080va	15240as	15415as	15515va
			17580va 17750as 21725va					
0200	0300		Bulgaria, Radio	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, CHNX Halifax, NS	6130do				
0200	0300		Canada, CKZN St John's NF	6160do				
0200	0300		Canada, CKZU Vancouver BC	6160do				
0200	0300		Costa Rica, R for Peace Intl	7455va	15050va			
0200	0300		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na 13749na					
0200	0300		Cuba, Radio Havana	6000na	9820na	11705usb		
0200	0300		Ecuador, HCJB	9745na	15115na	21455usb		
0200	0300		Egypt, Radio Cairo	9475am				
0200	0300	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0200	0300		Guyana, Voice of	3289do	5949do			
0200	0300		Kenya, Kenya BC Corp	4885irr	4915irr			
0200	0300		Malaysia, Radio	7295do				
0200	0300		Malaysia, RTM Kota Kinabalu	5980do				
0200	0300		Namibia, Namibian BC Corp	3270af	3289af			
0200	0300		Netherlands, Radio	6135na	6175na			
0200	0300		New Zealand, Radio NZ Intl	17675pa				
0200	0300		New Zealand, ZLXA	3935do	7290do			
0200	0300	vl	Papua New Guinea, NBC	9675do	11880irr			
0200	0300		Russia, Voice of Russia	7180na	9725na	11825na	17595na	
0200	0300		Singapore, SBC Radio One	6150do				
0200	0300	vl	Solomon Islands, SIBC	5020do	9545do			
0200	0300		South Korea, Radio Korea Intl	7275na	11725sa	11810sa	15575na	
0200	0300		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as	
			15425as					
0200	0300		Taiwan, Radio Taipei Intl	5950na	9680na	11740am	15270as	
			15345as					
0200	0300		UK, BBC World Service	5975am	6135am	6195as	9410as	9770af
			9915sa 11835as 11955va	12095as	15280as	15310as	15360as	
			17790as					
0200	0300		UK, Merlin Network One	9430na				
0200	0300		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
			6350va 6458va 6847va	10320va	10940va	12579va	12689va	
			13254va 13362va 16847va					
0200	0300		USA, KAIJ Dallas TX	5755va				
0200	0300		USA, KTBN Salt Lake City UT	7510na				
0200	0300		USA, KWHR Naalehu HI	17510as				
0200	0300		USA, Voice of America	7115as	9635as	11705as	11725as	11820as
			13650as 15250as 17740as	17820as				
0200	0300		USA, WBCQ Monticello ME	7415na				
0200	0300		USA, WBCQ Monticello ME	9330na				
0200	0300		USA, WEWN Birmingham AL	5825na				
0200	0300		USA, WHRA Greenbush ME	7580eu				
0200	0300		USA, WHRI Noblesville IN	5745va	7315am			
0200	0300		USA, WINB Red Lion PA	12160am				
0200	0300		USA, WJCR Upton KY	7490am	13595as			
0200	0300		USA, WRMI Miami FL	7385na				
0200	0300		USA, WRNO New Orleans LA	7355va				
0200	0300		USA, WSHB Cypress Crk SC	5850na	7535am	9430na		
0200	0300		USA, WTJC Newport NC	9370na				
0200	0300		USA, WWCR Nashville TN	3215na	5070na	5935na	7435na	
0200	0300		USA, WWFV McCaysville GA	5085va				
0200	0300		USA, WYFR Okeechobee FL	6065na	9505na			
0200	0300	vl	Vanuatu, Radio	3945do	4960do	7260do		
0200	0300		Zambia, Christian Voice	4965do				
0200	1215		Cambodia, National Radio Of	11940as				
0205	0210		Croatia, The Voice of Croatia	9925irrg				
0215	0220		Nepal, Radio	5005as	7165as			
0230	0257		Vietnam, Voice of	9525na				
0230	0300		Albania, Radio Tirana Intl	6115na	7160na			
0230	0300		Philippines, Radyo Pilipinas	11885pa	15120pa	15270pa		
0230	0300		Slovakia, Adventist World Radio	7235as				
0230	0300		Sweden, Radio	9495am	9755na			
0230	0300		Switzerland, Swiss Radio Intl	9885am				
0250	0300		Vatican City, Vatican Radio	7305am	9605am			

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

0300	0310		Vatican City, Vatican Radio	7305am	9605am			
0300	0327		Czech Rep, Radio Prague Intl	7345no	7385no	9870na		
0300	0330	sm w fa	Belorus, Radio Belorus Intl	6070eu	7210eu			
0300	0330		Egypt, Radio Cairo	9475am				
0300	0330		S Africa, Channel Africa	6035af				
0300	0330		Thailand, Radio	15395am				
0300	0330		UK, BBC World Service	3255af	5975am	6005af	6135am	6190af
			6195eu 7120af 7160af	9410eu	11730af	12035as	12095me	
			15280as 15310as 15360as	15575me	17760as	17790as	21660as	
			21830as					
0300	0330		USA, WBCQ Monticello ME	7415na				
0300	0330	s twhfa	USA, WBCQ Monticello ME	9330na				
0300	0330	s	USA, WINB, Red Lion PA	12160am				
0300	0345		Germany, Deutsche Welle	9535no	9640no	13780am	15105no	
0300	0345		Iraq, Radio Iraq Intl	7157irr	9887irr	11785irr		
0300	0358		New Zealand, Radio NZ Intl	17675pa				
0300	0400		Anguilla, Caribbean Beacon	6090am				
0300	0400	vl	Australia, ABC/Alice Springs	4835do				
0300	0400	vl	Australia, ABC/Katherine	5025do				
0300	0400	vl	Australia, ABC/Tennant Creek	4910do				
0300	0400		Australia, Christian Voice	21550as	21680pa			
0300	0400		Australia, Radio	9660pa	12080pa	15240as	15415as	15515va
			17580va 17750as 21725va					
0300	0400	mtwhf	Bhutan, Bhutan BC Service	6035do				
0300	0400	vl	Botswana, Radio	3356do	4820do	7255do		
0300	0400		Canada, CBC Northern Service	9625da				
0300	0400		Canada, CFRX Toronto ON	6070do				
0300	0400		Canada, CFVP Calgary AB	6030do				
0300	0400		Canada, CHNX Halifax, NS	6130do				
0300	0400		Canada, CKZN St John's NF	6160do				
0300	0400		Canada, CKZU Vancouver BC	6160do				
0300	0400		China, China Radio Intl	9690na				
0300	0400		Costa Rica, Faro del Caribe	5054ca	6175ca	9644ca		
0300	0400		Costa Rica, R for Peace Intl	7455va	15050va			
0300	0400		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na 17645as					
0300	0400		Cuba, Radio Havana	6000na	9820na	11705usb		
0300	0400		Ecuador, HCJB	9745na	15115na	21455usb		
0300	0400	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
0300	0400	vl	Guatemala, Radio Cultural	3300do	5955do			
0300	0400		Guyana, Voice of	3289do	5949do			
0300	0400	sm	Honduras, Radio Luz y Vida	3250ca				
0300	0400		Japan, Radio	17825ca	21610pa			
0300	0400		Kenya, Kenya BC Corp	4885irr	4915irr			
0300	0400	vl	Lesotho, Radio	4800do				
0300	0400		Malaysia, Radio	7295do				
0300	0400		Malaysia, Voice of	6175as	9750as	15295pa		
0300	0400		Namibia, Namibian BC Corp	3270af	3289af			
0300	0400		Netherlands, Radio	6135na	6175na			
0300	0400		Oman, Radio Sultanate of	15355va				
0300	0400	vl	Papua New Guinea, NBC	9675do	11880irr			
0300	0400		Philippines, Radyo Pilipinas	11885	15120pa	15270pa		
0300	0400		Russia, Voice of Russia	7180na	9725na	17595na		
0300	0400		Singapore, SBC Radio One	6150do				
0300	0400	vl	Solomon Islands, SIBC	5020do	9545do			
0300	0400		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as	
			15425as					
0300	0400		Taiwan, Radio Taipei Intl	5950na	9680na	11875pa	15320as	
0300	0400		Uganda, Radio	7196do				
0300	0400		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
			6350va 6458va 6847va	10320va	10940va	12579va	12689va	
			13254va 13362va 16847va					
0300	0400		USA, KAIJ Dallas TX	5755va				
0300	0400		USA, KTBN Salt Lake City UT	7510na				
0300	0400		USA, KWHR Naalehu HI	17510as				
0300	0400		USA, Voice of America	5855af	6080af	7105af	7275af	7290af
			7340af 9575af 9885af	17895af				
0300	0400		USA, WEWN Birmingham AL	5825na				
0300	0400		USA, WHRA Greenbush ME	7580eu				
0300	0400		USA, WHRI Noblesville IN	5745va	7315am			
0300	0400		USA, WJCR Upton KY	7490am	13595as			
0300	0400		USA, WMLK Bethel PA	9465eu				
0300	0400		USA, WRMI Miami FL	7385na				
0300	0400		USA, WRNO New Orleans LA	7395am				
0300	0400		USA, WSH8 Cypress Crk SC	5850na	7535eu			
0300	0400		USA, WTJC Newport NC	9370na				
0300	0400		USA, WWCR Nashville TN	3215na	5070na	5935na	7435na	
0300	0400		USA, WWFV McCaysville GA	5085va				
0300	0400		USA, WYFR Okeechobee FL	6065na	9505na			
0300	0400	vl	Vanuatu, Radio	3945do	4960do	7260do		
0300	0400		Zambia, Christian Voice	6065do				
0300	0400	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
0305	0310		Croatia, The Voice of Croatia	9925na				
0310	0315		Vatican City, Vatican Radio	7305am	9605am	9660af		
0315	0340		Vatican City, Vatican Radio	9660af				
0330	0345	vl	Libya, Voice of Africa	11815af	15435af	17725af		
0330	0350		UAE, Emirates Radio	12005na	13675na	15400na		
0330	0357		Czech Rep, Radio Prague Intl	11600as	15470as			
0330	0357		Vietnam, Voice of	9795na				
0330	0400		Austria, AWR Europe	17635as				
0330	0400		Hungary, Radio Budapest	9570na				
0330	0400		Myanmar, Radio	9730do				
0330	0400		Sweden, Radio	9495na				
0330	0400		UK, BBC World Service	3255af	5975am	6005af	6135am	6190af
			6195eu 7120af 7160af	9410eu	11730af	12035as	12095me	
			15280as 15310as 15420af	15575me				
0330	0400		USA, WBCQ Monticello ME	7415na				
0330	0400	twhfa	USA, WBCQ Monticello ME	9330na				
0345	0400	f	Seychelles, FEBA Radio	11885af				
0345	0400		Tajikistan, Radio	7245as				
0359	0400		New Zealand, Radio NZ Intl	15340pa				

0400 UTC - 11PM E / 10PM C / 8PM P

0400	0430		Australia, Christian Voice	21550as				
0400	0430		Australia, Radio	9660pa	12080va	15240pa	15415as	15515va
			17580pa 21725pa					
0400	0430	as	Australia, Radio	17750as				
0400	0430		France Radio France Intl	9550af	15155af			
0400	0430		Hungary, Radio Budapest	9560na				
0400	0430	s twhfa	Mexico, Radio Mexico Intl	9705am	11770am			
0400	0430	vl	Nigeria, Radio/Kaduna	6090do	7275do			
0400	0430		S Africa, Channel Africa	5955af				
0400	0430		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as	
			15425as					
0400	0430		Switzerland, Swiss Radio Intl	9885am				
0400	0430		USA, WBCQ Monticello ME	7415na				
0400	0430	h	USA, WBCQ Monticello ME	9330na				
0400	0430		USA, WRMI Miami FL	7385no				
0400	0445		Germany, Deutsche Welle	7225af	9565af	9765af	13690af	
0400	0450		Turkey, Voice of	9650af	11655va	21715as		
0400	0455		USA, WYFR Okeechobee FL	6065na	9355eu	9505na		
0400	0456		China, China Radio Intl	9560na	9730na			

Shortwave Guide

0400	0456		Romania, Radio Romania Intl	11940na	15365na	17735as	21480as	
0400	0500		Anguilla, Caribbean Beacon	6090am				
0400	0500	vl	Australia, ABC/Alice Springs	4835do				
0400	0500	vl	Australia, ABC/Katherine	5025da				
0400	0500	vl	Australia, ABC/Tennant Creek	4910do				
0400	0500	vl	Botswana, Radio 3356do	4820do	7255da			
0400	0500		Canada, CBC Northern Service	9625do				
0400	0500		Canada, CFRX Toronto ON	6070do				
0400	0500		Canada, CFVP Calgary AB	6030do				
0400	0500		Canada, CHNX Halifax, NS	6130do				
0400	0500		Canada, CKZN St John's NF	6160do				
0400	0500		Canada, CKZU Vancouver BC	6160do				
0400	0500		Costa Rica, R for Peace Intl	7455va	15050va			
0400	0500		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724so	
0400	0500		Cuba, Radio Havana 6000na	9820no	11705usb			
0400	0500		Ecuador, HCJB 9745na	15115na	21455usb			
0400	0500	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
0400	0500	vl	Guatemala, Radio Cultural	3300do	5955da			
0400	0500		Guyana, Voice of 3289do	5949do				
0400	0500		Kenya, Kenya BC Corp 4885irr	4915irr				
0400	0500	vl	Lesotho, Radio 4800do					
0400	0500		Malaysia, Radio 7295do					
0400	0500		Malaysia, Voice of 6175as	9750as	15295pa			
0400	0500		Myanmar, Radio 9730do					
0400	0500		Namibia, Namibian BC Corp	3270af	3289af			
0400	0500		Netherlands, Radio 6175na					
0400	0500		New Zealand, Radio NZ Intl	15340pa				
0400	0500		New Zealand, ZLXA 3935do	7290do				
0400	0500	vl	Nigeria, Radio/Enugu 6025do					
0400	0500	vl	Papua New Guinea, NBC	9675do	11880irr			
0400	0500		Russia, Voice of Russia 7180no 17690na	11750no	15455no	17650no	17660no	
0400	0500		Singapore, SBC Radio One	6150do				
0400	0500	vl	Solomon Islands, SIBC 5020do	9545do				
0400	0500		Uganda, Radio 7196do					
0400	0500		UK, BBC World Service 3255af 6190af 6195eu 7120af 15280as 15310as 15420af 21660as 21830as	5975am	6005af	6135am	6175am	7160af 9410eu 12035eu 12095me 7160af 9410eu 12035eu 12095me 15575me 17640af 17760as 17790as
0400	0500		Ukraine, Radio Ukraine Intl 12040as	7150as	7320as	7410as	9640as	
0400	0500		USA, Armed Forces Radio 6350va 6458va 6847va 13254va 13362va 16847va	4278va	4319va	4993va	5765va	10320va 10940va 12579va 12689va
0400	0500		USA, KAIJ Dallas TX	5755va				
0400	0500		USA, KTBN Salt Lake City UT	7510na				
0400	0500		USA, KWHR Naalehu HI 17780as					
0400	0500		USA, Voice of America 4960af 9530va 9575af 11965me	5855af	6080af	7275af	7290af	15205va 17895af
0400	0500		USA, WEWN Birmingham AL	5825na				
0400	0500		USA, WHRA Greenbush ME	7580eu				
0400	0500		USA, WHRI Noblesville IN	5745va	7315am			
0400	0500		USA, WJCR Upton KY 7490am	13595as				
0400	0500		USA, WMLK Bethel PA 9465eu					
0400	0500		USA, WSHB Cypress Crk SC	7535eu	15195af			
0400	0500		USA, WTJC Newport NC 9370na					
0400	0500		USA, WWCR Nashville TN	3215na	5070na	5935na	7435na	
0400	0500		USA, WWFV McCaysville GA	5085va				
0400	0500		Zambia, Christian Voice 6065do					
0400	0500	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
0405	0410		Croatia, The Voice of Croatia	9925irrg				
0427	0525	a	Liberia, Voice of Hope 12060af	15320af				
0430	0500		Australia, Christian Voice	21550as	21680pa			
0430	0500		Australia, Radio 9660pa 17580pa 21725pa	12080pa	15240as	15415as	15515va	
0430	0500		Italy, Italian Radio Relay Svc	3985va				
0430	0500		Netherlands, Radio 6165na	9590na				
0430	0500	vl	Nigeria, Radio/Ibadan 6050do					
0430	0500	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570do		
0430	0500	vl	Nigeria, Radio/Lagos 3326do	4990do				
0430	0500		S Africa, AWR Africa 11975af					
0430	0500		Sri Lanka, Sri Lanka BC Corp	6130do				
0430	0500	mtwhfa	Swaziland, Trans World Radio	3200af	4775af			
0430	0500		Switzerland, Swiss Radio Intl	9885am				
0430	0500		USA, WBCQ Monticello ME	7415na				
0430	0500	s twhfa	USA, WRMI Miami FL 7385na					
0430	0500		Yugoslavia, Radio 11870na					
0445	0500		Italy, RAI International 5975af	7235af				
0445	0500		USA, WYFR Okeechobee FL	9355eu				

0500 UTC - 12AM E / 11PM C / 9PM P

0500	0515		Canada, CBC Northern Service	9625do				
0500	0515		Israel, Kol Israel 9435va	15640va	17545va			
0500	0515	s hfa	USA, KVOH Los Angeles CA	9975na				
0500	0515		Zambia, National BC Corp	6265do				
0500	0520		Vatican City, Vatican Radio	9660af	11625af	11625af	15570af	
0500	0530		Australia, Christian Voice	21550as				
0500	0530as		Australia, Radio 17750as					
0500	0530		Belgium, RVI Flanders R Intl	15595na				
0500	0530		France Radio France Intl 11710af	17800af				
0500	0530	s twhfa	Mexico, Radio Mexico Intl	9705am	11770am			
0500	0530		Netherlands, Radio 6165na	9845na				
0500	0530		S Africa, AWR Africa 5960af	6015af				
0500	0530		S Africa, Channel Africa 11720af					
0500	0530		Switzerland, Swiss Radio Intl	9610eu				
0500	0530	s twhfa	USA, WRMI Miami FL 7385na					
0500	0530	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
0500	0545		Germany, Deutsche Welle	9690na	9785na	11985na		
0500	0600		Anguilla, Caribbean Beacon	6090am				
0500	0600	vl	Australia, ABC/Alice Springs	4835da				
0500	0600	vl	Australia, ABC/Katherine	5025da				
0500	0600	vl	Australia, ABC/Tennant Creek	4910da				
0500	0600	vl	Botswana, Radio 3356do	4820do	7255da			
0500	0600		Canada, CFRX Toronto ON	6070do				
0500	0600		Canada, CFVP Calgary AB	6030do				
0500	0600		Canada, CHNX Halifax, NS	6130do				
0500	0600		Canada, CKZN St John's NF	6160do				
0500	0600		Canada, CKZU Vancouver BC	6160do				
0500	0600		Costa Rica, R for Peace Intl	7455va	15050va			
0500	0600		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
0500	0600		Cuba, Radio Havana 9550na	9820na	9830usb			
0500	0600		Ecuador, HCJB 9745na	15115na	21455usb			
0500	0600	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
0500	0600		Guyana, Voice of 3289do	5949do				
0500	0600		Italy, Italian Radio Relay Svc	3985va				
0500	0600		Japan, Radio 5975eu 13630na 15195as	6110na	7230eu	11715as	11760as	17810pa 21755pa
0500	0600		Kenya, Kenya BC Corp 4885irr	4915irr				
0500	0600		Kuwait, Radio 15110as					
0500	0600	vl	Lesotho, Radio 4800do					
0500	0600		Malaysia, Radio 7295do					
0500	0600		Malaysia, RTM Sarawak 7160do					
0500	0600		Malaysia, Voice of 6175as	9750as	15295pa			
0500	0600		Myanmar, Radio 9730do					
0500	0600		Namibia, Namibian BC Corp	3270af	3289af			
0500	0600		Netherlands, Radio 6175na					
0500	0600		New Zealand, Radio NZ Intl	15340pa				
0500	0600		New Zealand, ZLXA 3935do	7290do				
0500	0600	vl	Nigeria, Radio/Enugu 6025do					
0500	0600	vl	Nigeria, Radio/Ibadan 6050do					
0500	0600	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275da	9570do		
0500	0600	vl	Nigeria, Radio/Lagos 3326do	4990do				
0500	0600		Nigeria, Voice of 7255af	11770af	15120af			
0500	0600	vl	Papua New Guinea, NBC	9675do	11880irr			
0500	0600		Russia, Voice of Russia 7180no 17660na 17690na	11750na	12000na	15455na	17650na	
0500	0600		Singapore, SBC Radio One	6150do				
0500	0600	vl	Solomon Islands, SIBC 5020do	9545do				
0500	0600		Spain, Radio Exterior Espana	6055na				
0500	0600		Sri Lanka, Sri Lanka BC Corp	6130do				
0500	0600		Swaziland, Trans World Radio	4775af	6035af	9500af		
0500	0600		Uganda, Radio 7196do					
0500	0600		UK, BBC World Service 5975am 7160af 9410eu 9740as 15280as 15310as 15360as 15420af 17790as 17885af 21660as	6005af	6175am	6190af	6195eu	11760me 11765af 11940af 12095eu 15575as 17640af 17760as
0500	0600		USA, Armed Forces Radio 6350va 6458va 6847va 13254va 13362va 16847va	4278va	4319va	4993va	5765va	10320va 10940va 12579va 12689va
0500	0600		USA, KAIJ Dallas TX	5755va				
0500	0600		USA, KTBN Salt Lake City UT	7510na				
0500	0600		USA, KWHR Naalehu HI 11565pa	17780as				
0500	0600		USA, Voice of America 5970af 11965me 12080af 13670af	6035af	6080af	7195af	9530va	15205va
0500	0600		USA, WBCQ Monticello ME	7415na				
0500	0600		USA, WEWN Birmingham AL	5825na				
0500	0600		USA, WHRA Greenbush ME	11730af				
0500	0600		USA, WHRI Noblesville IN	5745va	7315am			
0500	0600		USA, WJCR Upton KY 7490am	13595as				
0500	0600		USA, WMLK Bethel PA 9465eu					
0500	0600		USA, WRNO New Orleans LA	7395am				
0500	0600		USA, WSHB Cypress Crk SC	7535eu	9840af			
0500	0600		USA, WTJC Newport NC 9370na					
0500	0600		USA, WWCR Nashville TN	3215na	5070na	5935na	7460na	
0500	0600		USA, WYFR Okeechobee FL	5985na	9355eu	11580eu		
0500	0600	vl	Vanuatu, Radio 3945do	4960do	7260da			
0500	0600		Zambia, Christian Voice 6065do					
0505	0510		Croatia, The Voice of Croatia	9470au				
0515	0530	h a	USA, KVOH Los Angeles CA	9975na				
0520	0530		Vatican City, Vatican Radio	11625af	15570af			
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915da			
0530	0540	vl	Cameroon, CRTV Radio Bueo	6005do				
0530	0545	ma	USA, KVOH Los Angeles CA	9975na				
0530	0550		UAE, Emirates Radio 15435au	17830au	21700au			
0530	0600		Australia, Christian Voice	21550as	21680pa			
0530	0600		Australia, Radio 9660pa 17750as 21725pa	12080va	15240pa	15515va	17580pa	
0530	0600		Hungary, Radio Budapest	9570na				
0530	0600		S Africa, AWR Africa 11970af					
0530	0600		Thailand, Radio 21765eu					
0530	0600	smtwhf	UK, BBC World Service 17885af					
0530	0600	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
0532	0600		Austria, Radio Austria Intl	6155eu	13730eu			
0545	0600	ma	USA, KVOH Los Angeles CA	9975na				

0600 UTC - 1AM E / 12AM C / 10PM P

0600	0605		New Zealand, Radio NZ Intl	15340pa				
0600	0605		USA, WWCR Nashville TN	5070na	5935na	7435na		
0600	0605	twhfa	USA, WWCR Nashville TN	3215na				
0600	0615		S Africa, Trans World Radio	11640af				
0600	0615	mtwhfa	USA, WBCQ Monticello ME	7415na				
0600	0620		Vatican City, Vatican Radio	4005eu	5885eu	7250eu		
0600	0630		France Radio France Intl 11710af	17800af	21620as			
0600	0630		S Africa, Channel Africa 15215af					
0600	0630		USA, Voice of America 5970af 9680af 11805af 11965me	6035af	6080af	7195af	9530va	11995af 12080af 13670af 15205va
0600	0641		Romania, Radio Romania Intl	11940na	15180na			
0600	0645		Germany, Deutsche Welle	11925af	13640af	13790af	17860af	

0600	0700		Anguilla, Caribbean Beacon	6090am				
0600	0700	vl	Australia, ABC/Alice Springs	4835da				
0600	0700	vl	Australia, ABC/Katherine	5025do				
0600	0700	vl	Australia, ABC/Tennant Creek	4910do				
0600	0700		Australia, Christian Voice	21550as	21680pa			
0600	0700		Australia, Radio 9660pa 12080pa 15240pa 15415as 15515va 17580pa 17750as 21725pa					
0600	0700	vl	Botswana, Radio 7255do	9600do				
0600	0700		Canada, CFRX Toronto ON	6070da				
0600	0700		Canada, CFVP Calgary AB	6030do				
0600	0700		Canada, CHNX Halifax, NS	6130do				
0600	0700		Canada, CKZN St John's NF	6160do				
0600	0700		Canada, CKZU Vancouver BC	6160do				
0600	0700		Costa Rica, R for Peace Intl	7455va	15050va			
0600	0700		Costa Rica, University Network 5030am 6150am 7375am 9724sa 11870am 13749na 17645as					
0600	0700		Cuba, Radio Havana 9550na	9820na	9830usb			
0600	0700		Ecuador, HCJB 9745na	11680eu	15115na	21455usb		
0600	0700	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
0600	0700		Germany, Overcomer Ministries	9430pa	13810au			
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do			
0600	0700		Guyana, Voice of 3289do	5949do				
0600	0700	mtwhf/vl	Italy, Italian Radio Relay Svc	7120va				
0600	0700		Japan, Radio 7230eu 21755pa	11740pa	13630pa	15195as	17870pa	
0600	0700		Kenya, Kenya BC Corp 4885irr	4915irr				
0600	0700		Kuwait, Radio 15110as					
0600	0700	vl	Lesotho, Radio 4800do					
0600	0700		Liberia, ELWA 4760do					
0600	0700		Liberia, Radio Liberia Intl	6100do				
0600	0700		Malaysia, Radio 7295do					
0600	0700		Malaysia, RTM Sarawak 7160do					
0600	0700		Malaysia, Voice of 6175as	9750as	15295pa			
0600	0700		Myanmar, Radio 9730do					
0600	0700		Namibia, Namibian BC Corp	3270af	3289af			
0600	0700		Netherlands, Radio 6175na					
0600	0700		New Zealand, ZLXA 3935do	7290do				
0600	0700	vl	Nigeria, Radio/Enugu 6025do					
0600	0700	vl	Nigeria, Radio/Ibadan 6050da					
0600	0700	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570da		
0600	0700	vl	Nigeria, Radio/Lagos 3326do	4990do				
0600	0700		Nigeria, Voice of 7255af	11770af	15120af			
0600	0700	vl	Papua New Guinea, NBC	9675do	11880irr			
0600	0700		Russia, Voice of Russia 17635au	17685au	21790au			
0600	0700		Sierra Leone, Sierra Leone BS	3316do				
0600	0700		Singapore, SBC Radio One	6150da				
0600	0700	vl	Solomon Islands, SIBC 5020do	9545do				
0600	0700		Sri Lanka, Sri Lanka BC Corp	3316do				
0600	0700		Swaziland, Trans World Radio	4775af	6035af	9500af		
0600	0700		UK, BBC World Service 6055af 9410eu 9740as 11760me 15360as 15485eu	6175am 11765af	6190af 11940af	6195eu 12095eu	7160af 15310as 15565eu	
0600	0700	as	UK, BBC World Service 17885af	17640af	17760as	17790as	21660as	
0600	0700		USA, Armed Forces Radio 6350vo 6458va 6847va 13254va 13362va 16847va	4278va	4319va	4993va	5765va	10320va 10940va 12579va 12689va
0600	0700		USA, KAIJ Dallas TX 5755va					
0600	0700		USA, KTBN Salt Lake City UT	7510na				
0600	0700		USA, KWHR Naalehu HI 11565pa	17780as				
0600	0700		USA, WEWN Birmingham AL	5825na				
0600	0700		USA, WHRA Greenbush ME	11730af				
0600	0700		USA, WHRI Noblesville IN	5745va	7315am			
0600	0700		USA, WJCR Upton KY 7490am	13595as				
0600	0700		USA, WMLK Bethel PA 9465eu					
0600	0700		USA, WRNO New Orleans LA	7395am				
0600	0700		USA, WSHB Cypress Crk SC	11615af	13650af			
0600	0700		USA, WTJC Newport NC 9370na					
0600	0700		USA, WYFR Okeechobee FL	5985na	7355eu			
0600	0700	vl	Vanuatu, Radio 3945do	4960do	7260do			
0600	0700		Yemen, Rep of Yemen Radio	9780me				
0600	0700		Zambia, Christian Voice 9865da					
0600	0700	vl	Zimbabwe, Zimbabwe BC Corp	5975da	6045da			
0605	0610		Croatia, The Voice of Croatia	9470irrg				
0605	0700		USA, WWCR Noshville TN	3210na	5070na	5935na	7435na	
0606	0700		New Zealand, Radio NZ Intl	11675pa				
0610	0620	mtwhf	Greece, Voice of Greece 9420eu	11900au	15630eu	17520pa	21530eu	
0630	0640	vl	Comeroon, CRTV Radio Bueo	6005do				
0630	0700		Finland, YLE/Radio Finland	15315va	21670va			
0630	0700		Georgia, Georgian Radio	11805eu				
0630	0700		USA, Voice of America 9530va	9680af	11805af	11965me	15205va	
0630	0700os		USA, Voice of America 5970af 12080af 13670af	6035af	6080af	7195af	11995af	
0630	0700		Vatican City, Vatican Radio	11625af	13765af	15570af		
0641	0656		Romania, Radio Romania Intl	11775eu	11940na	15180na	15365eu	

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

0700	0720		Swaziland, Trans World Radio	4775af	6035af	9500af		
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu			
0700	0730	mtwhfo	Malta, Voice of Mediterranean	6110eu				
0700	0730	vl	Papua New Guinea, NBC	9675do	11880irr			
0700	0730		Slovakia, Radio Slovakia Intl	9440au	15460au	17550au		
0700	0730		UK, BBC World Service 6190af 9410eu 9740as 11760me 11765af 11940af 12095eu 15310as 15360as 15400af 15485eu 15565eu 15575as 17640eu 17760as 17790as 17830af 21660as					
0700	0730	as	UK, BBC World Service 17885af					
0700	0730	a	USA, Voice of America 6873va					
0700	0756		Romania, Radio Romania Intl	17735pa				
0700	0800		Anguilla, Caribbean Beacon	6090am				
0700	0800	vl	Australia, ABC/Alice Springs	4835do				
0700	0800	vl	Australia, ABC/Katherine	5025do				
0700	0800	vl	Australia, ABC/Tennant Creek	4910do				
0700	0800		Australia, Christian Voice	17820as	21680pa			
0700	0800		Australia, Radio 9660pa 12080va 15240va 15415as 17580pa 17750as 21725pa					
0700	0800	vl	Botswana, Radio 7255do	9600do				
0700	0800		Canada, CFRX Toronto ON	6070do				
0700	0800		Canada, CFVP Calgary AB	6030do				
0700	0800		Canada, CHNX Halifax, NS	6130do				
0700	0800		Canada, CKZN St John's NF	6160do				
0700	0800		Canada, CKZU Vancouver BC	6160do				
0700	0800		Costa Rica, R for Peace Intl	7455va	15050va			
0700	0800		Costa Rica, University Network 5030am 6150am 7375am 9724sa 11870am 13749na 17645as					
0700	0800		Ecuador, HCJB 11680eu	11755pa	21455usb			
0700	0800	mtwhf	Eqt Guinea, Radio Africa	15185af				
0700	0800	as/vl	Eqt. Guinea, Radio East Africa	15185af				
0700	0800	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
0700	0800		France Radio France Intl 15605af					
0700	0800		Germany, Overcomer Ministries	9430pa	13810au			
0700	0800	as	Germany, Trans World Radio	12070eu				
0700	0800		Germany, Voice of Hope 5975eu	21590me				
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915da			
0700	0800		Guyana, Voice of 3289do	5949do				
0700	0800	as/vl	Italy, Italian Radio Relay Svc	7120va				
0700	0800		Kenya, Kenya BC Corp 4885irr	4915irr				
0700	0800		Kuwait, Radio 15110as					
0700	0800	vl	Lesotho, Radio 4800do					
0700	0800		Liberia, ELWA 4760do					
0700	0800		Liberia, Radio Liberia Intl	6100do				
0700	0800		Malaysia, Radio 7295do					
0700	0800		Malaysia, RTM Sarawak 7160do					
0700	0800		Malaysia, Voice of 6175as	9750as	15295pa			
0700	0800		Myanmar, Radio 9730do					
0700	0800		Namibia, Namibian BC Corp	3270af	3289af			
0700	0800		New Zealand, Radio NZ Intl	11675pa				
0700	0800		New Zealand, ZLXA 3935do	7290do				
0700	0800	vl	Nigeria, Radio/Enugu 6025do					
0700	0800	vl	Nigeria, Radio/Ibadan 6050da					
0700	0800	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570do		
0700	0800	vl	Nigeria, Radio/Lagos 3326do	4990do				
0700	0800		Nigeria, Voice of 7255af	11770af	15120af			
0700	0800		Russia, Voice of Russia 15490au	17635au	17685au	21790au		
0700	0800		Sierra Leone, Sierra Leone BS	3316da				
0700	0800		Singapore, SBC Radio One	6150da				
0700	0800	vl	Solomon Islands, SIBC 5020do	9545do				
0700	0800		Sri Lanka, Sri Lanka BC Corp	3316do				
0700	0800		Taiwan, Radio Taipei Intl	5950na				
0700	0800		USA, Armed Forces Radio 6350va 6458va 6847va 13254va 13362va 16847va	4278va	4319va	4993va	5765va	10320va 10940va 12579va 12689va
0700	0800		USA, KAIJ Dallas TX 5755va					
0700	0800		USA, KTBN Salt Lake City UT	7510na				
0700	0800		USA, KWHR Naalehu HI 11565pa	17780as				
0700	0800		USA, WEWN Birmingham AL	5825na				
0700	0800		USA, WHRA Greenbush ME	11730af				
0700	0800		USA, WHRI Noblesville IN	5745va	7315am			
0700	0800		USA, WJCR Upton KY 7490am	13595as				
0700	0800		USA, WMLK Bethel PA 9465eu					
0700	0800		USA, WRNO New Orleans LA	7395am				
0700	0800		USA, WSHB Cypress Crk SC	11615af	13650af			
0700	0800		USA, WTJC Newport NC 9370no					
0700	0800		USA, WWCR Noshville TN	3210no	5070na	5935no	7435na	
0700	0800		USA, WYFR Okeechobee FL	7355eu	13695af	15170af		
0700	0800	vl	Vanuatu, Radio 3945do	4960do	7260do			
0700	0800		Zambia, Christian Voice 9865do					
0700	0800	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
0705	0710		Croatia, The Voice of Croatia	13820ou				
0710	0715	mtwhf	Vaticon City, Votican Radio 11740eu 15595eu	4005eu	5885eu	7250eu	9645eu	
0715	0800		Guam, KTWR/ Trans World R	15200as				
0720	0735	mtwhf	Swaziland, Trans World Radio	4775af	6035af	9500af		
0730	0800	t h	Georgia, Georgian Radio	6080me				
0730	0800	vl	Papua New Guinea, NBC	4890do	9675irr			
0730	0800		Switzerland, Swiss Radio Intl	15545af	17685af	21750af		
0730	0800		UK, BBC World Service 6190af 9410eu 9740as 11760me 11765af 11940af 12095eu 15310as 15360as 15400af 15485eu 15565eu 17640eu 17760as 17790as 17830af 21660as					
0730	0800	as	UK, BBC World Service 15575as	17885af				
0745	0755	as	Monaco, Trans World Radio	9870eu				
0750	0755	as	Greece, Voice of Greece 9420eu	11900au	15630eu	17520as	21530as	
0755	0800	mtwhf	Germany, Trans World Radio	12070eu				
0755	0800		Monaco, Trans World Radio	9870eu				

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

0800	0805		Pakistan, Radio 17520eu	21465eu				
0800	0815		Guam, KTWR/ Trans World R	15200as				
0800	0825		Malaysia, Voice of 6175as	9750as	15295pa			
0800	0830	vl	Australia, ABC/Alice Springs	4835do				
0800	0830	vl	Australia, ABC/Katherine	5025do				
0800	0830	vl	Australia, ABC/Tennant Creek	4910do				
0800	0830		Australia, Radio 5995pa 9710pa 12080va 13605pa 15240va 15415as 21725pa					
0800	0830		Belgium, RVI Flanders R Intl	9865eu				
0800	0830		Myanmar, Radio 9730do					
0800	0830		Sierra Leone, Sierra Leone BS	3316do				
0800	0830		Sri Lanka, Sri Lanka BC Corp	3316do				
0800	0900		Anguilla, Caribbean Beacon	6090am				
0800	0900	mtwhf	Bhutan, Bhutan BC Service	6035do				
0800	0900	vl	Botswana, Radio 7255do	9600do				
0800	0900		Canada, CFRX Toronto ON	6070do				
0800	0900		Canada, CFVP Calgary AB	6030do				
0800	0900		Canada, CHNX Halifax, NS	6130do				

Shortwave Guide

0800	0900		Canada, CKZN St John's NF	6160do				
0800	0900		Canada, CKZU Vancouver BC	6160do				
0800	0900		Costa Rica, R for Peace Intl	7455va	15050va			
0800	0900		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
0800	0900		Ecuador, HCJB	11755pa	21455usb			
0800	0900	mtwhf	Eqt Guinea, Radio Africa	15185af				
0800	0900	as/vl	Eqt. Guinea, Radio East Africa	15185af				
0800	0900	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
0800	0900		Germany, Deutsche Welle	13640eu				
0800	0900		Germany, Overcomer Ministries	13800pa	13810au			
0800	0900		Germany, Trans World Radio	12070eu				
0800	0900		Germany, Voice of Hope	5975eu	21590me			
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do			
0800	0900		Guyana, Voice of	3289do	5949do			
0800	0900		Indonesia, Voice of	9525pa				
0800	0900	as/vl	Italy, Italian Radio Relay Svc	7120va				
0800	0900		Kenya, Kenya BC Corp	4885irr	4915irr			
0800	0900	vl	Lesotho, Radio	4800do				
0800	0900		Liberia, ELWA	4760do				
0800	0900		Liberia, Radio Liberia Intl	6100do				
0800	0900		Malaysia, Radio	7295do				
0800	0900		Monaco, Trans World Radio	9870eu				
0800	0900		Namibia, Namibian BC Corp	7165af	7215af			
0800	0900		Netherland, Radio	6175na				
0800	0900		New Zealand, Radio NZ Intl	11675pa				
0800	0900		New Zealand, ZLXA	3935do	7290do			
0800	0900	vl	Nigeria, Radio/Enugu	6025do				
0800	0900	vl	Nigeria, Radio/Ibadan	6050do				
0800	0900	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0800	0900	vl	Nigeria, Radio/Lagos	3326do	4990do			
0800	0900		Nigeria, Voice of	7255af	11770af	15120af		
0800	0900	vl	Papua New Guinea, NBC	4890do	9675irr			
0800	0900		Russia, Voice of Russia	15490au	17495au	17525au	17635au	17685au
0800	0900	s	S Africa, Amateur Radio League	9750af	21560af			
0800	0900		Singapore, SBC Radio One	6150do				
0800	0900	vl	Solomon Islands, SIBC	5020do				
0800	0900		South Korea, Radio Korea Intl	9570om	13670eu			
0800	0900		UK, BBC World Service 15360as 15400af 17885af	6190af	9740as	11940af	12095eu	15310as
			15485eu 21470af	15565eu	17640eu	17760cs	17830af	
0800	0900	as	UK, BBC World Service	15575as	21660as	21830as		
0800	0900		USA, Armed Forces Radio 6350va 6458va 13254va 13362va	4278va	4319va	4993va	5765va	
			16847va	6847va	10320va	10940va	12579va	12689va
0800	0900		USA, KAIJ Dallas TX	5755va				
0800	0900		USA, KNLS Anchor Point AK	11765as				
0800	0900		USA, KTBN Salt Lake City UT	7510na				
0800	0900		USA, KWHR Naalehu HI	11565pa	17780as			
0800	0900		USA, Voice of America	11930as	13610as	15150as		
0800	0900		USA, WEWN Birmingham AL	5825na				
0800	0900		USA, WHRA Greenbush ME	11730af				
0800	0900		USA, WHRI Noblesville IN	5745va	7315am			
0800	0900		USA, WJCR Upton KY	7490am	13595as			
0800	0900		USA, WRNO New Orleans LA	7395am				
0800	0900		USA, WSHB Cypress Crk SC	9845au	9860eu	11615eu		
0800	0900		USA, WTJC Newport NC	9370na				
0800	0900		USA, WWCR Nashville TN	3210na	5070na	5935na	7435na	
0800	0900	vl	Vanuatu, Radio	3945do	4960do	7260do		
0800	0900		Zambia, Christian Voice	9865do				
0800	0900	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
0805	0810		Croatia, The Voice of Croatia	13820irrg				
0810	0830	s	Armenia, Voice of Armenia	4810eu	15270eu			
0815	0900		Guam, KTWR/ Trans World R	15200as	15330as			
0815	0900	f	Seychelles, FEBA Radio	15460as				
0830	0900	vl	Australia, ABC/Alice Springs	2310do				
0830	0900	vl	Australia, ABC/Katherine	2485do				
0830	0900	vl	Australia, ABC/Tennant Creek	2325do				
0830	0900		Australia, Radio 15415as 17750as 21725pa	5995pa	9710pa	12080va	13605pa	15240va
0830	0900		Austria, AWR Europe	17780af				
0830	0900		Georgia, Georgian Radio	11910eu				
0830	0900		Italy/Adv World Radio Europe	9610eu				
0830	0900		S Africa, AWR Africa	9610af	17780va			
0830	0900		Switzerland, Swiss Radio Intl	21770af				
0855	0900	s	Taiwan, CBS	11725as				

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

0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do			
0900	0920		Monaco, Trans World Radio	9870eu				
0900	0929		Czech Rep, Radio Prague Intl	21745os				
0900	0930		Australia, Radio	11880as	13605pa	15240as	21820as	
0900	0930		Guam, KTWR/ Trans World R	15330as				
0900	0930		UK, BBC World Service 11940af 11945as 15485eu 15565eu 17830af	6190af	6195as	9605as	9740as	11760me
				12095eu	15190sa	15310as	15360as	15400af
				15575as	17640eu	17655as	17760as	17790as
				17885af	21470af	21660as		
0900	0945		Germany, Deutsche Welle 17715pa 17770pa 17800af	6160pa	12035af	15410af	15470af	
				17820as	21560af	21680pa	21790as	
0900	0945		USA, WINB Red Lion PA	13845va				
0900	1000		Anguilla, Caribbean Beacon	6090am				
0900	1000	vl	Australia, ABC/Alice Springs	2310do				
0900	1000	vl	Australia, ABC/Katherine	2485do				
0900	1000	vl	Australia, ABC/Tennant Creek	2325do				
0900	1000	vl	Botswana, Radio	7255do	9600da			
0900	1000		Canada, CFRX Toronto ON	6070da				
0900	1000		Canada, CFVP Calgary AB	6030da				
0900	1000		Canada, CHNX Halifax, NS	6130do				
0900	1000		Canada, CKZN St John's NF	6160do				
0900	1000		Canada, CKZU Vancouver BC	6160do				
0900	1000		China, China Radio Intl	11730pa	15210pa			
0900	1000		Costa Rica, R for Peace Intl	7455va	15050va			
0900	1000		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
0900	1000		Ecuador, HCJB	11775pa	21455usb			
0900	1000	mtwhf	Eqt Guinea, Radio Africa	15185af				
0900	1000	as/vl	Eqt. Guinea, Radio East Africa	15185af				
0900	1000	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
0900	1000	a	Germany, Good News World R	5985eu	5995eu			
0900	1000		Germany, Overcomer Ministries	13800pa	13810au			
0900	1000		Germany, Trans World Radio	12070eu				
0900	1000		Germany, Voice of Hope	5975eu	21590me			
0900	1000		Guyana, Voice of	3289do	5949da			
0900	1000	as/vl	Italy, Italian Radio Relay Svc	7120va				
0900	1000		Kenya, Kenya BC Corp	4885irr	4915irr			
0900	1000	vl	Lesotho, Radio	4800do				
0900	1000		Liberia, ELWA	4760da				
0900	1000		Liberia, Radio Liberia Intl	6100do				
0900	1000		Malaysia, Radio	7295da				
0900	1000	s	Malta, Voice of Mediterranean	11770eu				
0900	1000		Namibia, Namibian BC Corp	7165af	7215af			
0900	1000		New Zealand, Radio NZ Intl	11675pa				
0900	1000		New Zealand, ZLXA	3935do	7290do			
0900	1000	vl	Nigeria, Radio/Enugu	6025do				
0900	1000	vl	Nigeria, Radio/Ibadan	6050do				
0900	1000	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0900	1000	vl	Nigeria, Radio/Lagos	3326do	4990da			
0900	1000		Palau, KHBN/Voice of Hope	15725os				
0900	1000	vl	Papua New Guinea, NBC	4890do	9675irr			
0900	1000		Russia, Voice of Russia	15490au	17495au	17525au	17635au	17685au
0900	1000		Singapore, SBC Radio One	6150do				
0900	1000	vl	Solomon Islands, SIBC	5020do				
0900	1000		Sri Lanka, Sri Lanka BC Corp	6130da				
0900	1000		USA, Armed Forces Radio 6350va 6458va 13254va 13362va	4278va	4319va	4993va	5765va	
			16847va	6847va	10320va	10940va	12579va	12689va
0900	1000		USA, KAIJ Dallas TX	5755va				
0900	1000		USA, KTBN Salt Lake City UT	7510na				
0900	1000		USA, KWHR Naalehu HI	11565pa	17780as			
0900	1000		USA, Voice of America	11930as	13610as	15150as		
0900	1000		USA, WEWN Birmingham AL	5825na				
0900	1000		USA, WHRA Greenbush ME	11730af				
0900	1000		USA, WHRI Noblesville IN	5745va	7315am			
0900	1000		USA, WJCR Upton KY	7490am	13595as			
0900	1000	mtwhfa	USA, WRMI Miami FL	9955am				
0900	1000		USA, WSHB Cypress Crk SC	9455sa	9860eu	11615eu		
0900	1000		USA, WTJC Newport NC	9370na				
0900	1000		USA, WWCR Nashville TN	5070na	5935na	7435na	9475na	
0900	1000	vl	Vanuatu, Radio	3945do	4960do	7260do		
0900	1000		Zambia, Christian Voice	9865do				
0900	1000	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
0910	0920		Greece, Voice of Greece	12105eu	15630eu			
0915	1000	vl	Ghana, Ghana BC Corp	6130do	4915do			
0915	1000	vl/as	Ghana, Ghana BC Corp	4915do				
0930	1000		Australia, Radio	11880as	13605pa	15240as	17750as	21820as
0930	1000		Georgia, Georgian Radio	11910me				
0930	1000		Lithuania, Radio Vilnius	9710eu				
0930	1000		Netherlands, Radio	9790as	12065as	13710as		
0930	1000		UK, BBC World Service 12095eu 15190sa 15575as 21660as	6190af	6195as	9740as	11760me	11940af
				15310as	15360as	15400af	15485eu	15565eu
				17640eu	17760as	17790as	17830af	17885af
								21470af
0945	1000		USA, WINB Red Lion PA	13845va				

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

1000	1005		New Zealand, Radio NZ Intl	11675pa				
1000	1027		Vietnam, Voice of	12019as	15115as			
1000	1030		Guam, KSDA/ Adventist World R	11560as	11705as			
1000	1030		Netherlands, Radio	9790as	12065as	13710as		
1000	1030		Palau, KHBN/Voice of Hope	15725os				
1000	1030		Sri Lanka, Sri Lanka BC Corp	4940do				
1000	1030		UK, BBC World Service 12095eu 15310as 17760as 17790as	6190af	6195va	9740as	11760me	11940af
				15360as	15485eu	15565eu	15575as	17640eu
				17885af	21470af	21660as		
1000	1030	as	UK, BBC World Service	15190sa	15400af	17830af		
1000	1030		UK, RTE Radio	11685ou				
1000	1100		Anguilla, Caribbean Beacon	11775am				
1000	1100	v	Australia, ABC/Alice Springs	2310do				
1000	1100	vl	Australia, ABC/Katherine	2485do				
1000	1100	vl	Australia, ABC/Tennant Creek	2325do				
1000	1100		Australia, Radio	11880as	13605pa	15240as	17750as	21820as
1000	1100	as	Bhutan, Bhutan BC Service	6035da				
1000	1100	vl	Botswana, Radio	7255da	9600da			
1000	1100		Canada, CFRX Toronto ON	6070do				
1000	1100		Canada, CFVP Calgary AB	6030do				
1000	1100		Canada, CHNX Halifax, NS	6130do				
1000	1100		Canada, CKZN St John's NF	6160do				
1000	1100		Canada, CKZU Vancouver BC	6160do				
1000	1100		China, China Radio Intl	11730pa	15210pa			
1000	1100		Costa Rica, R for Peace Intl	15050va				
1000	1100		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
1000	1100		Ecuador, HCJB	11755pa	21455usb			
1000	1100	mtwhf	Eqt Guinea, Radio Africa	15185af				
1000	1100	as/vl	Eqt. Guinea, Radio East Africa	15185af				
1000	1100	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1000	1100		Germany, Voice of Hope	21590me				
1000	1100	vl	Ghana, Ghana BC Corp	6130do				
1000	1100	vl, as	Ghana, Ghana BC Corp	4915do				
1000	1100		Guyana, Voice of	5949do				
1000	1100		India, All India Radio 17895au	11585as	15050as	15770au	17510au	17840au

1000	1100	as/vl	Italy, Italian Radio Relay Svc	7120va				
1000	1100		Japan, Radio	9695pa	15590as	21755pa		
1000	1100		Kenya, Kenya BC Corp	4885irr	4915irr			
1000	1100	vl	Lesotho, Radio	4800do				
1000	1100		Liberia, ELWA	4760do				
1000	1100		Liberia, Radio Liberia Intl	6100do				
1000	1100		Malaysia, Radio	7295do				
1000	1100		Namibia, Namibian BC Corp	7165af	7215af			
1000	1100		New Zealand, ZLXA	3935do				
1000	1100	vl	Nigeria, Radio/Enugu	6025do				
1000	1100	vl	Nigeria, Radio/Ibadan	6050do				
1000	1100	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1000	1100	vl	Nigeria, Radio/Lagos	4990do	7285do			
1000	1100	vl	Papua New Guinea, NBC	4890do	9675irr			
1000	1100		Singapore, SBC Radio One	6150do				
1000	1100	vl	Solomon Islands, SIBC	5020do				
1000	1100		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
			6350va 6458va 6847va	10320va	10940va	12579va	12689va	
			13254va 13362va 16847va					
1000	1100		USA, KAIJ Dallas TX	5755va				
1000	1100		USA, KTBN Salt Lake City UT	7510na				
1000	1100		USA, KWHR Naalehu HI	9930as	11565pa			
1000	1100		USA, Voice of America	5745am	7370am	9590am	9770pa	15240as
			15425as					
1000	1100		USA, WEWN Birmingham AL	7425na	15745eu			
1000	1100		USA, WHRI Noblesville IN	6040na	9495am			
1000	1100		USA, WINB Red Lion PA	13845va				
1000	1100		USA, WJCR Upton KY	7490am	13595as			
1000	1100	mtwhfa	USA, WRMI Miami FL	9955am				
1000	1100		USA, WRNO New Orleans LA	7395am				
1000	1100		USA, WSHB Cypress Crk SC	6095am	9455sa	11870as		
1000	1100		USA, WTJC Newport NC	9370na				
1000	1100		USA, WWCR Nashville TN	5070na	5935na	7260na	15685na	
1000	1100		USA, WYFR Okeechobee FL	5950na				
1000	1100	vl	Vanuatu, Radio	3945do	4960do	7260do		
1000	1100	mt hfa	Vatican City, Vatican Radio	5885eu				
1000	1100		Zambia, Christian Voice	9865do				
1000	1100	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
1006	1100		New Zealand, Radio NZ Intl	15175pa				
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9705do		
1030	1050		UAE, Emirates Radio	13675eu	15370eu	15395eu	21605eu	
1030	1100		Guam, KSDA/ Adventist World R	11560as				
1030	1100		Malaysia, RTM Sarawak	7160do				
1030	1100		Mongolia, Voice of	12085au				
1030	1100		Netherlands, Radio	5965na	6045eu	9760as	9860eu	12065as
			13710as					
1030	1100		Palau, KHBN/Voice of Hope	9965as	15725as			
1030	1100		Sri Lanka, Sri Lanka BC Corp	4940do	11835as	15120as	17850as	
1030	1100		UK, BBC World Service	6190af	6195va	9740as	11760me	11940af
			12095eu 15310as	15485eu	15565eu	15575as	17640eu	17790as
			17885af 21470af					
1045	1100		Germany, Deutsche Welle	13640eu				
1056	1100		Pakistan, Radio	17520eu	21465eu			

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

1100	1127		Vietnam, Voice of	7285as				
1100	1130		Australia, Radio	5995pa	6020pa	9475as	9580va	11650pa
			11880as 12080va	13605va	15240as	21820as		
1100	1130		Netherlands, Radio	5965na	6045eu	9760as	9860eu	12065as
			13710as					
1100	1130		Sri Lanka, Sri Lanka BC Corp	4940do	11835as	15210as	17850as	
1100	1130		Switzerland, Swiss Radio Intl	15315eu				
1100	1130	mtwhf	UK, BBC Caribbean Report	6195ca	15220ca			
1100	1130		UK, BBC World Service	6190af	6195as	9740as	9815as	11760me
			11940af 11955as	12095eu	15280as	15310as	15400af	15485eu
			15565eu 15575as	17640eu	17700as	17790sa	17830af	17885af
			21470af					
1100	1130	as	UK, BBC World Service	6195am	15190sa	15220am		
1100	1145		Germany, Deutsche Welle	11785af	15410af	17860af	21780af	
1100	1150		UAE, Emirates Radio	13675eu	15395eu	21605eu		
1100	1200		Anguilla, Caribbean Beacon	11775am				
1100	1200	vl	Australia, ABC/Alice Springs	2310do				
1100	1200	vl	Australia, ABC/Katherine	2485do				
1100	1200	vl	Australia, ABC/Tennant Creek	2325do				
1100	1200	vl	Botswana, Radio	7255do	9600do			
1100	1200		Canada, CBC Northern Service	9625do				
1100	1200		Canada, CFRX Toronto ON	6070do				
1100	1200		Canada, CFVP Calgary AB	6030do				
1100	1200		Canada, CHNX Halifax, NS	6130do				
1100	1200		Canada, CKZN St John's NF	6160do				
1100	1200		Canada, CKZU Vancouver BC	6160do				
1100	1200		Costa Rica, R for Peace Intl	15050va				
1100	1200		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na 17645as					
1100	1200		Ecuador, HCJB	12005am	15115am	21455usb		
1100	1200	mtwhf	Eqt Guinea, Radio Africa	15185af				
1100	1200	as/vl	Eqt Guinea, Radio East Africa	15185af				
1100	1200	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1100	1200		Germany, Voice of Hope	21590me				
1100	1200	vl	Ghana, Ghana BC Corp	6130do				
1100	1200	vl/as	Ghana, Ghana BC Corp	4915do				
1100	1200		Guyana, Voice of	5949do				
1100	1200		Iran, VO Islamic Rep of Iran	15385as	15430as	15585as	21470as	
			21730as					
1100	1200	as/vl	Italy, Italian Radio Relay Svc	7120va				
1100	1200		Japan, Radio	6120na	9695pa	15590as		
1100	1200		Kenya, Kenya BC Corp	4885irr	4915irr			
1100	1200	vl	Lesotho, Radio	4800do				
1100	1200		Liberia, ELWA	4760do				
1100	1200		Liberia, Radio Liberia Intl	6100da				
1100	1200		Malaysia, Radio	7295do				
1100	1200		Malaysia, TRM Sarawak	7160da				
1100	1200		Namibia, Namibian BC Corp	7165af	7215af			
1100	1200		New Zealand, Radio NZ Intl	15175pa				
1100	1200		New Zealand, ZLXA	3935do				
1100	1200	vl	Nigeria, Radio/Enugu	6025do				
1100	1200	vl	Nigeria, Radio/Ibadan	6050da				
1100	1200	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1100	1200	vl	Nigeria, Radio/Lagos	4990do	7285do			
1100	1200		Palau, KHBN/Voice of Hope	9965as				
1100	1200	vl	Papua New Guinea, NBC	4890do	9675irr			
1100	1200		Singapore, Radio Singapore Intl	6150as	9600as			
1100	1200		Switzerland, Swiss Radio Intl	13735as	21770as			
1100	1200		Taiwan, Radio Taipei Intl	7445as	11905as			
1100	1200		Taiwan, Voice of Asia	7445as				
1100	1200		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
			6350va 6458va 6847va	10320va	10940va	12579va	12689va	
			13254va 13362va 16847va					
1100	1200		USA, KAIJ Dallas TX	5755va				
1100	1200		USA, KTBN Salt Lake City UT	7510na				
1100	1200		USA, KWHR Naalehu HI	9930as	11565pa			
1100	1200		USA, Voice of America	6160as	9645as	9760as	9770pa	15160as
			15240as 15425as					
1100	1200		USA, WEWN Birmingham AL	7425na	15745eu			
1100	1200		USA, WHRI Noblesville IN	6040na	9495am			
1100	1200		USA, WINB Red Lion PA	13845va				
1100	1200		USA, WJCR Upton KY	7490am	13595as			
1100	1200	mtwhfa	USA, WRMI Miami FL	9955am				
1100	1200		USA, WRNO New Orleans LA	7395am				
1100	1200		USA, WSHB Cypress Crk SC	6095am	9455am	11590am	11660am	
1100	1200		USA, WTJC Newport NC	9370na				
1100	1200		USA, WWCR Nashville TN	5070na	5935na	7260na	15685na	
1100	1200		USA, WYFR Okeechobee FL	5850na	5950na			
1100	1200	vl/s	Vanuatu, Radio	3945do	4960do	7260do		
1100	1200		Zambia, Christian Voice	9865do				
1100	1200	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
1115	1127		Zambia, National BC Corp	6265do				
1115	1145		Nepal, Radio	5005as	7165as			
1130	1135		Israel, Kol Israel	15640va	17545va			
1130	1145	vl	Libya, Voice of Africa	11815af	15435af	17725af		
1130	1200		Australia, Radio	5995pa	6020pa	9475as	9580va	11650pa
			11880as 12080va	13605va	21820as			
1130	1200	a	Austria, Radio Austria Intl	6155eu	13730eu			
1130	1200		Netherlands, Radio	5965na	6045eu	9760as	9860eu	12065as
			13710as					
1130	1200		South Korea, Radio Korea Intl	9650na				
1130	1200		Sri Lanka, Sri Lanka BC Corp	4940do				
1130	1200		Sweden, Radio	17505as	18960na			
1130	1200		UK, BBC World Service	6190af	6195as	9740as	9815as	11760me
			11940af 11955as	12095eu	15220am	15280as	15310as	15485eu
			15575as 17640eu	17700as	17830af	17885af	21470af	
1130	1200	f	Vatican City, Vatican Radio	15595va	17515va			

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

1200	1205		New Zealand, Radio NZ Intl	15175pa				
1200	1220	fa	Kazakhstan, Radio Almaty	9620eu	11840eu			
1200	1220	mtwhf	UK, BBC Caribbean Report	6195ca	15220ca			
1200	1220		UK, BBC World Service	6190af	6195as	9740as	9815as	11760me
			11940af 11955as	12095eu	15280as	15310as	15485eu	15565eu
			15575as 17640eu	17700as	17830af	17885af	21470af	
1200	1220	as	UK, BBC World Service	6195am	15220am			
1200	1225		Netherlands, Radio	5965na	9860eu			
1200	1230		France Radio France Intl	25820af				
1200	1230		Iran, VO Islamic Rep. of Iran	15385as	15430as	15585as	21470as	
			21730as					
1200	1230		Philippines, FEBC	15110as				
1200	1230		Sri Lanka, Sri Lanka BC Corp	4940do				
1200	1230		Uzbekistan, Radio Tashkent	7285as	9715as	15295as	17775as	
1200	1245		USA, WYFR Okeechobee FL	5850na	5950na	17750na		
1200	1256		North Korea, Voice of Korea	3560va	9640va	9850va	9975va	
			11334va 13650va					
1200	1300		Anguilla, Caribbean Beacon	11775am				
1200	1300	vl	Australia, ABC/Alice Springs	2310do				
1200	1300	vl	Australia, ABC/Katherine	2485do				
1200	1300	vl	Australia, ABC/Tennant Creek	2325do				
1200	1300		Australia, Radio	5995pa	6020pa	9475as	9580as	11650va
			11880as 21820as					
1200	1300		Bangladesh, Bangla Betar	7185as	9550as			
1200	1300	vl	Botswana, Radio	7255do	9600do			
1200	1300		Bulgaria, Radio	17500eu				
1200	1300		Canada, CBC Northern Service	9625do				
1200	1300		Canada, CFRX Toronto ON	6070do				
1200	1300		Canada, CFVP Calgary AB	6030do				
1200	1300		Canada, CHNX Halifax, NS	6130do				
1200	1300		Canada, CKZN St John's NF	6160do				
1200	1300		Canada, CKZU Vancouver BC	6160do				
1200	1300		Canada, Radio Canada Intl	9660as	15190as			
1200	1300	mtwhf	Canada, Radio Canada Intl	9640am	15305am	17820am		
1200	1300		China, China Radio Intl	9730as	9760pa	11675pa	11980as	15415pa
1200	1300		Costa Rica, R for Peace Intl	15050usb	21815usb			
1200	1300		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na 17645as					
1200	1300		Ecuador, HCJB	12005am	15115am	21455usb		
1200	1300	as/vl	Eqt. Guinea, Radio East Africa	15185af				
1200	1300	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1200	1300		Germany, Voice of Hope	15715me				
1200	1300	vl	Ghana, Ghana BC Corp	4915do	6130do			
1200	1300		Guyana, Voice of	5949do				
1200	1300	as/vl	Italy, Italian Radio Relay Svc	7120va				
1200	1300		Kenya, Kenya BC Corp	4885irr	4915irr			
1200	1300	vl	Lesotho, Radio	4800do				
1200	1300		Liberia, Radio Liberia Intl	6100do				

1200	1300		Malaysia, Radio	7295da				
1200	1300		Namibia, Namibian BC Corp	7165af	7215af			
1200	1300		Netherlands, Radio	9515na				
1200	1300		New Zealand, ZLXA	3935do				
1200	1300	vl	Nigeria, Radio/Enugu	6025do				
1200	1300	vl	Nigeria, Radio/Ibadan	6050da				
1200	1300	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570da	
1200	1300	vl	Nigeria, Radio/Lagos	4990da	7285da			
1200	1300		Palau, KHBN/Voice of Hope		9965as			
1200	1300	vl	Papua New Guinea, NBC		4890da	9675irr		
1200	1300		Singapore, Radio Singapore Intl		6150as	9600as		
1200	1300		Taiwan, Radio Taipei Intl		7130as	9610au		
1200	1300		Ukraine, Radio Ukraine Intl		12040eu	15135na		
1200	1300		USA, Armed Forces Radio		4278va	4319va	4993va	5765va
			6350va 6458va 6847va		10320va	10940va	12579va	12689va
			13254va 13362va 16847va					
1200	1300		USA, KAIJ Dallas TX	13815va				
1200	1300		USA, KTBN Salt Lake City UT		7510na			
1200	1300		USA, KWHR Naalehu HI	9930as	11565pa			
1200	1300		USA, Voice of America	6160as	9645as	9760as	15160as	15240as
			15425as					
1200	1300		USA, WEWN Birmingham AL		7425na	15745eu		
1200	1300		USA, WHRI Noblesville IN		6040na	9495am		
1200	1300		USA, WINB Red Lion PA	13570am				
1200	1300		USA, WJCR Upton KY	7490am	13595as			
1200	1300	mtwhfa	USA, WRMI Miami FL	15724na				
1200	1300	s	USA, WRMI Miami FL	9955am				
1200	1300		USA, WRNO New Orleans LA		7395am			
1200	1300		USA, WSHB Cypress Crk SC		6095am	9455am	9875as	11590am
			11660am 12065as					
1200	1300		USA, WTJC Newport NC	9370na				
1200	1300		USA, WWCR Nashville TN		7435na	12160na	13845na	15685na
1200	1300		USA, WWFV McCaysville GA		12172va			
1200	1300	vl/s	Vanuatu, Radio	3945do	4960do	7260do		
1200	1300		Zambia, Christian Voice	9865da				
1200	1300	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1205	1300	occsnal	New Zealand, Radio NZ Intl		6095pa			
1215	1300		Egypt, Radio Cairo	17595as				
1220	1240	w	Kazakhstan, Radio Almaty		9620eu	11840eu		
1220	1300		UK, BBC World Service	6190af	6195as	9740as	9815as	11760me
			11940af 11955as	12095eu	15220am	15280as	15310as	15485eu
			15565eu 15575as	17640eu	17700as	17830af	17885af	21470af
1230	1257		Vietnam, Voice of	12019as	15115as			
1230	1300		Belgium, RVI Flanders R Intl		9865as	9925eu		
1230	1300		Finland, YLE/Radio Finland		15400na	17670na		
1230	1300		Germany, Overcomer Ministries		6110eu			
1230	1300		Italy/Adv World Radio Europe		9610eu			
1230	1300		Sri Lanka, Sri Lanka BC Corp		4940do	6005as	6075as	9770as
			15425as					
1230	1300		Sweden, Radio	17505as	18960na	21530as		
1230	1300		Thailand, Radio	9885va				
1230	1300	a	UK, Wales Radio Intl	17810au				
1230	1300		Ukraine, Radio Ukraine Intl		15135na			
1240	1300	t	Kazakhstan, Radio Almaty		9620eu	11840eu		
1245	1300		Germany, Deutsche Welle		13640eu			
1245	1300	a	Seychelles, FEBA Radio	15535me				
1245	1300		USA, WYFR Okeechobee FL		17750na			
1255	1300	mtwhfa	Taiwan, CBS	6180as	7250as	9630as	11725as	11775as

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

1300	1329		Czech Rep, Radio Prague Intl		13580eu	21745as		
1300	1330		Australia, Radio	5995pa	6020pa	9475as	9580va	11650va
			11880as 21820as					
1300	1330		Egypt, Radio Cairo	17595as				
1300	1330	s	Germany, Universal Life	9955na				
1300	1330		Guam, KSDA/ Adventist World R		15385as			
1300	1330		Switzerland, Swiss Radio Intl		15315eu			
1300	1355		Poland, Radio Polonia	6095eu	7270eu	9525eu	11820eu	
1300	1400		Anguilla, Caribbean Beacon		11775am			
1300	1400	vl	Australia, ABC/Alice Springs		2310do			
1300	1400	vl	Australia, ABC/Katherine		2485do			
1300	1400	vl	Australia, ABC/Tennant Creek		2325do			
1300	1400	vl	Botswana, Radio	7255do	9600do			
1300	1400		Canada, CBC Northern Service		9625da			
1300	1400		Canada, CFRX Toronto ON		6070da			
1300	1400		Canada, CFVP Calgary AB		6030do			
1300	1400		Canada, CHNX Halifax, NS		6130do			
1300	1400		Canada, CKZN St John's NF		6160do			
1300	1400		Canada, CKZU Vancouver BC		6160do			
1300	1400		Canada, Radio Canada Intl		9640am	15305am		
1300	1400	mtwhf	Canada, Radio Canada Intl		17820am			
1300	1400	as	Canada, Radio Canada Intl		17800am			
1300	1400		China, China Radio Intl	7405na	9570na	11675pa	11900pa	11980as
			15180as					
1300	1400		China, Voice of Hope	13820as				
1300	1400		Costa Rica, R for Peace Intl		15050va	21815usb		
1300	1400		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
1300	1400		Ecuador, HCJB	12005am	15115am	21455usb		
1300	1400	as/vl	Eqt. Guinea, Radio East Africa		15185af			
1300	1400	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1300	1400		France, Radio France Intl		15540eu			
1300	1400		Germany, Deutsche Welle		13640eu			
1300	1400		Germany, Overcomer Ministries		6110eu	13810af		
1300	1400		Germnay, Voice of Hope	15715me				
1300	1400	vl	Ghana, Ghana BC Corp		4915da	6130do		
1300	1400		Guyana, Voice of	5949da				
1300	1400	as/vl	Italy, Italian Radio Relay Svc		7120va			
1300	1400		Jordan, Radio	11690eu				
1300	1400		Kenya, Kenya BC Corp	4885irr	4915irr			
1300	1400	vl	Lesotho, Radio	4800da				
1300	1400		Liberia, Radio Liberia Intl		6100do			
1300	1400		Malaysia, Radio	7295da				
1300	1400		Namibia, Namibian BC Corp	7165af	7215af			
1300	1400		Netherland, Radio	9515na	11865na			
1300	1400	occsnal	New Zealand, Radio NZ Intl		6095pa			
1300	1400		New Zealand, ZLXA	3935do				
1300	1400	vl	Nigeria, Radio/Enugu	6025do				
1300	1400	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1300	1400	vl	Nigeria, Radio/Lagos	4990do	7285do			
1300	1400		Palau, KHBN/Voice of Hope		9965as			
1300	1400	vl	Papua New Guinea, NBC		4890do	9675irr		
1300	1400	as	S Africa, Channel Africa	11720af	17780af	21725af		
1300	1400		Singapore, Radio Singapore Intl		6150as	9600as		
1300	1400		South Korea, Radio Korea Intl		9570as	13670am		
1300	1400		Sri Lanka, Sri Lanka BC Corp		4940do	6005as	6075as	9770as
			15425as					
1300	1400		Uganda, Radio	7196do				
1300	1400		UK, BBC World Service	6190af	9740as	9815as	11760me	11940af
			12095eu 15220am	15310as	15420af	15485eu	15565eu	15575me
			17640eu 17700as	17830af	17885af	21470af		
1300	1400		USA, Armed Forces Radio		4278va	4319va	4993va	5765va
			6350va 6458va 6847va		10320va	10940va	12579va	12689va
			13254va 13362va 16847va					
1300	1400		USA, KAIJ Dallas TX	13815va				
1300	1400		USA, KJES Vado NM	11715na				
1300	1400		USA, KNLS Anchor Point AK		11765as			
1300	1400		USA, KTBN Salt Lake City UT		7510na			
1300	1400		USA, KWHR Naalehu HI	9930as	11565pa			
1300	1400		USA, Voice of America	6160as	9645as	9760as	15160as	15425as
1300	1400	a	USA, WBCQ Monticello ME		17495na			
1300	1400		USA, WEWN Birmingham AL		11875na			
1300	1400		USA, WHRI Noblesville IN		6040na	15105am		
1300	1400		USA, WINB Red Lion PA	13570am				
1300	1400		USA, WJCR Upton KY	7490am	13595as			
1300	1400	mtwhfa	USA, WRMI Miami FL	15724na				
1300	1400	s	USA, WRMI Miami FL	9955am				
1300	1400		USA, WRNO New Orleans LA		7395am			
1300	1400		USA, WSHB Cypress Crk SC		9430na	9455am	9940as	
1300	1400		USA, WTJC Newport NC	9370na				
1300	1400		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
1300	1400		USA, WWFV McCaysville GA		12172va			
1300	1400		USA, WYFR Okeechobee FL		11550as	11830na	11970na	17750na
1300	1400		Zambia, Christian Voice	9865do				
1300	1400	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1330	1350		UAE, Emirates Radio	13630eu	13675eu	15395eu	21605eu	
1330	1357		Vietnam, Voice of	9730eu	11630eu	13740eu		
1330	1400		Australia, Radio	5995po	6020pa	9475as	9580va	11650va
			11660as 21820as					
1330	1400	s	Austria, Radio Austria Intl		6155eu	13730eu	21789as	
1330	1400		Germany, Voice of Hope	15750as				
1330	1400		Guam, KSDA/ Adventist World R		11705as	11980as		
1330	1400		India, All India Radio	9690as	11620as	13710as		
1330	1400		Sweden, Radio	17505va	18960na			
1330	1400		Turkey, Voice of	17810as	17830eu			
1330	1400		UAE, AWR Africa	15385va				
1330	1400		UK, BBC World Service	6190af	6195va	9740as	9815as	11760me
			11940af 12095eu	15220am	15310as	15420af	15485eu	15565eu
			15575me 17640eu	17700as	17830af	17885af	21470af	
1330	1400		Uzbekistan, Radio Tashkent		7285as	9715as	15295as	17775as

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

1400	1430		Ecuador, HCJB	12005am	15115am	21455usb		
1400	1430		Germany, Voice of Hope	15750me	17550as			
1400	1430		Guam, KSDA/ Adventist World R		17720as			
1400	1430		Thailand, Radio	9830as				
1400	1430		Turkey, Voice of	17810as	17830eu			
1400	1430	cs	UK, BBC World Service	15245as				
1400	1430	s	USA, Voice of America	18275va				
1400	1456		Romania, Radio Romania Intl		15250eu	17735eu		
1400	1500		Anguilla, Caribbean Beacon		11775am			
1400	1500	vl	Australia, ABC/Alice Springs		2310do			
1400	1500	vl	Australia, ABC/Katherine		2485do			
1400	1500	vl	Australia, ABC/Tennant Creek		2325do			
1400	1500		Australia, Radio	5995va	9580va	11660as		
1400	1500	v	Botswana, Radio	7255do	9600do			
1400	1500	vl	Cameroon, CRTV Radio Buea		6005do			
1400	1500		Canada, CBC Northern Service		9625do			
1400	1500		Canada, CFRX Toronto ON		6070do			
1400	1500		Canada, CFVP Calgary AB		6030da			
1400	1500		Canada, CHNX Halifax, NS		6130do			
1400	1500		Canada, CKZN St John's NF		6160da			
1400	1500		Canada, CKZU Vancouver BC		6160do			
1400	1500		Canada, Radio Canada Intl		9640am	15305am		
1400	1500	mtwhf	Canada, Radio Canada Intl		17820am			
1400	1500	as	Canada, Radio Canada Intl		17800am			
1400	1500		China, China Radio Intl	7180as	7405na	9700as	`1675as	11765as
			13685af 15125af					
1400	1500		China, Voice of Hope	13820as				
1400	1500		Costa Rica, R for Peace Intl		15050va	21815usb		
1400	1500		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
1400	1500	as/vl	Eqt. Guinea, Radio East Africa		15185af			
1400	1500	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1400	1500		France Radio France Intl	11610me	17620as			
1400	1500		Germany, Deutsche Welle		13640eu			
1400	1500	as	Germany, Overcomer Ministries		17490eu			
1400	1500		Germany, Overcomer Ministries		6110eu	13810af		
1400	1500	vl	Ghana, Ghana BC Corp		4915do	6130do		
1400	1500		Guyana, Voice of	5949da				
1400	1500		India, All India Radio	9690as	11620as	13710as		

1400	1500	as/vl	Italy, Italian Radio Relay Svc		7120va			
1400	1500		Japan, Radio	7200pa	9505na	11730as	17755me	
1400	1500		Kenya, Kenya BC Corp	4885irr	4915irr			
1400	1500	vl	Lesotho, Radio	4800do				
1400	1500		Liberia, Radio Liberia Intl		6100do			
1400	1500		Malaysia, Radio	7295do				
1400	1500		Malaysia, RTM Sarawak	7160do				
1400	1500		Namibia, Namibian BC Corp		7165af	7215af		
1400	1500		Netherland, Radio	9515na	11865na			
1400	1500	occsnal	New Zealand, Radio NZ Intl		6095pa			
1400	1500		New Zealand, ZLXA	3935do				
1400	1500	vl	Nigeria, Radio/Enugu	6025do				
1400	1500	vl	Nigeria, Radio/Ibadan	6050do				
1400	1500	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1400	1500	vl	Nigeria, Radio/Lagos	4990do	7285do			
1400	1500		Oman, Radio Sultanate of		15140va			
1400	1500		Palau, KHBN/Voice of Hope		9965as			
1400	1500	os	S Africa, Channel Africa	11720af	17780af	21725af		
1400	1500		Singapore, SBC Radio One		6150do			
1400	1500		Sri Lanka, Sri Lanka BC Corp 15425as		4940do	6005as	6075as	9770as
1400	1500		Switzerland, Swiss Radio Intl		9575as	17680os		
1400	1500		Taiwan, Radio Taipei Intl		15265os			
1400	1500		Ugondo, Radio	7196do				
1400	1500		UK, BBC World Service 12095eu 15310as 17830af 17840am	6190af 15485eu 21470af	6195as 15565eu 21660af	9740as 15575me	9815as 17640eu	11940af 17700as
1400	1500		USA, Armed Forces Radio 6350va 6458va 13254va 13362va	6847va	4278va 10320va	4319va 10940va	4993va 12579va	5765va 12689va
1400	1500		USA, KAIJ Dallas TX	13815va				
1400	1500		USA, KJES Vodo NM	11715na				
1400	1500		USA, KTBN Salt Lake City UT		7510no			
1400	1500		USA, KWHR Naalehu HI	9930as	11565pa			
1400	1500		USA, Voice of America 15255va 15425os	6160as	7125os	9645as	9760as	15160os
1400	1500		USA, WBCQ Monticello ME		17494na			
1400	1500		USA, WEWN Birmingham AL		11875no			
1400	1500		USA, WHRI Noblesville IN		6040na	15105am		
1400	1500		USA, WINB Red Lion PA	13750am				
1400	1500		USA, WJCR Upton KY	7490am	13595as			
1400	1500	mtwhfo	USA, WRMI Miami FL	15724na				
1400	1500	s	USA, WRMI Miami FL	9955am				
1400	1500		USA, WRNO New Orleans LA		7395am			
1400	1500		USA, WTJC Newport NC	9370na				
1400	1500		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
1400	1500		USA, WWFV McCoysville GA		12172va			
1400	1500		USA, WYFR Okeechobee FL		11550as	11830na	11970na	17750na
1400	1500		Zambia, Christian Voice	9865do				
1400	1500	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1415	1420		Nepal, Radio 5005as	7165as				
1430	1500		Guam, KTWR/ Trans World R		15330os			
1430	1500		Malaysia, RTM Kota Kinabalu		5980do			
1430	1500		Myanmar, Radio	5985do				
1430	1500		Netherlands, Radio	9890as	11835as	12075as	15220na	
1445	1500	f	Seychelles, FEBA Radio	11600as				

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

1500	1530		Australia, Radio	5995va	9580va	11650va	11660as	
1500	1530		Germany, Voice of Hope	17550as				
1500	1530		Mexico, Radio Mexico Intl		9705am	11770am		
1500	1530		Mongolia, Voice of	12015as	12085os			
1500	1530		S Africa, Channel Africa	17770af				
1500	1530	h	Seychelles, FEBA Radio	11600as				
1500	1530		UK, BBC World Service 11940af 12095eu 15310as 17700as 17830af 17840am	5975as	6190af 15400af 21470af	6195as 15420af 21490af	9740as 15485eu 21660af	11860af 15565eu
1500	1530		USA, VOA Special English 12040as 15550as		6160as	9590as	9760as	9845os
1500	1556		North Korea, Voice of Korea 13760na		4405va	6574na	9335na	11710na
1500	1559		Canada, Radio Canada Intl		15455as	17720as		
1500	1559	as	Canada, Radio Canada Intl		9640am	15305am	17800am	
1500	1600		Anguilla, Caribbean Beacon		11775am			
1500	1600	vl	Australia, ABC/Alice Springs		2310do			
1500	1600	vl	Australia, ABC/Katherine		2485do			
1500	1600	vl	Australia, ABC/Tennant Creek		2325do			
1500	1600	vl	Botswana, Radio	7255do	9600do			
1500	1600		Canada, CBC Northern Service		9625do			
1500	1600		Canada, CFRX Toronto ON		6070do			
1500	1600		Canada, CFVP Calgary AB		6030do			
1500	1600		Canada, CHNX Halifax, NS		6130do			
1500	1600		Canada, CKZN St John's NF		6160do			
1500	1600		Canada, CKZU Vancouver BC		6160do			
1500	1600		China, China Radio Intl	7160as	7405na	9785as	13685af	15125af
1500	1600		China, Voice of Hope	13820os				
1500	1600		Costa Rica, R for Peace Intl		15050va	21815usb		
1500	1600		Costa Rica, University Network 11870am 13749na	17645as	5030am	6150am	7375am	9724sa
1500	1600	os/vl	Eqt. Guinea, Radio East Africa		15185af			
1500	1600	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1500	1600		Germany, Deutsche Welle		13640eu			
1500	1600	as	Germany, Overcomer Ministries		17490eu			
1500	1600		Germany, Overcomer Ministries		5110eu	13810af		
1500	1600		Germany, Voice of Hope	15715me				
1500	1600	vl	Ghana, Ghana BC Corp		4915do	6130do		
1500	1600		Guam, KTWR/ Trans World R		15330as			
1500	1600		Guyana, Voice of	5949do				
1500	1600		Japan, Radio	7200pa	9750as	11730as		
1500	1600		Jordan, Radio	11690na	17680al			
1500	1600		Kenya, Kenya BC Corp	4885irr	4915irr			
1500	1600	vl	Lesotho, Radio	4800do				
1500	1600		Liberia, Radio Liberia Intl		6100da			
1500	1600		Malaysia, Radio	7295do				
1500	1600		Malaysia, RTM Kota Kinabalu		5980da			
1500	1600		Malaysia, RTM Sarawak	7160do				
1500	1600		Myanmar, Radio	5985do				
1500	1600		Namibia, Namibian BC Corp		7165af	7215af		
1500	1600		Netherlands, Radio 15220na	9515na	9890as	11835as	11865na	12075as
1500	1600	occsnal	New Zealand, Radio NZ Intl		6095pa			
1500	1600		New Zealand, ZLXA	3935do				
1500	1600	vl	Nigeria, Radio/Enugu	6025do				
1500	1600	vl	Nigeria, Radio/Ibadan	6050do				
1500	1600	vl	Nigeria, Radio/Kaduno	4770do	6090do	7275do	9570do	
1500	1600	vl	Nigeria, Radio/Lagos	4990do	7285do			
1500	1600		Russia, Voice of Russia	9745as	12055as	15560as		
1500	1600		Singapore, SBC Radio One		6150do			
1500	1600		Sri Lanka, Sri Lanka BC Corp 15425os		4940do	6005os	6075as	9770as
1500	1600		Uganda, Radio	7196do				
1500	1600	s	UK, Merlin Network One	6175eu				
1500	1600		USA, Armed Forces Radio 6350va 6458va 13254va 13362va	6847va	4278va 10320va	4319va 10940va	4993va 12579va	5765va 12689va
1500	1600		USA, KAIJ Dallas TX	13815va				
1500	1600		USA, KTBN Salt Lake City UT		15590na			
1500	1600		USA, KWHR Naalehu HI	9930as	11565pa			
1500	1600		USA, Voice of America	7125os	9645as	9700me	15205eu	15255va
1500	1600		USA, WBCQ Monticello ME		17494na			
1500	1600		USA, WEWN Birmingham AL		11875na			
1500	1600		USA, WHRA Greenbush ME		17650af			
1500	1600		USA, WHRI Noblesville IN		13760va	15105am		
1500	1600		USA, WINB Red Lion PA	13570am				
1500	1600		USA, WJCR Upton KY	7490am	13595as			
1500	1600	mtwhfa	USA, WRMI Miami FL	15724na				
1500	1600	s	USA, WRMI Miami FL	9955am				
1500	1600		USA, WRNO New Orleans LA		7395am	15420ol		
1500	1600		USA, WTJC Newport NC	9370na				
1500	1600		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
1500	1600		USA, WWFV McCoysville GA		12172va			
1500	1600		USA, WYFR Okeechobee FL		5280os	11830na	17750no	
1500	1600		Zambia, Christian Voice	4965do				
1500	1600	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1515	1600	m	Seychelles, FEBA Radio	11600as				
1530	1600		Australia, Radio	5995va	9475as	9580va	11650va	11660as
1530	1600		Austria, AWR Europe	7165eu	17660os			
1530	1600		Austria, Radio Austria Intl		6155eu	13730eu	17865na	
1530	1600	vl	Botswana, Radio	3356do	4820do	7255do		
1530	1600		Iran, VO Islamic Rep. of Iran		7245as	9635os	11775na	
1530	1600	mtwhf	S Africa, World Beacon	6145af				
1530	1600	as	Seychelles, FEBA Radio	11600as				
1530	1600		UK, BBC World Service 11940af 12095eu 17830af 17840am	5975as	6190af 15400af 21470af	6195as 15485eu 21660af	9740as 15565eu	9815as 17700as
1545	1600		USA, WMLK Bethel PA	9465eu				
1550	1600		Vatican City, Vatican Radio		12065au	13765au	15235au	

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

1600	1610		Vatican City, Vatican Radio		12065au	13765au	15235au	
1600	1615		Pakistan, Radio	11570va	15100va	15725va	17720va	
1600	1620		UAE, Emirates Radio	13630eu	13675eu	15395eu	21605eu	
1600	1625		Netherlands, Radio	9890as	11835as	12075as	15220na	
1600	1627		Czech Rep, Radio Prague Intl		5930eu	21745af		
1600	1630		Iran, VO Islamic Rep. of Iran		7245as	9635os	11775as	
1600	1630		Mexico, Radio Mexico Intl		9705am	11770am		
1600	1630		Netherland, Radio	9515na				
1600	1630		S Africa, Channel Africa	9525af				
1600	1630		UK, BBC World Service 9410eu 9740as 11940af 12095eu 15310as 15400af 15485eu 15565eu 17700as 17830af 17840am 21470af 21660af	5975as	6190af	6195as	7160as	
1600	1630	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1600	1650	occsnal	New Zealand, Radio NZ Intl		6095pa			
1600	1656		North Korea, Voice of Korea		3560va	6520va	9660va	9975va
1600	1700		Algeria, Radio Algiers Intl		11715va	15160va		
1600	1700		Anguilla, Caribbean Beacon		11775am			
1600	1700	vl	Australia, ABC/Alice Springs		2310do			
1600	1700	vl	Australia, ABC/Katherine		2485do			
1600	1700	vl	Australia, ABC/Tennant Creek		2325do			
1600	1700		Australia, Radio	5995va	9475as	9580va	11650va	11660as
1600	1700	vl	Botswana, Radio	3356do	4820do	7255do		
1600	1700		Canada, CBC Northern Service		9625do			
1600	1700		Canada, CFRX Toronto ON		6070do			
1600	1700		Canada, CFVP Calgary AB		6030do			
1600	1700		Canada, CHNX Halifax, NS		6130do			
1600	1700		Canada, CKZN St John's NF		6160do			
1600	1700		Canada, CKZU Vancouver BC		6160do			
1600	1700		China, China Radio Intl	7190af	13650af			
1600	1700		Costa Rica, R for Peace Intl		15050va	21815usb		
1600	1700		Costa Rica, University Network 11870am 13749na		5030am	6150am	7375am	9724sa
1600	1700		Ethiopia, Radio	7165af	9560af			
1600	1700	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1600	1700		France Radio France Intl 17850af	11615af	11995af	12015af	15605af	17605af
1600	1700		Germany, Deutsche Welle		13640eu			
1600	1700	a	Germany, Good News World R		15105af			
1600	1700	as	Germany, Overcomer Ministries		17490eu			
1600	1700	vl	Ghana, Ghana BC Corp		4915do	6130do		
1600	1700	a	Greece, Voice of Greece	9420eu	15630eu	17705na		
1600	1700		Guam, KSDA/ Adventist World R		11850as			

1600	1700		Guyana, Voice of	5949da			
1600	1700		Jordan, Radio	11690na	17680al		
1600	1700		Kenya, Kenya BC Corp	4885irr	4915irr		
1600	1700	vl	Lesotho, Radio	4800do			
1600	1700		Liberia, Radio Liberia Intl	6100da			
1600	1700		Malaysia, Radio	7295da			
1600	1700		Namibia, Namibian BC Corp	7165af	7215af		
1600	1700		New Zealand, ZLXA	3935da			
1600	1700	vl	Nigeria, Radio/Enugu	6025da			
1600	1700	vl	Nigeria, Radio/Ibadan	6050da			
1600	1700	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570da
1600	1700	vl	Nigeria, Radio/Lagos	3326do	4990do		
1600	1700		Russia, Voice of Russia	4940me	4965me	4975me	7325me 9730eu
				11500as	11985me		
1600	1700		S Africa, World Beacon	6145af			
1600	1700		South Korea, Radio Korea Intl	5975am	6150eu	9515af	9870af
1600	1700		Sri Lanka, Sri Lanka BC Corp	4940do			
1600	1700		Taiwan, Radio Taipei Intl	11550as			
1600	1700		Uganda, Radio	7196da			
1600	1700	a	UK, Merlin Network One	6175eu			
1600	1700		UK, World Beacon	15455eu			
1600	1700		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
			6350va 6458va	6847va	10320va	10940va	12579va 12689va
			13254va 13362va	16847va			
1600	1700		USA, KAIJ Dallas TX	13815va			
1600	1700		USA, KTBN Salt Lake City UT	15590na			
1600	1700		USA, KWHR Naalehu HI	9930as			
1600	1700		USA, VOA Special English	13600af	15445af	17895af	
1600	1700		USA, Voice of America	6035af	6160as	7125as	9645as 9700me
			9760as 13605af	13710af	15205eu	15225af	15255va 15410af
1600	1700		USA, WBCQ Monticello ME	17494na			
1600	1700		USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600	1700		USA, WHRA Greenbush ME	17650af			
1600	1700		USA, WHRI Noblesville IN	13760va	15105am		
1600	1700		USA, WINB Red Lion PA	13570am			
1600	1700		USA, WJCR Upton KY	7490am	13595as		
1600	1700		USA, WMLK Bethel PA	9465eu			
1600	1700	mtwhfa	USA, WRMI Miami FL	15724na			
1600	1700	s	USA, WRMI Miami FL	9955am			
1600	1700		USA, WRNO New Orleans LA	7395am	15420al		
1600	1700		USA, WSHB Cypress Crk SC	18910af			
1600	1700		USA, WTJC Newport NC	9370na			
1600	1700		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1600	1700		USA, WWFV McCaysville GA	12172va			
1600	1700		USA, WYFR Okeechabee FL	11830na	17750na	18980eu	21455eu
			21525af				
1600	1700		Zambia, Christian Voice	4965do			
1615	1700	as	UK, BBC World Service	11860af	21490af		
1625	1640		Armenia, Trans World Radio	5855me			
1630	1657		Vietnam, Voice of	9730eu	11630al	13740eu	
1630	1700	vl	Cameroon, CRTV Radio Buea	6005do			
1630	1700		Egypt, Radio Cairo	15255af			
1630	1700		Georgia, Georgian Radio	6180me			
1630	1700	as	UK BBC World Service	11860af	21490af		
1630	1700		UK, BBC World Service	3915as	5975as	6109af	6195as 7160as
			9410eu 9740as	11940af	12095eu	15310as	15400af 15420af
			15485eu 15565eu	17700as	17830af	17840am	21470af 21660af
1630	1700	f	UK, Merlin Network One	11535as			
1630	1700	mtwh	UK, Merlin Network One	11590as			
1630	1700	as	UK, Merlin Network One	11540as			
1630	1700	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
1645	1700		Tajikistan, Radio	7245as			
1650	1700		New Zealand, Radio NZ Intl	11725pa			

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

1700	1727		Czech Rep, Radio Prague Intl	5930eu	21745af		
1700	1727		Vietnam, Voice of	12070eu			
1700	1730		Azerbaijan, Voice of	6110eu	9155eu		
1700	1730		France Radio France Intl	15605af	17605af		
1700	1730		Germany, Overcomer Ministries	6110eu			
1700	1730		Israel, Kol Israel	15615va	17545va	21670va	
1700	1730		Jordan, Radio	11690na	17680al		
1700	1730		S Africa, Channel Africa	17870af			
1700	1745		Germany, Deutsche Welle	6140eu			
1700	1746		UK, BBC World Service	3255af	3915as	5975as	6005af 6190af
			6195eu 7160as	9410eu	9510as	9630af	9740as 12095eu
			15400af 15420af	15485eu	15575me	17830af	21470af
1700	1750		New Zealand, Radio NZ Intl	11725pa			
1700	1756		Romania, Radio Romania Intl	11740eu	15365eu	15380eu	17805eu
1700	1800		Anguilla, Caribbean Beacon	11775am			
1700	1800	vl	Australia, ABC/Alice Springs	2310do			
1700	1800	vl	Australia, ABC/Katherine	2485do			
1700	1800	vl	Australia, ABC/Tennant Creek	2325da			
1700	1800		Australia, Radio	5995va	9475as	9580va	9655va 9815as
			11880va				
1700	1800	vl	Botswana, Radio	3356da	4820da	7255da	
1700	1800		Canada, CBC Northern Service	9625da			
1700	1800		Canada, CFRX Toronto ON	6070da			
1700	1800		Canada, CFVP Calgary AB	6030da			
1700	1800		Canada, CHNX Halifax, NS	6130da			
1700	1800		Canada, CKZN St John's NF	6160da			
1700	1800		Canada, CKZU Vancouver BC	6160da			
1700	1800		China, China Radio Intl	7150af	9570af	9670af	9695af 11910af
			15365af				
1700	1800		Costa Rica, R for Peace Intl	15050va	21815usb		
1700	1800		Costa Rica, University Network	5030am	6150am	7375am	9724sa
			11870am 13749na	17645as			
1700	1800		Egypt, Radio Cairo	15255af			
1700	1800	mtwhf	Eqt Guinea, Radio Africa	15185af			
1700	1800	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va		
1700	1800	a	Germany, Good News World R	11795me			
1700	1800	a	Germany, Overcomer Ministries	17490eu			
1700	1800		Germany, Voice of Hope	9495eu			
1700	1800		Germany, Unt Methodist Church	13820af	15485af		
1700	1800	vl	Ghana, Ghana BC Corp	3366do	4915do		
1700	1800		Guyana, Voice of	5949da			
1700	1800	vl	Italy, Italian Radio Relay Svc	3985va			
1700	1800		Japan, Radio	9505na	11970eu	15355af	
1700	1800		Kenya, Kenya BC Corp	4885irr	4915irr		
1700	1800	vl	Lesotho, Radio	4800da			
1700	1800		Liberia, Radio Liberia Intl	6100do			
1700	1800		Namibia, Namibian BC Corp	3270af	3289af		
1700	1800		Netherlands, Radio	17840na			
1700	1800		New Zealand, ZLXA	3935da			
1700	1800	vl	Nigeria, Radio/Enugu	6025do			
1700	1800	vl	Nigeria, Radio/Ibadan	6050do			
1700	1800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1700	1800	vl	Nigeria, Radio/Lagos	3326do	4990do		
1700	1800		Russia, Voice of Russia	7305as	9730eu	11985me	12055as 15540me
1700	1800		S Africa, World Beacon	6145af			
1700	1800		Sierra Leone, Sierra Leone BS	3316do			
1700	1800		Sri Lanka, Sri Lanka BC Corp	3316irr			
1700	1800		Uganda, Radio	7196do			
1700	1800	as	UK, Merlin Network One	11540as			
1700	1800		UK, World Beacon	15455eu			
1700	1800		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
			6350va 6458va	6847va	10320va	10940va	12579va 12689va
			13254va 13362va	16847va			
1700	1800		USA, KAIJ Dallas TX	13815va			
1700	1800		USA, KTBN Salt Lake City UT	15590na			
1700	1800		USA, KWHR Naalehu HI	9930as			
1700	1800		USA, Voice of America	6160as	7125as	7170as	9645as 9700me
			9760af 15255va	15410af	15445af	17895af	
1700	1800	mtwhf	USA, Voice of America	5990as	6045as	7215as	9550as 9770as
			9785as				
1700	1800		USA, WBCQ Monticello ME	17494na			
1700	1800		USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700	1800		USA, WHRA Greenbush ME	17650af			
1700	1800		USA, WHRI Noblesville IN	9495am	13760va		
1700	1800		USA, WINB Red Lion PA	13570am			
1700	1800		USA, WJCR Upton KY	7490am	13595as		
1700	1800		USA, WMLK Bethel PA	9465eu			
1700	1800	mtwhf	USA, WRMI Miami FL	15724na			
1700	1800		USA, WRNO New Orleans LA	7395am	15420al		
1700	1800		USA, WSHB Cypress Crk SC	18910af			
1700	1800		USA, WTJC Newport NC	9370na			
1700	1800		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1700	1800		USA, WWFV McCaysville GA	12172va			
1700	1800		USA, WYFR Okeechabee FL	13855af	18980eu	21455eu	
1700	1800		Zambia, Christian Voice	4965da			
1700	1800	vl	Zimbabwe, Zimbabwe BC Corp	4828da	6045do		
1715	1730		Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu
			15595eu				
1725	1740		Germany, Trans World Radio	5855eu			
1725	1745	mtwhf	UK, United Nations Radio	6125af	15265me	17580af	
1730	1745	vl	Libya, Voice of Africa	11815af	15435af	17725af	
1730	1745	as	Swaziland, Trans World Radio	9500af			
1730	1745	mtwhf	Swaziland, Trans World Radio	3200af			
1730	1800		Guam, KSDA/ Adventist World R	11965as			
1730	1800		Liberia, ELWA	4760da			
1730	1800		Netherlands, Radio	6020af	7120af	11655af	
1730	1800		Philippines, Radya Pilipinas	11720pa	15190pa	17720pa	
1730	1800		S Africa, AWR Africa	12130af			
1730	1800		Slovakia, Radio Slovakia Intl	5920eu	6055eu	7345eu	
1730	1800	mtwhfa	Sweden, Radia	6065va			
1730	1800	s	Sweden, Radio	13580eu			
1730	1800		Switzerland, Swiss Radio Intl	15220af	17735af	21720af	
1730	1800		Vatican City, Vatican Radio	13765af	15570af	17515af	
1735	1745	vl/th	Paraguay, Radio Nacional	9739sa			
1745	1800		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu	
1745	1800		Germany, Deutsche Welle	6140eu			
1745	1800		India, All India Radio	7410eu	9950as	11935as	13605af 13750af
			15155af 17670af				
1745	1800	smtwhf	Swaziland, Trans World Radio	3200af			
1746	1800		UK, BBC World Service	3255af	3915as	5975as	6190af 6195eu
			7160as 9410eu	9510as	9740as	12095eu	15400af 15420af
			15485eu 15575me	17830af	21470af		
1751	1800		New Zealand, Radio NZ Intl	15160pa			

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

1800	1810		Zambia, National BC Corp	6265do			
1800	1827		Vietnam, Voice of	7145eu	9730eu		
1800	1830		Egypt, Radio Cairo	15255af			
1800	1830	s	Germany, Universal Life	13855af			
1800	1830		Netherlands, Radio	6020af	7120af	11655af	
1800	1830		S Africa, AWR Africa	5960af	6100af		
1800	1830		S Africa, Channel Africa	17870af			
1800	1830		UK, BBC World Service	3255af	5975as	6190af	6190eu 6195eu
			9410eu 9510as	12095eu	15400af	15420af	15575me 17830af
			21470af				
1800	1830	mtwh	UK, Merlin Network One	11590as			
1800	1830		UK, Merlin Network One	11540as			
1800	1830	f	UK, Merlin Network One	11535as			
1800	1830		UK, RTE Radio	15315me			
1800	1855		Poland, Radio Polonia	6000eu	7285eu		
1800	1858		Yemen, Rep of Yemen Radio	9780me			
1800	1859		Canada, Radio Canada Intl	13690af	15470af	17820af	21570af
1800	1900		Anguilla, Caribbean Beacon	11775am			
1800	1900	mtwhf	Argentina, RAE	15345eu			
1800	1900	vl	Australia, ABC/Alice Springs	2310da			
1800	1900	vl	Australia, ABC/Katherine	2485da			

1800	1900	vl	Australia, ABC/Tennant Creek	2325do				
1800	1900		Australia, Radio 11880va	6080pa	7240va	9475as	9580va	9815pa
1800	1900		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu		
1800	1900	vl	Botswana, Radio	3356do	4820do			
1800	1900		Canada, CBC Northern Service	9625do				
1800	1900		Canada, CFRX Toronto ON	6070do				
1800	1900		Canada, CFVP Calgary AB	6030do				
1800	1900		Canada, CHNX Halifax, NS	6130do				
1800	1900		Canada, CKZN St John's NF	6160do				
1800	1900		Canada, CKZU Vancouver BC	6160do				
1800	1900		Costa Rica, R for Peace Intl	15050va	21815usb			
1800	1900		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724so	
1800	1900	mtwhf	Eqt Guinea, Radio Africa	15185af				
1800	1900	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1800	1900		Germany, Unt Methodist Church	13820af	15485af			
1800	1900		Germnay, Voice of Hope	9495eu				
1800	1900	vl	Ghana, Ghana BC Corp	3366do	4915do			
1800	1900	s	Greece, Voice of Greece	9420eu	15630eu	17705na		
1800	1900		Guyana, Voice of	5949do				
1800	1900		India, All India Radio 15155af 17670af	7410as	9950as	11935as	13605af	13750af
1800	1900	vl	Italy, Italian Radio Relay Svc	3985va				
1800	1900		Kenya, Kenya BC Corp	4885irr	4915irr			
1800	1900		Kuwait, Radio	11990va				
1800	1900	vl	Lesotho, Radio	4800do				
1800	1900		Liberia, ELWA	4760do				
1800	1900		Liberia, Radio Liberia Intl	5100do				
1800	1900		Namibia, Namibian BC Corp	3270af	3289af			
1800	1900		New Zealand, Radio NZ Intl	15160pa				
1800	1900		New Zealand, ZLXA	3935do				
1800	1900	vl	Nigeria, Radio/Enugu	6025do				
1800	1900	vl	Nigeria, Radio/Ibadan	6050do				
1800	1900	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1800	1900	vl	Nigeria, Radio/Lagos	3326do	4990do			
1800	1900		Philippines, Radyo Pilipinas	11720pa	15190pa	17720pa		
1800	1900	as	Russia, Voice of Russia	7420eu	9480eu	9820eu	11675eu	
1800	1900		Russia, Voice of Russia 11985af	7310eu	9730eu	9775eu	9890eu	11510af
1800	1900		Russia, World Beacon	15365eu				
1800	1900	m	S Africa, Amateur Radio League	3215af				
1800	1900	as	S Africa, Radio Lufonia	3345af				
1800	1900		S Africa, World Beacon	3230af	9675af	17665af		
1800	1900		Sierra Leone, Sierra Leone BS	3316do				
1800	1900		Sri Lanka, Sri Lanka BC Corp	3316irr				
1800	1900		Swaziland, Trans World Radio	3200af	9500af			
1800	1900		Taiwan, Radio Taipei Intl	3955eu				
1800	1900		Uganda, Radio	7196do				
1800	1900		UK, World Beacon	15585af	17665af			
1800	1900		USA, Armed Forces Radio 6350va 6458va 6847va 13254va 13362va 16847va	4278va	4319va	4993va	5765va	10320va 10940va 12579va 12689va
1800	1900		USA, KAIJ Dallas TX	13815va				
1800	1900		USA, KJES Vado NM	15385au				
1800	1900		USA, KTBN Salt Lake City UT	15590na				
1800	1900		USA, KWHR Naalehu HI	17510as				
1800	1900		USA, Voice of America 15410af 15580af 17895af	6035af	7415af	9760af	9770me	11975af
1800	1900	mtwhfa	USA, WBCQ Monticello ME	17494na				
1800	1900		USA, WEWN Birmingham AL	11875na	13615na	15745eu		
1800	1900		USA, WHRA Greenbush ME	17650af				
1800	1900		USA, WHRI Noblesville IN	9495am	13760va			
1800	1900		USA, WINB Red Lion PA	13570am				
1800	1900		USA, WJCR Upton KY	7490am	13595as			
1800	1900		USA, WMLK Bethel PA	9465eu				
1800	1900	mtwhf	USA, WRMI Miami FL	15724na				
1800	1900		USA, WRNO New Orleans LA	7395am	15420al			
1800	1900		USA, WSHB Cypress Crk SC	15665va	18910af			
1800	1900		USA, WTJC Newport NC	9370na				
1800	1900		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1800	1900		USA, WWFV McCaysville GA	12172va				
1800	1900		USA, WYFR Okeechobee FL	18980eu				
1800	1900		Zambia, Christian Voice	4965do				
1800	1900	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
1815	1845	s	S Africa, Radio Lufonia	7155af				
1830	1855		Greece, Voice of Greece	11645eu				
1830	1900		Austria, Radio Austria Intl	5945eu	6155eu			
1830	1900		Belgium, RVI Flanders R Intl	5910eu	9925eu	13770eu		
1830	1900	vl	Cameroon, CRTV Radio Buea	6005do				
1830	1900	mtwhf	Georgia, Georgian Radio	6230eu				
1830	1900	as	Georgia, Georgian Radio	6080as				
1830	1900		Netherlands, Radio 17605af 21590af	6020af	7120af	9895af	11655af	13700af
1830	1900		UK, BBC World Service 9630af 12095as	3255af	6005af	6190af	6195eu	9410eu 15400af 15575me 17830af 21470af
1830	1900		UK, RTE Radio	13640na	21630af			
1830	1900	as	USA, Voice of America	11690af	13730af	15525af		
1830	1900		Yugoslavia, Radio	6100eu				
1845	1900		Congo, RTV Congolaise	4765af	5985af			

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

1900	1915		Congo, RTV Congolaise	4765do	5985af			
1900	1927		Vietnam, Voice of	9730eu	11630al	13740eu		
1900	1930		Philippines, Radyo Pilipinas	11720pa	15190pa	17720pa		
1900	1945		Germany, Deutsche Welle 17810af	11805af	11965af	13720af	15390af	
1900	1945		India, All India Radio 15155af 17670af	7410as	9950as	11935as	13605af	13790af
1900	1956		North Korea, Voice of Korea	4405va	6574na	6595na	6615na	9335na 11710na 13760na
1900	2000		Anguilla, Caribbean Beacon	11775am				
1900	2000	vl	Australia, ABC/Katherine	2485do				
1900	2000	vl	Australia, ABC/Tennant Creek	2325do				
1900	2000		Australia, Radio 11880va	6080pa	7240va	9500as	9580va	9815pa
1900	2000	vl	Botswana, Radio	3356do	4820do			
1900	2000		Canada, CFRX Toronto ON	6070do				
1900	2000		Canada, CFVP Calgary AB	6030do				
1900	2000		Canada, CHNX Halifax, NS	6130do				
1900	2000		Canada, CKZN St John's NF	6160do				
1900	2000		Canada, CKZU Vancouver BC	6160do				
1900	2000		Canada, CBC Northern Service	9625do				
1900	2000		China, China Radio Intl	6165af	9440af	9585af		
1900	2000		Costa Rica, R for Peace Intl	15050va	21815usb			
1900	2000		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724so	
1900	2000		Ecuador, HCJB	17660eu				
1900	2000	mtwhf	Eqt Guinea, Radio Africa	15185af				
1900	2000	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
1900	2000		Germany, Deutsche Welle	6140eu				
1900	2000		Germany, Voice of Hope	7290eu	15750as			
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do			
1900	2000	vl	Italy, Italian Radio Relay Svc	3985va				
1900	2000		Kenya, Kenya BC Corp	4885irr	4915irr			
1900	2000		Kuwait, Radio	11990va				
1900	2000	vl	Lesotho, Radio	4800do				
1900	2000		Liberia, ELWA	4760do				
1900	2000		Liberia, Radio Liberia Intl	5100do				
1900	2000		Namibia, Namibian BC Corp	3270af	3289af			
1900	2000		Netherlands, Radio 17605af 21590af	6020af	7120af	9895af	11655af	13700af
1900	2000		New Zealand, Radio NZ Intl	15160pa				
1900	2000		New Zealand, ZLXA	3935do				
1900	2000	vl	Nigeria, Radio/Enugu	6025do				
1900	2000	vl	Nigeria, Radio/Ibadan	6050do				
1900	2000	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1900	2000	vl	Nigeria, Radio/Lagos	3326do	4990do			
1900	2000		Nigeria, Voice of	7255af	11770af	15120af		
1900	2000		Russia, Voice of Russia 9775eu 9820eu	7300eu	7310eu	7420eu	9480eu	9745af 9890eu 11510af 11695me 11980af
1900	2000		Russia, World Beacon	15365eu				
1900	2000		S Africa, World Beacon	3230af	9675af	11640af		
1900	2000		Sierra Leone, Sierra Leone BS	3316do				
1900	2000	vl	Solomon Islands, SIBC	5020do				
1900	2000		South Korea, Radio Korea Intl	5975am	7275eu			
1900	2000		Sri Lanka, Sri Lanka BC Corp	3316irr				
1900	2000	a	Sri Lanka, Sri Lanka BC Corp	6010eu				
1900	2000		Swaziland, Trans World Radio	3200af				
1900	2000		Thailand, Radio	7160eu				
1900	2000		Uganda, Radio	7196do				
1900	2000		UK, BBC World Service 9630af 12095eu	3255af	6005af	6190af	6195eu	9410eu 12095eu 15400af 15575me 17830af
1900	2000	vl	UK, R. Chessington/Merlin	15475af				
1900	2000		UK, World Beacon	9675eu	15585eu			
1900	2000		USA, Armed Forces Radio 6350va 6458va 6847va 13254va 13362va 16847va	4278va	4319va	4993va	5765va	10320va 10940va 12579va 12689va
1900	2000		USA, KAIJ Dallas TX	13815va				
1900	2000		USA, KTBN Salt Lake City UT	15590na				
1900	2000		USA, KWHR Naalehu HI	17510as				
1900	2000		USA, VOA Special English	7260eu	9680me	13690me		
1900	2000		USA, Voice of America 9525pa 9760af 15445af 15580af	4950af	6035af	6160me	7375af	7415af 9770af 11805pa 11975af 15180pa 15410af
1900	2000	mtwhf	USA, Voice of America 13725me 15235as	9550eu	9840as	11780me	11970as	12015as
1900	2000	mtwhfa	USA, WBCQ Monticello ME	17494na				
1900	2000		USA, WEWN Birmingham AL	11875na	13615na	15745eu		
1900	2000		USA, WHRA Greenbush ME	17650af				
1900	2000		USA, WHRI Noblesville IN	9495am	13760va			
1900	2000		USA, WINB Red Lion PA	13570am				
1900	2000		USA, WJCR Upton KY	7490am	13595as			
1900	2000		USA, WMLK Bethel PA	9465eu				
1900	2000	mtwhf	USA, WRMI Miami FL	15724na				
1900	2000		USA, WRNO New Orleans LA	7395am	15420al			
1900	2000		USA, WSHB Cypress Crk SC	15665va	18910af			
1900	2000		USA, WTJC Newport NC	9370na				
1900	2000		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1900	2000		USA, WWFV McCaysville GA	12172va				
1900	2000		USA, WYFR Okeechobee FL	15775af	18980eu			
1900	2000		Zambia, Christian Voice	4965do				
1900	2000	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
1930	2000		Georgia, Georgian Radio	11760eu				
1930	2000		Iran, VO Islamic Rep. of Iran	9022eu	11920eu	13730eu		
1930	2000	vl	Papua New Guinea, NBC	4890do				
1930	2000		Slovakia, Radio Slovakia Intl	5920eu	6055eu	7345eu		
1930	2000		Sweden, Radio	6065eu				
1930	2000		Switzerland, Swiss Radio Intl	13770af	15220af	17580af	17735af	
1930	2000		Turkey, Voice of	9785eu				
1935	1955		Italy, RAI International	5970eu	9750eu			
1940	2000	mtwhfa	Armenia, Voice of Armenia	4810eu	9960eu			

2000 UTC - 3PM E / 2PM C / 12PM P

2000	2010		Vatican City, Vatican Radio	9660af	11625af	13765af		
2000	2015		Swaziland, Trans World Radio	3200af				
2000	2020		Iran, VO Islamic Rep. of Iran	9022eu	11920eu	13730eu		
2000	2020		Turkey, Voice of	9730as	9785eu			
2000	2025		Netherlands, Radio 17605af 21590af	6020af	7120af	9895af	11655af	13700af
2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600au			

2000	2030		Ecuador, HCJB	17660eu				
2000	2030		Hungary, Radio Budapest		7130eu			
2000	2030		Israel, Kol Israel	9435va	11605va	15615va	15640af	17545va
2000	2030		Mangalia, Voice of	12015eu	12085eu			
2000	2030		S Africa, AWR Africa	11640af				
2000	2030		Switzerland, Swiss Radio Intl		6110eu	13700af	15220af	17580af
			13660af 13790af					
2000	2030		USA, Voice of America	4950af	6035af	6095af	7375af	7415af
			9760as 9770af	11855af	11975af	15410af	15445af	15580af
			17745af 17895af					
2000	2045		Iraq, Radio Iraq Intl	9887irr	11787irr			
2000	2059		Canada, Radio Canada Intl		5995eu	11690eu	15325eu	17870eu
			21570eu					
2000	2100		Algeria, Radio Algiers Intl		11715eu	11750eu	15160va	
2000	2100		Anguilla, Caribbean Beacon		11775am			
2000	2100	vl	Australia, ABC/Alice Springs		2310da			
2000	2100	vl	Australia, ABC/Katherine		2485da			
2000	2100	vl	Australia, ABC/Tennant Creek		2325da			
2000	2100		Australia, Radio	9500as	9580va	9815pa	11880va	12080va
2000	2100	vl	Botswana, Radio	3356da	4820da			
2000	2100		Bulgaria, Radio	11900eu				
2000	2100		Canada, CBC Northern Service		9625da			
2000	2100		Canada, CFVP Calgary AB		6030da			
2000	2100		Canada, CHNX Halifax, NS		6130da			
2000	2100		Canada, CKZN St John's NF		6160da			
2000	2100		Canada, CKZU Vancouver BC		6160da			
2000	2100		China, China Radio Intl	5965eu	9440af	9840eu	11735af	13640af
2000	2100		Costa Rica, R for Peace Intl		15050va	21815usb		
2000	2100		Costa Rica, University Network		5030am	6150am	7375cm	9724sa
			11870am 13749na 17645as					
2000	2100	mtwhf	Eqt Guinea, Radio Africa		15185af			
2000	2100	a/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
2000	2100		Germany, Voice of Hope	7290eu	15750as			
2000	2100	vl	Ghana, Ghana BC Corp		3366do	4915do		
2000	2100		Indonesia, Voice of	15150eu				
2000	2100	vl	Italy, Italian Radio Relay Svc		3985va			
2000	2100		Kenya, Kenya BC Corp	4885irr	4915irr			
2000	2100		Kuwait, Radio	11990va				
2000	2100	vl	Lesotho, Radio	4800do				
2000	2100		Liberia, ELWA	4760do				
2000	2100		Liberia, Radio Liberia Intl		5100do			
2000	2100	asmtwh	Malta, Voice of Mediterranean		12060eu			
2000	2100		Namibia, Namibian BC Corp		3270af	3289af		
2000	2100		New Zealand, Radio NZ Intl		15160pa			
2000	2100		New Zealand, ZLXA	3935do	7290do			
2000	2100	vl	Nigeria, Radio/Enugu	6025do				
2000	2100	vl	Nigeria, Radio/Ibadan	6050do				
2000	2100	vl	Nigeria, Radio/Kaduna	4770da	6090do	7275da	9570do	
2000	2100	vl	Nigeria, Radio/Lagos	3326do	4990do			
2000	2100		Nigeria, Voice of	7255af	11770af	15120af		
2000	2100	vl	Papua New Guinea, NBC		4890do			
2000	2100		Russia, Voice of Russia	7310eu	7400eu	7420eu	7440eu	9775eu
			9820eu 9890eu					
2000	2100		Russia, World Beacon	15365eu				
2000	2100		S Africa, World Beacon	3230af	9675af	11640af	15465eu	
2000	2100	vl	Solomon Islands, SIBC	5020do				
2000	2100	mtwhf	Spain, Radio Exterior Espana		9595af	15290eu		
2000	2100		Sri Lanka, Sri Lanka BC Corp		4940irr			
2000	2100	vl	Syria, Radio Damascus	12085eu	13610eu			
2000	2100		Uganda, Radio	7196do				
2000	2100		UK, BBC World Service	3255af	6005af	6190af	6195sec	9410eu
			9630af 11835af	12095eu	15400af	17830af		
2000	2100		UK, World Beacon	7420af	9675af			
2000	2100		USA, Armed Forces Radio		4278va	4319va	4993vc	5765va
			6350va 6458va	6847va	10320va	10940va	12579va	12689va
			13254va 13362va	16847va				
2000	2100		USA, KAIJ Dallas TX	13815va				
2000	2100		USA, KJES Vado NM	15385na				
2000	2100		USA, KTBN Salt Lake City UT		15590na			
2000	2100		USA, KWHR Naalehu HI	17510as				
2000	2100		USA, WBCQ Monticello ME		7415na			
2000	2100	mtwhfa	USA, WBCQ Monticello ME		17494na			
2000	2100		USA, WEWN Birmingham AL		11875na	13615na	15745eu	
2000	2100		USA, WHRA Greenbush ME		17650af			
2000	2100		USA, WHRI Noblesville IN		5745va	9495am		
2000	2100		USA, WINB Red Lion PA	13570am				
2000	2100		USA, WJCR Upton KY	7490am	13595as			
2000	2100		USA, WMLK Bethel PA	15265eu				
2000	2100	smtwhf	USA, WRMI Miami FL	15724na				
2000	2100		USA, WRNO New Orleans LA		7395am	15420al		
2000	2100		USA, WTJC Newport NC	9370na				
2000	2100		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
2000	2100		USA, WWFV McCaysville GA		12172va			
2000	2100		USA, WYFR Okeechabee FL		17725af	17845af	18980eu	
2000	2100	vl	Vanuatu, Radio	3945do	4960da	7260da		
2000	2100		Zambia, Christian Voice	4965da				
2000	2100	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do		
2000	2100		USA, WSHB Cypress Crk SC		15665va	18910af		
2010	2030		Vatican City, Vatican Radio		9660af	11625af	13765af	
2025	2045		Italy, RAI International	7125af	9635af	11800af		
2030	2045	vl	Libya, Voice of Africa	11815af	15435af	17725af		
2030	2045		Thailand, Radio	9680eu				
2030	2057		Vietnam, Voice of	9730eu	11630al	13740eu		
2030	2100		Australia, Christian Voice		9865pa	11840as		
2030	2100	th	Belarus, Radio Belarus Intl		7105eu	7210eu		
2030	2100		Belgium, RVI Flanders R Intl		9925eu			
2030	2100		Cuba, Radio Havana	13660usb	13750eu			
2030	2100		Ecuador, HCJB	17660eu	21455usb			
2030	2100		Egypt, Radio Cairo	15375af				
2030	2100		Poland, Radio Polonia	6035eu	7185eu	7265eu	9525eu	
2030	2100		S Africa, AWR Africa	9745af				
2030	2100	f	UK, Wales Radio Intl	7325eu				
2030	2100		USA, Voice of America	6035af	6095me	7375af	7415af	9760af
			9770af 11975af	15410af	15445af	15580af	17745af	17895af
2030	2100	as	USA, Voice of America	4950af				
2030	2100		Uzbekistan, Radio Tashkent		9545eu	11905eu		
2045	2100		Albania, Radio Tirana Intl		7210eu	9510eu		
2045	2100		India, All India Radio	7150au	7410eu	9650eu	9910au	9950eu
			11620au 11715au					

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

2100	2110		Kenya, Kenya BC Corp	4885irr	4915irr			
2100	2115		Egypt, Radio Cairo	15375af				
2100	2125		Poland, Radio Polonia	6035eu	7185eu	7265eu	9525eu	
2100	2130	vl	Australia, ABC/Alice Springs		2310da			
2100	2130	vl	Australia, ABC/Katherine		2485da			
2100	2130	vl	Australia, ABC/Tennant Creek		2325da			
2100	2130		Australia, Christian Voice		9865pa	11840as		
2100	2130		Australia, Radio	7240va	9500as	9580va	9660pa	11880va
			12080va 17715va	21740va				
2100	2130		Austria, AWR Europe	15165af				
2100	2130		China, China Radio Intl	5965eu	9840eu	11735af	13640af	
2100	2130		Cuba, Radio Havana	13660usb	13750eu			
2100	2130		South Korea, Radio Korea Intl		3975eu	15575eu		
2100	2130		UK, BBC World Service	3255af	3915as	5965as	6005af	6190af
			6195va 9410eu	11835af	11945as	12095sa	15400af	
2100	2130	as	UK, BBc World Service	5975am	3915as			
2100	2130		Yugoslavia, Radio	6100eu				
2100	2145		Germany, Deutsche Welle		7130eu	9670pa	9765af	9875af
			11865af 11915pa	15135af				
2100	2145		Iraq, Radio Iraq Intl	7157irr	9684irr	11785irr		
2100	2145		USA, WYFR Okeechobee FL		13855af	15120af	17845af	18980eu
2100	2156		Romania, Radio Romania Intl		9725eu	11740eu	11940eu	15365eu
2100	2200		Angola, R. Nacional de Angola		3374va	4950va	7245va	
2100	2200		Anguilla, Caribbean Beacon		11775am			
2100	2200	vl	Botswana, Radio	3356da	4820do			
2100	2200		Canada, CBC Northern Service		9625da			
2100	2200		Canada, CFRX Toronto ON		6070da			
2100	2200		Canada, CFVP Calgary AB		6030da			
2100	2200		Canada, CHNX Halifax, NS		6130do			
2100	2200		Canada, CKZN St John's NF		6160do			
2100	2200		Canada, CKZU Vancouver BC		6160do			
2100	2200		Costa Rica, R for Peace Intl		15050va	21815usb		
2100	2200		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na 17645as					
2100	2200		Ecuador, HCJB	17660eu	21455usb			
2100	2200	mtwhf	Eqt Guinea, Radio Africa		15185af			
2100	2200	f/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
2100	2200	vl	Ghana, Ghana BC Corp		3366do	4915da		
2100	2200		India, All India Radio	7150au	7410eu	9650eu	9910au	9950eu
			11620au 11715au					
2100	2200	vl	Italy, Italian Radio Relay Svc		3985va			
2100	2200		Japan, Radio	6035pa	6055eu	6180eu	11830eu	11855af
			17825na 17860pa	21670pa				
2100	2200	vl	Lesotho, Radio	4800da				
2100	2200		Liberia, ELWA	4760do				
2100	2200		Liberia, Radio Liberia Intl		5100do			
2100	2200		Namibia, Namibian BC Corp		3270af	3289af		
2100	2200		New Zealand, Radio NZ Intl		15160pa			
2100	2200		New Zealand, ZLXA	3935do	7290do			
2100	2200	vl	Nigeria, Radio/Enugu	6025do				
2100	2200	vl	Nigeria, Radio/Ibadan	6050do				
2100	2200	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570da	
2100	2200	vl	Nigeria, Radio/Lagos	3326do	4990do			
2100	2200		Nigeria, Voice of	7255af	11770af	15120af		
2100	2200	vl	Papua New Guinea, NBC		4890do			
2100	2200		Russia, Voice of Russia	7400eu	7420eu	9775eu	9820eu	9890eu
			11980eu					
2100	2200		Russia, World Beacon	15365eu				
2100	2200		S Africa, World Beacon	3230af	9675af	11640af		
2100	2200	vl	Solomon Islands, SIBC	5020do	9545da			
2100	2200	as	Spain, Radio Exterior Espana		9595af	9840eu		
2100	2200		Sri Lanka, Sri Lanka BC Corp		4940irr			
2100	2200	vl	Syria, Radio Damascus	12085eu	13610eu			
2100	2200		UK, World Beacon	9675af				
2100	2200		USA, Armed Forces Radio		4278va	4319va	4993va	5765va
			6350va 6458va	6847va	10320va	10940va	12579va	12689va
			13254va 13362va	16847va				
2100	2200		USA, KAIJ Dallas TX	13815va				
2100	2200		USA, KTBN Salt Lake City UT		15590na			
2100	2200		USA, KWHR Naalehu HI	17510as				
2100	2200		USA, Voice of America	6035af	6040me	6095me	7375af	7415as
			9530af 9705as	9760eu	11870pa	11975af	15185as	15410af
			15445af 15580af	17740as	17820as	17895af		
2100	2200		USA, WBCQ Monticello ME		7415na			
2100	2200	mtwhf	USA, WBCQ Monticello ME		9330na			
2100	2200	a	USA, WBCQ Monticello ME		17494na			
2100	2200		USA, WEWN Birmingham AL		11875na	13615na	15745eu	
2100	2200		USA, WHRA Greenbush ME		17650af			
2100	2200		USA, WHRI Noblesville IN		5745va	9495am		
2100	2200		USA, WINB Red Lion PA	13570am				
2100	2200		USA, WJCR Upton KY	7490am	13595as			
2100	2200		USA, WRMI Miami FL	15724na				
2100	2200		USA, WRNO New Orleans LA		7395am	15420al		
2100	2200		USA, WSHB Cypress Crk SC		15665va	18910af		
2100	2200		USA, WTJC Newport NC	9370na				
2100	2200		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
2100	2200		USA, WWFV McCaysville GA		12172va			
2100	2200		USA, WYFR Okeechobee FL		17725af			
2100	2200	vl	Vanuatu, Radio	3945da	4960do	7260da		
2100	2200		Vatican City, Vatican Radio		4005eu	5885eu	7250eu	9645eu
2100	2200		Zambia, Christian Voice	4965do				

2100	2200	vl	Zimbabwe, Zimbabwe BC Corp	4828da	6045da			
2115	2130	mtwhf	UK, BBC Caribbean Report	5975ca	11675ca	15390ca		
2115	2200		Egypt, Radio Cairo 9990eu	15375af				
2120	2200	s	Greece, Voice of Greece 9425au	15650au				
2130	2145	tf	UK, BBC Calling Falklands	11680sa				
2130	2150		Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu	
2130	2157		Czech Rep, Radio Prague Intl	11600au	15545af			
2130	2200	vl	Australia, ABC/Alice Springs	4835da				
2130	2200	vl	Australia, ABC/Katherine	5025da				
2130	2200	vl	Australia, ABC/Tennant Creek	4910da				
2130	2200		Australia, Christian Voice	9725as	11840as			
2130	2200		Australia, Radio 7240va 9660pa 11880va 12080pa 17715va 21740va					
2130	2200	mtwhf	Austria, Radio Austria Intl	5945eu	6155eu			
2130	2200	th	Belarus, Radio Belarus Intl	7105eu	7210eu			
2130	2200		Guam, KSDA/ Adventist World R	11980as	15240as			
2130	2200		Iran, VO Islamic Rep of Iran	9570as	13745as			
2130	2200		South Korea, Radio Korea Intl	15575eu				
2130	2200		Sweden, Radio 6065eu	15255as				
2130	2200		Turkey, Voice of 7170as					
2130	2200		UK, BBC World Service 3255af 6190af 6195va 9410eu	3915as	5965as	5975am	6005af	
				11835af	11945as	12095sa	15400af	
2130	2200		Uzbekistan, Radio Tashkent	7105eu	9540eu	11905eu		
2145	2200		USA, WYFR Okeechobee FL	13855af	15120af	17845af		

2200 UTC - 5PM E / 4PM C / 2PM P

2200	2215		New Zealand, Radio NZ Intl	15160pa				
2200	2220	s	Greece, Voice of Greece 9425au	15650au				
2200	2230		Canada, Radio Canada Intl	9755am	13670am	17695am		
2200	2230	mtwhf	Canada, Radio Canada Intl	15305am	17880am			
2200	2230		Canada, Radio Canada Intl	9755am	13670am	17695am		
2200	2230		India, All India Radio 7150au 7410eu 9650eu 9910au 9950eu 11620au 11715au					
2200	2230		Iran, VO Islamic Rep. of Iran	9570as	13745as			
2200	2230		Mexico, Radio Mexico Intl	9705am	11770am			
2200	2230	vl	Papua New Guinea, NBC	4890do				
2200	2230		Turkey, Voice of 7170as					
2200	2230	mtwhf	USA, Voice of America 5855af	6035af	7375af	7415af	11975af	
2200	2230	mtwhfa	Yugoslavia, Radio 7230au					
2200	2245		Egypt, Radio Cairo 9990eu					
2200	2245		USA, WYFR Okeechobee FL	11740na	15120af	17725af	17845af	
2200	2300		Anguilla, Caribbean Beacon	6090am				
2200	2300	vl	Australia, ABC/Alice Springs	4835da				
2200	2300	vl	Australia, ABC/Katherine	5025da				
2200	2300	vl	Australia, ABC/Tennant Creek	4910da				
2200	2300		Australia, Christian Voice	17850as				
2200	2300		Australia, Radio 11880as	15240as	17715va	17795va	21740va	
2200	2300		Bulgaria, Radio 11900eu					
2200	2300		Canada, CBC Northern Service	9625do				
2200	2300		Canada, CFRX Toronto ON	6070do				
2200	2300		Canada, CFVP Calgary AB	6030do				
2200	2300		Canada, CHNX Halifax, NS	6130do				
2200	2300		Canada, CKZN St John's NF	6160do				
2200	2300		Canada, CKZU Vancouver BC	6160do				
2200	2300		China, China Radio Intl 7170eu					
2200	2300		Costa Rica, R for Peace Intl	15050va	21815usb			
2200	2300		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
2200	2300	mtwhf	Eqt Guinea, Radio Africa	15185af				
2200	2300	f/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do			
2200	2300	fas/vl	Italy, Italian Radio Relay Svc	3985va				
2200	2300		Malaysia, Radio 7295do					
2200	2300		Namibia, Namibian BC Corp	3270af	3289af			
2200	2300		Netherlands, Radio 6175na	9590na				
2200	2300		New Zealand, ZLXA 3935do	7290do				
2200	2300	vl	Nigeria, Radio/Enugu 6025do					
2200	2300	vl	Nigeria, Radio/Ibadan 6050do					
2200	2300	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570do		
2200	2300	vl	Nigeria, Radio/Lagos 3326do	4990do				
2200	2300		Nigeria, Voice of 7255af	11770af	15120af			
2200	2300	vl	Soloman Islands, SIBC 5020do	9545do				
2200	2300		Sri Lanka, Sri Lanka BC Corp	4940irr				
2200	2300		Taiwan, Radio Taipei Intl	11565eu	15600eu			
2200	2300		UK, BBC World Service 5965as 11835af 11955as 12095sa	5975am	6195na	7105as	9660as	
				15400af				
2200	2300		Ukraine, Radio Ukraine Intl 11950eu	5905eu	6020eu	7410eu	11705eu	
2200	2300		USA, Armed Forces Radio 6350va 6458va 6847va 13254va 13362va 16847va	4278va	4319va	4993va	5765va	
				10320va	10940va	12579va	12689va	
2200	2300		USA, KAIJ Dallas TX 13815va					
2200	2300		USA, KTBN Salt Lake City UT	15590na				
2200	2300		USA, KWHR Naalehu HI 17510as					
2200	2300		USA, Voice of America 7215as 15290as 15305as 17740as	9705as	9770as	11760as	15185as	
				17820as				
2200	2300		USA, WBCQ Monticello ME	7415na				
2200	2300	mtwhf	USA, WBCQ Monticello ME	9330na				
2200	2300	a	USA, WBCQ Monticello ME	17494na				
2200	2300		USA, WEWN Birmingham AL	9385na	9975eu	13615na		
2200	2300		USA, WHRA Greenbush ME	7580eu				
2200	2300		USA, WHRI Noblesville IN	5745va	9495am			
2200	2300		USA, WINB Red Lion PA 13570am					
2200	2300		USA, WJCR Upton KY 7490am	13595as				
2200	2300	as	USA, WRMI Miami FL 9955am					
2200	2300		USA, WRNO New Orleans LA	7395am	15420al			
2200	2300		USA, WSHB Cypress Crk SC	13770eu	15285sa			
2200	2300		USA, WTJC Newport NC 9370na					
2200	2300		USA, WWCR Nashville TN	7435na	9475na	12160na	13845na	
2200	2300		USA, WWFV McCaysville GA	5085va	12172va			
2200	2300	vl	Vanuatu, Radio 3945da	4960da	7260da			
2200	2300		Zambia, Christian Voice 4965da					
2200	2359		Liberia, Radio Liberia Intl	5100da				
2205	2230		Italy, RAI International 9675as	11900as	15265as			
2216	2300		New Zealand, Radio NZ Intl	17675pa				
2230	2257		Czech Rep, Radio Prague Intl	11600na	15445na			
2230	2300		Canada, Radio Canada Intl	9755am	13670am	17695am		
2230	2300		Cuba, Radio Havana 9550am					
2230	2300		Hungary, Radio Budapest	3975eu				
2230	2300	vl	Papua New Guinea, NBC	4890do	11880irr			
2245	2300		India, All India Radio 9705as	9950as	11620as	13605as		
2245	2300		USA, WYFR Okeechobee FL	11740na				

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

2300	0000		Anguilla, Caribbean Beacon	6090am				
2300	0000	vl	Australia, ABC/Alice Springs	4835da				
2300	0000	vl	Australia, ABC/Katherine	5025da				
2300	0000	vl	Australia, ABC/Tennant Creek	4910da				
2300	0000	vl	Cameroon, CRTV Radio Buea	6005da				
2300	0000		Canada, CBC Northern Service	9625da				
2300	0000		Canada, CFRX Toronto ON	6070da				
2300	0000		Canada, CFVP Calgary AB	6030da				
2300	0000		Canada, CHNX Halifax, NS	6130da				
2300	0000		Canada, CKZN St John's NF	6160da				
2300	0000		Canada, CKZU Vancouver BC	6160da				
2300	0000		China, China Radio Intl 13680na					
2300	0000		Costa Rica, R for Peace Intl	15050va	21815usb			
2300	0000		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9925sa	
2300	0000		Ecuador, HCJB 17660as					
2300	0000		Egypt, Radio Cairo 9900am					
2300	0000	f/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do			
2300	0000		India, All India Radio 9705as	9950as	11620as	13605as		
2300	0000		Liberia, Radio Liberia Intl	5100do				
2300	0000		Malaysia, Radio 7295da					
2300	0000		Malaysia, RTM Kota Kinabalu	5980do				
2300	0000		Namibia, Namibian BC Corp	3270af	3289af			
2300	0000		Netherlandsss, Radio 6175na	9590na				
2300	0000		New Zealand, Radio NZ Intl	17675pa				
2300	0000		New Zealand, ZLXA 3935do	7290do				
2300	0000	vl	Papua New Guinea, NBC	4890do	11880irr			
2300	0000		Singapore, SBC Radio One	6150da				
2300	0000	vl	Soloman Islands, SIBC 5020da	9545da				
2300	0000		Sri Lanka, Sri Lanka BC Corp	4940do				
2300	0000		Turkey, Voice of 7190va	11845va				
2300	0000		UK, BBC World Service 3915as 7105as 11945as 11955as	5965as	5975am	6035as	6195as	
				12095sa	15280as			
2300	0000		USA, Armed Forces Radio 6350va 6458va 6847va 13254va 13362va 16847va	4278va	4319va	4993va	5765va	
				10320va	10940va	12579va	12689va	
2300	0000		USA, KAIJ Dallas TX 13815va					
2300	0000		USA, KTBN Salt Lake City UT	15590na				
2300	0000		USA, KWHR Naalehu HI 17510as					
2300	0000		USA, VOA Special English 11925as 13735as 13775as	7190as	7200as	9545as	11805pa	
				15205pa				
2300	0000		USA, Voice of America 7215as 15290as 15305as 17740as	9705as	9770as	11760as	15185as	
				17820as				
2300	0000		USA, WBCQ Monticello ME	7415na				
2300	0000	mtwhf	USA, WBCQ Monticello ME	9330na				
2300	0000	a	USA, WBCQ Monticello ME	17494na				
2300	0000		USA, WEWN Birmingham AL	9385na	9975eu	13615na		
2300	0000		USA, WHRA Greenbush ME	7580eu				
2300	0000		USA, WHRI Noblesville IN	5745va	9495am			
2300	0000		USA, WINB Red Lion PA 13570am					
2300	0000		USA, WJCR Upton KY 7490am	13595as				
2300	0000		USA, WRMI Miami FL 9955am					
2300	0000		USA, WRNO New Orleans LA	7355va				
2300	0000		USA, WSHB Cypress Crk SC	13770eu	15285sa			
2300	0000		USA, WTJC Newport NC 9370na					
2300	0000	as	USA, WWBS Macon GA 11910na					
2300	0000		USA, WWCR Nashville TN	5070na	7435na	9475na	13845na	
2300	0000		USA, WWFV McCaysville GA	5085va	6890va			
2300	0000	vl	Vanuatu, Radio 3945da	4960do	7260do			
2300	0000		Zambia, Christian Voice 4965do					
2300	2305	vl	Nigeria, Radio/Enugu 6025da					
2300	2305	vl	Nigeria, Radio/Ibadan 6050da					
2300	2305	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570do		
2300	2305	vl	Nigeria, Radio/Lagos 3326da	4990do				
2300	2330		Australia, Radio 9660pa 17795va 21740va	11880as	12080va	15240as	17715va	
2300	2330	mtwhf	Canada, Radio Canada Intl	6040am	11865am	15305am		
2300	2330		Cuba, Radio Havana 9550am					
2300	2330	mtwhf	Mexico, Radio Mexico Intl	9705am	11770am			
2300	2345		Germany, Deutsche Welle	9815as	12055as	13610as	21790as	
2300	2345		USA, WYFR Okeechobee FL	11740na				
2300	2356		Romania, Radio Romania Intl	9750eu	11775eu	11940na	15105na	
2300	2359		Canada, Radio Canada Intl	9755am	13670am	17695am		
2305	2310		Croatia, The Voice of Croatia	9925sa				
2330	0000		Albania, Radio Tirana Intl	7130eu	9540eu			
2330	0000		Australia, Christian Voice	9865pa	17850as			
2330	0000		Australia, Radio 9660pa 17715va 17795va 21740va	11695as	12080va	15240as	15415as	
2330	0000		Belgium, RVI Flanders R Intl	15565na				
2330	0000		Malaysia, RTM Sarawak 7160da					
2330	0000		Netherlands, Radio 6165na	9845na				
2330	0000		Switzerland, Swiss Radio Intl	9885sa	11905sa			
2330	2345	vl	Libya, Voice of Africa 11815af	15435af	17725af			
2330	2357		Vietnam, Voice of 12019as	15115as				

Notes:

1. Many countries made their seasonal time shifts in mid and late October. These affect some, but not all, broadcast times of services, transmissions and programming. Since this listing is prepared up to four weeks prior to the dates these changes go into effect – and since few stations provide official information that far in advance – these listings have been developed largely through observations about past practices. Most stations have remained consistent in their approach to these seasonal changes, but they are not required to do so. Consequently, there may be a few more errors in this month's listings than usual. Please feel free to point these out to the editors and provide corrected information where available.
2. **BBCWS stream abbreviations**: **(am)**=Americas; **(eu)**=Europe/N. Africa; **(me)**=Middle East, SW Asia, CIS (former Soviet Union); **(wcaf)**=West and Central Africa; **(esaf)**=East and Southern Africa; **(af)**=both (wcaf) and (esaf); **(sas)**=South Asia; **(eas)**=East Asia.

0000 UTC - Page 43 Freqs

Newscasts (*extended)

0000	BBCWS(am)	S	News Summary
		M	World Briefing*
		T-A	News
	R. Australia	O	World News
	R. Canada Int.	O	News
	R. Japan	O	World News
	R. New Zealand	O	News
	Spanish Foreign R.	T-A	Ibero-American News*
	VOA News Now	T-A	World News
0010	VOA News Now	T-A	Regional News
0014	VOA News Now	T-A	USA News
0030	BBCWS(am)	M	The World Today*
VOA News Now		T-A	World News

Current Affairs Magazines/Features

0005	BBCWS(am)	T-A	Outlook
	R. Canada Int.	T-A	As It Happens (from 2330)
0010	R. Australia	W	The National Interest
		H	Background Briefing (documentaries)
0015	R. Japan	T-A	44 Minutes
0032	Spanish Foreign R.	T-A	Press Review
0033	VOA News Now	T	Encounter
		F	Best of 'Talk to America'
		A	Press Conference USA

Business/Economics (also in Newscasts & Current Affairs)

0000	R. Netherlands	A	A Good Life (development issues)
0028	HCJB	T-A	Money Minute
0030	R. Netherlands	W	A Good Life (development issues)
0049	VOA News Now	T-F	Business News

Science/Technology (incl. Health & Environment)

0000	R. Netherlands	T	The Research File
0005	R. Canada Int.	S	Quirks and Quarks
0010	R. Australia	T	The Science Show
0030	R. Netherlands	F	The Research File
0045	VOA News Now	T-F	Science News
	BBCWS(am)	A	Body and Mind

Arts & Culture

0010	R. Australia	M	Awaye! (Aboriginal culture)
0030	R. Netherlands	S	Roughly Speaking (youth culture)
		M	Aural Tapestry
	R. New Zealand Int.	S	Bookmarks
0033	VOA News Now	H	Kaleidoscope

Local Lives and Views

0000	R. Netherlands	M	Dutch Horizons
0010	R. Australia	F	Hindsight (social history)
	R. Japan	M	Weekend Square
0030	R. Australia	A	Country Breakfast (rural Australia)
	R. Netherlands	T	Euroquest (Europe in context)
		H	Dutch Horizons

Informational Features

0000	R. Netherlands	M	Sound Fountain (soundscapes)
		H	Documentary
0005	R. Australia	S	The Europeans
0022	VOA News Now	T-A	Feature story
0045	BBCWS(am)	T	Patterns of Faith
		W	Plain English (on language)
		H	Heart and Soul (religion)
0047	Spanish Foreign R.	T-A	Spanish Language Course

Music

0000	R. Netherlands	W	Music 52-15 (world/folk)
0005	R. Canada Int.	M	Global Village (world/folk)
	R. New Zealand	M-F	Cadenza (light classics)
		A	Home Grown (NZ music)
0030	R. New Zealand Int.	A	Musical Chairs (featured artist)
0053	VOA News Now	T-F	Music feature

Entertainment/Variety, Magazine Shows

0000	WBCQ	M	Le Show
0001	BBCWS(am)	S	Play of the Week (radio theatre)
0045	BBCWS(am)	F	Best of "The Edge" (youth culture)

SWL, Media and Communications

0000	WBCQ	S	The Real Amateur Radio Show
	WHRI(5745 kHz)	A	DXing with Cumbre
0030	WHRI(5745 kHz)	S	DXing with Cumbre
R. Australia		H	The Media Report
	WBCQ	H	World of Radio
0047	Spanish Foreign R.	A	Radio Waves

Listener Contact/Interactive

0005	R. Australia	A	Feedback
0010	R. Japan	S	Hello from Tokyo
0030	HCJB	S	Saludos Amigos
	R. Australia	A	Feedback
0035	Spanish Foreign R.	A	Radio Club
0047	Spanish Foreign R.	M	Radio Club (rpt.)

Sport

0018	VOA News Now	T-A	Sports
0020	BBCWS(am)	M	Sports Roundup

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Newscasts (*extended)

0100	BBCWS(am)	S/M	The World Today*
		T-A	News
	China R. Int.	D	News
	Deutsche Welle	D	News
	HCJB	D	Latin American & World News
	R. Australia	D	News
	R. Habana Cuba	T-S	International News
	R. Netherlands	S/M	News
	R. New Zealand	D	News
	R. Prague	D	News
	Spanish Foreign R.	T-A	Ibero-American News*
	VOA News Now	T-A	World News
	Voice of Vietnam	D	News
0110	R. Habana Cuba	T-S	National News
	VOA News Now	T-A	Regional News
0114	VOA News Now	T-A	USA News
0130	R. Habana Cuba	T-S	News Bulletin
	RTE, Ireland	T-S	The News at Six*
	VOA News Now	T-A	World News
	VOA Spec. Eng.	T-A	News

Current Affairs Magazines/Features

0100	R. Netherlands	T-A	Newsline
0105	Deutsche Welle	M	Talking Point (journalists)
		T-A	Newslink
	R. Australia	S	Correspondents' Report
		A	Asia Pacific
	R. Netherlands	M	Wide Angle (week in review)
0110	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	R. Australia	M-F	Asia Pacific
	R. Habana Cuba	M	Weekly Review
0115	R. Habana Cuba	T-S	Viewpoint
0130	Deutsche Welle	T	Insight
0136	VOA News Now	T-F	Dateline
0140	R. Habana Cuba	A	Weekly Review
	VOA Spec. Eng.	A	In the News
0145	BBCWS(am)	S	Letter from America

Business/Economics (also in Newscasts & Current Affairs)

0115	Voice of Vietnam	F	Vietnam Economy
0120	R. Prague	F	Economic Report
0130	China R. Int.	W	China Horizons
0149	VOA News Now	T-F	Business News

Science/Technology (incl. Health & Environment)

0105	R. New Zealand	S	Eureka!
0130	Deutsche Welle	W	Man and Environment
	R. Australia	M	The Health Report
0140	VOA Spec. Eng.	T	Agriculture Today
		W/H	Science Report
		F	Environment Report
0145	VOA News Now	T-F	ScienceNews
	VOA Spec. Eng.	T	Science in the News
		W	Explorations
0150	R. Habana Cuba	M	Breakthrough

Arts & Cultural

0105	BBCWS(am)	T	Meridian-Ideas
		W	Meridian-Screen (cinema)
		F	Meridian-Writing (books)
	R. Prague	S	Readings from Czech Literature
0110	R. Prague	M	The Arts
0115	Deutsche Welle	M	Arts on the Air
	Voice of Vietnam	W	Culture and Society
0120	China R. Int.	S	In the Spotlight
	Voice of Vietnam	A	Literature and Arts
0130	R. Australia	A	Arts Talk
0145	VOA Spec. Eng.	A	American Stories
		H	The Making of a Nation

Local Lives and Views

0105	R. Netherlands	S	Europe Unzipped
R. New Zealand Int.		M-F	In Touch with New Zealand
R. Prague		M	Letter from Prague
T-A	Current Affairs		
	Voice of Vietnam	O	Current Affairs
0110	HCJB	T-A	Studio 9 (Latin America)
0115	Deutsche Welle	S	Inside Europe
	R. Prague	T	Spotlight (Czech current events) or One on One (interview)
		H	Czechs in History or Central Europe Today (biweekly)
	Voice of Vietnam	T	Vietnam: Land and People
		A	Rural Vietnam
0120	R. Prague	W	Talking Point
		A	From the Weeklies
0130	China R. Int.	M	People in the Know
		F	Life in China
	Deutsche Welle	H	Living in Germany
0140	R. Habana Cuba	T/H/F	Caribbean Outlook
0145	VOA Spec. Eng. (*1st wk.)	F	American Mosaic

Informational Features

0105	Deutsche Welle	M	Religion and Society
0115	Deutsche Welle	A	German by Radio
	Spanish Foreign R.	S	American Chronicles
0122	VOA News Now	T-A	Feature report
0130	BBCWS(am)	S	Reporting Religion
	China R. Int.	H	Voices from Other Lands
	R. Australia	S	Educational series
		T	The Law Report
		W	The Religion Report
	R. New Zealand	A	Changing feature or series
0147	Spanish Foreign R.	T-A	Spanish Language Course
0154	VOA News Now	T-F	Feature report

Music

0100	WBCQ(7415 kHz)	A	A Different Kind of Oldies Show
0105	BBCWS(am)	H	Meridian-Music
		A	Meridian-Masterpiece
	R. New Zealand Int.	A	Home Grown (from 0005)
0110	R. Prague	S	Saturday Music (classical/folk/jazz)
0120	Voice of Vietnam	S	Music
0128	Spanish Foreign R.	M	Flamenca
		T-A	Spanish Pop Music
0130	BBCWS(am)	T	Music Mix
		W	UK Top 20
		F	World of Music
	HCJB	A	Musica del Ecuador
	R. Australia	A	Oz Sounds
0145	BBCWS(am)	H	UK Album Chart
		A	Music X-Press

Entertainment/Variety, Magazine Shows

0100	WBCQ(7415 kHz)	M	Radio NY International
		A	Allan Weiner Worldwide
0110	Voice of Vietnam	S	Sunday Show
0130	BBCWS(am)	H/A	Westway (drama serial)

Shortwave Guide

SWL, Media and Communications

0100	WBCQ(7415 kHz)	F	Radio Detective (antique radio)
	WWCR(3215 kHz)	M	World of Radio
0109	HCJB	S	DX Partyline
0130	HCJB	H	Ham Radio Today
	R. Australia	H	The Media Report
	WWCR(3215 kHz)	A	World of Radio
0133	VOA News Now	S	Communications World
0140	R. Habana Cuba	S/W	DXers Unlimited
0147	Spanish Foreign R.	S	Radio Waves

Listener Contact/Interactive

0110	HCJB	M	Musical Mailbag
	R. Prague	A	Mailbox
0115	Voice of Vietnam	H	Letterbox
0120	China R. Int.	A	Listeners' Garden
0135	Spanish Foreign R.	A	Radio Club
0140	R. Habana Cuba	M	Mailbag Show
0147	Spanish Foreign R.	M	Radio Club

Sport

0115	Deutsche Welle	F	Hard to Beat: The World of Sport
0118	VOA News Now	T-A	Sports Report
0130	China R. Int.	T	Sports World
	R. Australia	F	The Sports Factor
	RTE Ireland	S/M	Sportsnews
0135	R. Habana Cuba	T-A	Time Out
0135	R. New Zealand Int.	S/A	Live Sport (in season)

0200 UTC - Page 43 Freqs

Newscasts (*extended)

0200	BBCWS(am)	S	The World Today*
		M-A	News
	R. Australia	O	News
	R. Budapest	O	News
	R. Canada Int.	O	News
	R. Habana Cuba	T-S	International News
	R. Korea Int.	O	News
	R. New Zealand	O	News
	R. Prague	O	News
	R. Taipei Int.	O	News
	Voice of Russia	O	News
0230	R. Habana Cuba	T-S	News Bulletin
	Voice of Russia	O	News in Brief
	Voice of Vietnam	O	News

Current Affairs Magazines/Features

0210	R. Australia	M-F	The World Today
0211	Voice of Russia	S	News and Views
		M	Sunday Panorama
		T-A	Commonwealth Update
0215	R. Korea Int.	T-A	Seoul Calling
0230	BBCWS(am)	S	From Our Own Correspondent
	R. Austria Int.	O	Report from Austria
	R. Sweden	T-A	60 Degrees North

Business/Economics

0210	R. Budapest	M	Europe Unlimited (trade-monthly)
0220	R. Prague	F	Economic Report
0230	R. Korea Int.	H	Economic Radar
0245	R. Sweden	H	Money Matters
	Voice of Vietnam	F	Vietnam Economy

Science/Technology (incl. Health & Environment)

0205	BBCWS(am)	T	Health Matters
		W	Science View
		F	One Planet (ecology)
		A	Discovery (research)
	R. Australia	A	Ockham's Razor (issues)
0230	R. Australia	A	Earthbeat (environment)
0245	R. Sweden	F	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)

Arts & Cultural

0200	HCJB	W	The Book & the Spade (archaeology)
0205	R. Prague	S	Readings from Czech Literature
		M	The Arts
0210	R. Budapest	M	Spotlight (monthly)
0215	R. Taipei Int.	H	Journey into Chinese Culture
0230	R. Korea Int.	W	Cultural Promenade
	R. Sweden	S	Spectrum (3rd wk.)
0245	Voice of Vietnam	W	Culture and Society
0250	Voice of Vietnam	F	Literature and Arts

Local Lives and Views

0205	R. Budapest	M	Heading for Hungary (monthly)
		T-A	Hungary Today
	R. Canada Int.	T-A	Canada Today
	R. New Zealand	M-F	In Touch with New Zealand
	R. Prague	M	Letter from Prague
		T-A	Current Affairs
0210	R. Korea Int.	S	Seoul Report
0215	R. Prague	T	Spotlight (Czech current events) or One on One (interview)
		H	Czechs in History or Central Europe Today
	R. Taipei Int.	T	People
		W	Taiwan Today
		F	Taipei Magazine
		A	Kaleidoscope (life in Taiwan)
0220	R. Prague	W	Talking Point
		A	From the Weeklies
0224	Voice of Russia	M	Russia in Personalities
0230	R. Korea Int.	F	Korea and Its Splendors
	R. Sweden	S	Weekend (Europe magazine-1st wk.) Sweden Today (2nd wk) Studio 49 (topical discussion-4th wk.)
	Voice of Vienam	O	Current Affairs
0232	Voice of Russia	S	Moscow Yesterday and Today
0240	R. Austria Int.	S	Radio E (on Europe)
	Voice of Vietnam	S	Weekly Review
		T/W/F/A	Press Review
		H	Talk of the Week
0245	R. Sweden	F	Nordic Report (1st wk.) The S-Files (things Swedish-4th wk)
		A	Review of the Newsweek
	Voice of Vietnam	T	Vietnam: Land & People
		A	Rural Vietnam
0254	Voice of Russia	H	Russia: People and Events

Informational Features

0200	HCJB	F	Viewpoint (issues)
0215	R. Taipei Int.	S	Great Wall Forum (mainland issues)
0230	BBCWS(am)	T	Everywoman (magazine)
		W	Focus on Faith
		F	People and Places
		A	Essential Guide
	R. Korea Int.	T	Exploring the New Millennium
0232	Voice of Russia	A	Christian Message from Moscow
0235	R. Habana Cuba	S	The World of Stamps
0245	R. Taipei Int.	M-A	Let's Learn Chinese

Music

0200	HCJB	A	Walkin' in the Sunshine (country)
0205	BBCWS(am)	M	Wright Around the World (pop requests)
0210	R. Habana Cuba	M	From Habana
	R. Korea Int.	M	Korean Pop Interactive (requests)
	R. Prague	S	Saturday Music (classical/folk/jazz)
0215	R. Taipei Int.	M	Jade Bells and Bamboo Pipes (traditional)
0230	R. Habana Cuba	M	The Jazz Place
	R. Korea Int.	A	Notes of Nostalgia (traditional)
	R. Sweden	M	Sounds Nordic (exc. 1st wk.)
0232	Voice of Russia	T	Folk Box
		W	Jazz Show
		H	Russian Musical Highlights (history)
		F	Yours for the Asking
0246	Voice of Russia	F	Music At Your Request
0250	Voice of Vietnam	S	Music (Vietnamese)

Entertainment/Variety, Magazine Shows

0200	HCJB	M	Sunday Nite
		H	Adventures in Odyssey (children's stories)
	WBCQ	S	Marion's Attic (vintage recordings)
0205	R. Australia	S	Margaret Throsby Interview
	R. New Zealand	S	Playhouse (radio theatre)
0232	Voice of Russia	M	Timelines
0240	Voice of Vietnam	M	Sunday Show

SWL, Media and Communications

0200	HCJB	S	Ham Radio Today
0205	R. Canada Int.	M	CIDX Report (biweekly)
0210	R. Budapest	S	DX Blockbuster
0230	R. Korea Int.	M	Multiwave Feedback

Listener Contact/Interactive

0205	R. Canada Int.	M	Maple Leaf Mailbag
0210	R. Budapest	M	And the Gatepost (monthly)
0215	R. Prague	A	Mailbox
0230	R. Korea Int.	S	From Us to You
	R. Sweden	M	In Touch with Stockholm (1st wk.)
0245	R. Taipei Int.	S	Mailbag Time
	Voice of Vietnam	H	Letterbox
	WWCR(5070 kHz)	S	Ask WWCR

Sport

0200	R. New Zealand	S/A	Live Sport (in season)
0205	BBCWS(am)	H	Sports International (magazine)
	R. Australia	S/A	Grandstand (live sports action*)
0245	R. Sweden	T	Sportscan

(*special on 9660, 12080, 17580, 17715, 17750, 21725 kHz only.)

0300 UTC - Page 44 Freqs

Newscasts (*extended)

0300	BBCWS(am)	O	World Briefing*
	BBCWS(me)(af)	O	World Briefing*
	BBCWS(sas)	S	World Briefing*
		M-A	News
	China R. Int.	O	News
	Deutsche Welle	O	News
	R. Australia	O	News
	R. Habana Cuba	T-S	International News
	R. New Zealand	S/A	News
		M-F	Pacific Regional News
	R. Taipei Int.	O	News
	Voice of Russia	O	News
0310	R. Habana Cuba	T-S	National News
0330	R. Budapest	O	News
	R. Habana Cuba	O	News Bulletin
	Voice of Russia	O	News in Brief
	Voice of Vietnam	O	News

Current Affairs Magazines/Features

0305	BBCWS(sas)	T-A	Outlook
	Deutsche Welle	S/M	Weekend Review
		T-A	Newslink
	R. New Zealand.	W	Pacific Report
		F	Dateline Pacific
0310	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	R. Habana Cuba	M	Weekly Review
0315	R. Habana Cuba	T-S	Viewpoint
0330	BBCWS(am)	M	Assignment
	BBCWS(af)	M-F	Network Africa
	Deutsche Welle	T	Insight (international affairs)
	R. New Zealand	F	Pacific Correspondent
	R. Sweden	T-A	60 Degrees North
0340	R. Habana Cuba	M/F	Caribbean Outlook
		A	Weekly Review
0345	BBCWS(am)(me)	TWFA	News Analysis
		H	From Our Own Correspondent

Business/Economics

0311	Voice of Russia	W/A	Newmarket
0315	R. Taipei Int.	M	Taiwan Economic Journal
0330	BBCWS(am)(me)	T-A	World Business Report
	BBCWS(me)	M	World Business Review
	China R. Int.	W	China Horizons
	R. New Zealand	W	Tradewinds
0340	R. Budapest	M	Europe Unlimited (trade-monthly)
0345	R. Sweden	H	Money Matters
	Voice of Vietnam	F	Vietnam Economy

Science/Technology (incl. Health & Environment)

0311	Voice of Russia	T/F	Science and Engineering
0315	Deutsche Welle	S	Spectrum
0330	BBCWS(am)	S	Science in Action
	Deutsche Welle	W	Man and Environment
0345	R. Sweden	F	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)
0350	R. Habana Cuba	M	Breakthrough

Arts and Culture

0305	R. New Zealand	M	Tagata o te Moana (Pacific culture)
0315	Deutsche Welle	M	Arts on the Air
0320	China R. Int.	S	In the Spotlight
0330	R. Sweden	S	Spectrum (3rd wk.)
0340	R. Budapest	M	Spotlight (monthly)
0345	Voice of Vietnam	W	Culture and Society
		A	Literature and Arts

Local Lives and Views

0305	R. Australia	A	Rural Reporter (outback)
0330	China R. Int.	M	People in the Know
		F	Life in China
	Deutsche Welle	H	Living in Germany
	R. Sweden	S	Weekend (Europe magazine-1st wk.) Sweden Today (2nd wk) Studio 49 (topical discussion-4th wk),
0332	Voice of Russia	M	This is Russia
		T	Kaleidoscope (events)
		H	Moscow Yesterday and Today
0335	R. Budapest	M	Heading for Hungary (monthly)
		T-A	Hungary Today
	Voice of Vietnam	O	Current Affairs
0345	R. Sweden	F	Nordic Report (1st wk.)
	The S-Files		

Shortwave Guide

	(things Swedish-4th wk)	A	Review of the Newsweek
	Voice of Vietnam	T	Vietnam: Land and People
		A	Rural Vietnam
0354	Voice of Russia	W	Russia: People and Events

Informational Features

0320	China R. Int.	H	Voices from Other Lands
0330	Deutsche Welle	A	German by Radio
0332	R. Australia	A	Educational series
	Voice of Russia	F	Russian by Radio

Music

0305	R. New Zealand	T	Top 5 (pop/rock)
		A	Musical feature or series
0315	HCJB	T-A	Rendezvous (inspirational)
0330	HCJB	A	Inspirational Classics
	R. New Zealand	T	New Releases
	R. Sweden	M	Sounds Nordic (rock-exc. 1st wk.)
0332	Voice of Russia	S	Songs from Russia
		W	Russian Musical Highlights (history)
0340	R. Australia	M	Australian Music Show (modern rock)
		T	Music Deli (international)
		W	Blacktracker (Aboriginal)
		H	Country Style
		F	Jazz Notes
0345	HCJB	W	Wonderful Words of Life (hymns)
0350	Voice of Vietnam	S	Music (Vietnamese)

Entertainment/Variety, Magazine Shows

0310	R. Australia	M-F	Margaret Throsby Interview
0330	HCJB	M	Radio Reading Room (Christian lit.)
		T	Unshackled (radio's oldest drama series)
0332	Voice of Russia	A	Audio Book Club
0340	Voice of Vietnam	M	Sunday Show

SWL, Media and Communications

0300	WWCR(5070 kHz)	S	Communications World
0305	R. New Zealand	H	Pacific DXers Report (biweekly) RNZI Talk (meet the staff-biweekly)
0330	WWCR(5070 kHz)	S	World of Radio
0340	R. Budapest	S	DX Blockbuster
	R. Habana Cuba	S/W	DXers Unlimited

Listener Contact/Interactive

0305	BBCWS(sas)	M	Talking Point (global phone-in)
	R. Australia	S	Feedback
	R. New Zealand	H	Mailbox (biweekly)
0311	Voice of Russia	S/M/H	Moscow Mailbag
0320	China R. Int.	A	Listeners' Garden
0330	R. Sweden	M	In Touch with Stockholm (1st wk.)
0340	R. Budapest	M	And the Gatepost (monthly)
	R. Habana Cuba	H	Mailbag Show
0345	Voice of Vietnam	H	Letterbox
0346	Voice of Russia	S	You Write to Moscow

Sport

0300	R. Australia	S/A	Grandstand (live action)*
	R. New Zealand	S/A	Live Sport (in season)
0320	BBCWS(am)(me)(af)	D	Sports Roundup
	BBCWS(sas)	S	Sports Roundup
0330	China R. Int.	T	Sports World
	Deutsche Welle	F	Hard to Beat: The World of Sport
	R. New Zealand	H	The World in Sport
0335	R. Habana Cuba	T-A	Time Out
0345	R. Sweden	T	Sportscon

(*special on 9660, 12080, 17580, 17715, 17750, 21725 kHz Only)

0400 UTC - Page 44 Freqs

Newscasts (*extended)

0400	BBCWS(am)	S/M	The World Today*
		T-A	News
	BBCWS(eu)(me)(af)	D	The World Today*
	BBCWS(sas)	S/A	The World Today*
		M-F	News
	China R. Int.	D	News
	HCJB	D	Latin American & World News
	R. Australia	D	News
	R. Habana Cuba	T-S	International News
	R. New Zealand.	D	News
	R. Prague	D	News
	R. Vlaanderen Int.	T-S	News
	Voice of Russia	D	News
0430	R. Habana Cuba	T-S	News Bulletin
	R. Netherlands	S/M	News
	Voice of Russia	D	News in Brief

Current Affairs Magazines/Features

0405	R. New Zealand	M-F	Checkpoint
0410	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	HCJB	T-A	Studio 9 (on Latin America)
	R. Habana Cuba	T-A	Spotlight on the Americas
0411	Voice of Russia	M	Sunday Panorama
		T-A	News & Views
0430	BBCWS(me)(sas)	A	Assignment
	BBCWS(af)	M-F	Network Africa
	R. Netherlands	T-A	Newsline
0455	R. Netherlands	S	Insight (commentary)

Business/Economics

0413	R. Vlaanderen Int.	F	Economics
0420	R. Prague	F	Economic Report
0430	BBCWS(am)(eu)	S	Global Business
	China R. Int.	W	China Horizons
0445	Swiss R. Int.	A	Business Spotlight

Science/Technology (incl. Health & Environment)

0405	R. Australia	A	Pacific Focus-Environment
0413	R. Vlaanderen Int.	W	Green Society (ecology)
0430	BBCWS(am)	T	Body & Mind (health)

Arts and Culture

0405	BBCWS(sas)	T	Meridian-Screen (cinema)
		H	Meridian-Writing (books)
	R. New Zealand	S	Whenua! (Maori culture)
		A	Tagata o te Moana (Pacific culture)
	R. Prague	S	Readings from Czech Literature
		M	The Arts
0413	R. Vlaanderen Int.	H/A	Around the Arts
0420	China R. Int.	S	In the Spotlight
0430	R. Australia	S	Arts Talk
	Voice of Russia	W/F	Russian history/culture program

Local Lives and Views

0404	R. Vlaanderen Int.	T-A	Belgium Today
0405	R. Prague	M	Letter from Prague
		T-A	Current Affairs
0408	R. Vlaanderen Int.	M	Tourism in Flanders
		T-A	Press Review
0410	R. Prague	F	From the Weeklies
0413	R. Vlaanderen Int.	T	Focus on Europe
0415	R. Prague	T	Spotlight (Czech current events) or One on One (interview)
		H	Czechs in History or Central Europe Today
0418	R. Vlaanderen Int.	H	Around Town
		A	Tourism in Flanders
0420	R. Prague	W	Talking Point
0424	Voice of Russia	M	Russia: People and Events
0430	BBCWS(me)(sas)	S	In Praise of God (worship service)
	BBCWS(af)	S	The Story of Africa
		A	Talkabout Africa
	BBCWS(eu)	A	Weekend (magazine)
	China R. Int.	M	People in the Know
		F	Life in China
0432	Voice of Russia	S	Kaleidoscope (Russian events)
0435	R. Netherlands	S	Europe Unzipped

Informational Features

0405	BBCWS(am)	T	Omnibus (documentary)
0418	R. Vlaanderen Int.	F	International Report
0420	China R. Int.	H	Voices from Other Lands
0430	BBCWS(am)	W	Patterns of Faith
		H	Plain English (on language)
		F	Heart and Soul (religion)
0432	Voice of Russia	T/H/S	20th Century
0435	R. Habana Cuba	S	The World of Stamps

Music

0400	R. Vlaanderen Int.	S	Music from Flanders
0405	BBCWS(am)	W	The Alternative (rock)
		H	The Greenfield Collection (classical requests)
		F	Jazzmatazz
	BBCWS(sas)	M	Meridian-Masterpiece*
		W	Meridian-Music
0410	R. Habana Cuba	M	From Habana
	R. Prague	S	Saturday Music (classical/folk/jazz)
0424	R. Vlaanderen Int.	M-A	Soundbox (Flemish rock)
0430	BBCWS(sas)	M	Music Mix*
		T	UK Top 20
		H	World of Music
	HCJB	A	Musica del Ecuador
	R. Australia	A	Jazz Notes
0445	BBCWS(sas)	W	UK Album Chart
		F	Music X-Press

Entertainment/Variety, Magazine Shows

0400	WBCQ(7415 kHz)	S	Le Bon Bon Club
0405	BBCWS(am)	A	Panel game or quiz show
0410	R. Australia	M-F	Margaret Throsby Interview
0430	BBCWS(am)	M	Westway (drama serial)
	BBCWS(sas)	W/F	Westway (drama serial)
0432	Voice of Russia	M	Audio Book Club
0445	BBCWS(am)	T-A	Off the Shelf (book readings)

SWL, Media and Communications

0400	R. Vlaanderen Int.	M	Radio World
	WWCR(5070 kHz)	S	Spectrum
0410	HCJB	S	DX Partyline
0430	HCJB	H	Ham Radio Today
	WHRI(5745 kHz)	S	DXing with Cumbre

Listener Contact/Interactive

0410	HCJB	M	Musical Mailbag
0414	R. Vlaanderen Int.	M	Brussels 1043
0415	R. Prague	A	Mailbox
0420	China R. Int.	A	Listeners' Garden
0430	BBCWS(am)	A	Write On
	R. Habana Cuba	M	The Mailbag Show
0435	R. Netherlands	M	Sincerely Yours

Sport

0400	R. Australia	S/A	Grandstand (live action)*
0418	R. Vlaanderen Int.	T	Sports
0430	China R. Int.	T	Sports World
0450	BBCWS(eu)(me)	M-F	Sports Roundup

(*special on 9660, 12080, 17580, 17715, 17750, 21725 kHz only.)

0500 UTC - Page 45 Freqs

Newscasts (*extended)

0500	BBCWS(eu)(me)(af)(eas)	D	The World Today*
	BBCWS(sas)	S	The World Today*
		M-A	News
	China R. Int.	D	News
	Deutsche Welle	D	News
	R. Australia	D	News
	R. Habana Cuba	T-A	International News
	R. Japan	D	News
	R. New Zealand	D	News
	Spanish Foreign R.	T-A	Ibero-American News*
	Voice of Russia	D	News
0510	R. Habana Cuba	T-A	National News
0530	R. Habana Cuba	T-A	News Bulletin
	Voice of Russia	D	News in Brief

Current Affairs Magazines/Features

0505	Deutsche Welle	S	Talking Point (journalists)
		T-A	Newslink
0505	R. New Zealand	M-F	Worldwatch
0510	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	R. Australia	M-F	Pacific Beat
0515	R. Habana Cuba	T-S	Viewpoint
	R. Japan	M-F	44 Minutes
0530	BBCWS(af)	M-F	Network Africa
	Deutsche Welle	T	Insight (international affairs)
	R. New Zealand	M	Letter from America
		F	The Pacific Report
0540	R. Habana Cuba	T/F	Caribbean Outlook
		A	Weekly Review

Business/Economics

0500	R. Netherlands	A	A Good Life (development)
0505	R. Australia	A	Pacific Focus-Business
0511	Voice of Russia	H	Newsmarket
0515	Deutsche Welle	S	Marks and Markets
0530	BBCWS(me)	S	Global Business
	China R. Int.	W	China Horizons

Science/Technology (incl. Health & Environment)

0500	R. Netherlands	T	Research File
0505	BBCWS(sas)	M	One Planet (ecology)
		T	Discovery
		W	Health Matters
		H	Science View
0511	Voice of Russia	W/A	Science and Engineering
0530	Deutsche Welle	W	Man and Environment

Arts and Culture

0520	China R. Int.	S	In the Spotlight
0530	BBCWS(eu)(me)(eas)	A	Arts in Action
	BBCWS(af)	S	Artbeat (arts in Africa)

Shortwave Guide

Local Lives and Views

0500	R. Netherlands	M	Dutch Horizons
0530	BBCWS(esaf)	A	Africa Quiz or This Week and Africa
	BBCWS(wcaf)	A	Talkabout Africa
	BBCWS(eas)	S	From Where I Stand
	China R. Int.	M	People in the Know
		F	Life in China
	Deutsche Welle	H	Living in Germany
	R. Australia	S	In Conversation-Rural
0532	Voice of Russia	S	Moscow Yesterday and Today
0546	Voice of Russia	W	Russia: People and Events

Informational Features

0500	HCJB	W	The Book & the Spade (archaeology)
	R. Netherlands	S	Sound Fountain (soundscapes)
		H	Documentary
0505	Deutsche Welle	M	Religion and Society
0515	Deutsche Welle	M	Cool (teen magazine)
0530	BBCWS(eu)(sas)	S	Reporting Religion
	BBCWS(sas)	M	People and Places
		T	Essential Guide
		W	Everywoman
		H	Focus on Faith
		F	Pick of the World (BBC's best)
	China R. Int.	H	Voices from Other Lands
	Deutsche Welle	A	German by Radio
	R. Australia	A	Lingua Franca (about language)
0547	Spanish Foreign R.	T-A	Spanish Language Course

Music

0500	HCJB	F	Inspirational Classics
		A	Walkin' in the Sunshine (country)
	R. Netherlands	W	Music 52-15 (world/folk)
0510	R. Japan	S	Pop Goes Asia
0511	Voice of Russia	S/M	Russian Musical Highlights (history)
0530	R. Australia	S	Fine Music Australia (classical)
	R. Habana Cuba	M	The Jazz Show
0532	Voice of Russia	M	Jazz Show
		T	Yours for the Asking
		W	Russian Musical Highlights (history)
		H	Folk Box
0546	Voice of Russia	T	Music At Your Request

Entertainment/Variety, Magazine Shows

0500	HCJB	M	Sunday Nite
		H	Adventures in Odyssey (stories)
	WBCQ(7315 kHz)	M-A	Amos 'n Andy (classic comedy)
0532	Voice of Russia	F	Audio Book Club
		A	Timelines
0545	R. Australia	A	Short Story

SWL, Media and Communications

0540	R. Habana Cuba	S/W	DXers Unlimited
0547	Spanish Foreign R.	S	Radio Waves

Listener Contact/Interactive

0500	HCJB	S	Saludos Amigos
0510	R. Japan	A	Hello from Tokyo
0511	Voice of Russia	T/F	Moscow Mailbag
0520	China R. Int.	A	Listeners' Garden
0535	Spanish Foreign R.	A	Radio Club
0540	R. Habana Cuba	M/H	Mailbag Show
0547	Spanish Foreign R.	M	Radio Club

Sport

0500	R. Australia	S/A	Grandstand (live action)*
0505	R. Australia	A	Pacific Focus-Sport
0530	China R. Int.	T	Sports World
	Deutsche Welle	F	Hard to Beat: The World of Sport
0535	R. Habana Cuba	T-A	Time Out

(*special on 9660, 12080, 17580, 17715, 17750, 21725 kHz only.)

0600 UTC - Page 45 Freqs

Newscasts (*extended)

0600	BBCWS(eu)(wcaf)	D	World Briefing*
	BBCWS(me)(esaf)	S	World Briefing*
		M-A	News
	BBCWS(eas)	S/A	World Briefing*
		M-F	News
	R. Australia	D	News
	R. Habana Cuba	T-S	International News
	R. Japan	D	News
	R. New Zealand Int.		D News
0630	R. Habana Cuba	T-S	News Bulletin

Current Affairs Magazines/Features

0605	BBCWS(me)(esaf)	T-A	Outlook (magazine)
0610	R. Habana Cuba	T-S	Spotlight on the Americas
0615	R. Japan	M-F	Asian Top News (region's radio)
0630	BBCWS(eu)(me)(af)	S	Agenda (trends)
	R. New Zealand.	M	Letter from America
		F	The Pacific Report
0645	BBCWS(eu)	T/W/F	Analysis
		H	From Our Own Correspondent

Business/Economics

0630	BBCWS(eu)	M-F	World Business Report

Science/Technology (incl. Health & Environment)

0630	R. New Zealand	M	Eureka!

Arts and Culture

0605	BBCWS(eas)	H	Meridian-Screen (film/cinema)
		A	Meridian-Writing (books)
	R. Australia	S	Pacific Focus-Arts

Local Lives and Views

0610	R. Japan	S	Weekend Square (Japanese life)
0620	R. Australia	M-F	Pacific Focus
0630	BBCWS(eu)(eas)	A	People and Politics
	BBCWS(wcaf)	M-F	Network Africa
		A	African Quiz or This Week and Africa
0645	BBCWS(eu)	M	Letter from America
	BBCWS(me)(esaf)	A	From Where I Stand (2nd or 3rd wk.)

Informational Features

0605	BBCWS(eas)	F	Omnibus (documentary)
	R. Australia	S	The Europeans
0625	R. Japan	T	Let's Try Japanese
		H	Brush Up Your Japanese
0635	R. Habana Cuba	S	The World of Stamps

Music

0600	HCJB	T	Chords of Love (sacred)
		A	Wonderful Words of Life (hymns)
0605	BBCWS(eas)	T	Meridian-Masterpiece*
		H	Meridian-Music
0610	R. Habana Cuba	M	From Havana (Cuban musicians)
	R. Japan	A	Pop Goes Asia
0625	R. Japan	M	Unforgettable Masterpieces
		W	Japan Music Log
		F	Music Beat (pop)
0630	BBCWS(eas)	M	Composer of the Month
		T	Music Mix*
		W	UK Top 20
		F	World of Music
	HCJB	T-A	Nightsounds (inspirational)
	R. Australia	A	Oz Sounds
0640	R. Australia	M	Australian Music Show (modern rock)
		T	Music Deli (international)
		W	Blocktracker (Aboriginal)
		H	Country Style
		F	Jazz Notes

Entertainment/Variety, Magazine Shows

0605	R. New Zealand	A	Saturday Night
0630	BBCWS(eas)	S	Westway Omnibus (drama serial)
	BBCWS(eas)	H	Panel game or Quiz
0645	BBCWS(me)(esaf)	M-F	Off the Shelf (readings)
	R. New Zealand	M-F	Storytime

SWL, Media and Communications

0600	WHRI	A	DXing with Cumbre
	WWCR(3210 kHz)	M	World of Radio
0630	WWCR(3210 kHz)	M	Communications World

Listener Contact/Interactive

0600	HCJB	S	Saludos Amigos
0605	BBCWS(me)(esaf)	M	Talking Point (global phone-in)
	R. Australia	S	Feedback
0645	BBCWS(me)(esaf)	A	Write On (exc. 2nd or 3rd wk.)

Sport

0600	R. Australia	S/A	Grandstand (live action)*
0610	R. Australia	M-F	Sport (daily report)
0620	BBCWS(eu)(wcaf)	D	Sports Roundup
	BBCWS(me)(wcaf)	S	Sports Roundup
	BBCWS(eas)	S/A	Sports Roundup
0630	R. New Zealand	F	Sports Story
0635	R. New Zealand	S/A	Live Sport (in season)

(*special on 9660, 12080, 17580, 17715, 17750, 21725 kHz only.)

1000 UTC - Page 47 Freqs

Newscasts (*extended)

1000	BBCWS(am,eu,me)	D	World Briefing*
	BBCWS(af)(eas)	S	News Summary
	BBCWS(esaf)	M-A	World Briefing*
	BBCWS(wcaf)	A	World Briefing*
	BBCWS(eas)	M-F	World Briefing*
	A	News	
	R. Australia	D	News
	R. New Zealand	D	News
	VOA News Now	D	World News
1010	VOA News Now	D	Regional News
1014	VOA News Now	D	USA News
1030	VOA News Now	D	World News

Current Affairs Magazines/Features

1005	R. Australia	M-F	Asia Pacific
	R. New Zealand	M-F	Late Edition
1030	BBCWS(am)(me)	S	Agenda (trends)
	BBCWS(esaf)	T-F	Analysis

Business/Economics

1030	BBCWS(am,eu,eas)	M-F	World Business Report
1049	VOA News Now	M-F	Business and Economic Report

Science/Technology (incl. Health & Environment)

1030	BBCWS(am,eu,me,af)	A	Science in Action
	R. Australia	M	Health Report
	A	In Conversation	
1045	VOA News Now	M-F	Science, Medicine, Environment

Local Lives and Views

1005	R. Australia	A	Pacific Review
1030	BBCWS(eu)	S	Weekend
	BBCWS(esaf)	M	Letter from America
	R. Australia	S	Rural Reporter

Informational Features

1001	BBCWS(wcaf)	S	Heart and Soul (religion)
1005	R. Australia	S	Lingua Franca (about language)
1030	BBCWS(me)	M-F	World Learning
	R. Australia	T	Law Report
		W	Religion Report
1033	VOA News Now	S	On the Line (US foreign policy)
1045	BBCWS(wcaf)	S	A Radio History of the World

Music

1001	BBCWS(eas)	S	Concert Hall (classical)
1005	BBCWS(esaf)	S	The Alternative (eclectic)
	BBCWS(eas)	A	Jazzmatazz
	R. New Zealand	A	Deep Purple (relaxing)
1020	BBCWS(wcaf)	S	The Alternative (eclectic)
1030	BBCWS(wcaf)	S	Composer of the Month
	BBCWS(eas)	A	Greenfield Collection (classical requests)

SWL, Media and Communications

1011	R. New Zealand	S	Mediawatch
1030	R. Australia	H	Media Report

Sport

1020	BBCWS(am,eu,me)	S/A	Sports Roundup
	BBCWS(wcaf)	S	Sports Roundup
1030	R. Australia	F	Sports Factor
1045	BBC(am,eu,esaf,eas)	M-F	Sports Roundup

1100 UTC - Page 48 Freqs

Newscasts (*extended)

1100	BBCWS(am)(eu)	D	World Briefing*
	BBCWS(me)	S	World Briefing*
		M-A	News
	BBCWS(esaf)	S-F	World Briefing*
		A	News
	BBCWS(eas)	S/A	World Briefing*
		M-F	News
	R. Australia	D	News
	R. Japan	D	News
	R. New Zealand	D	News
1105	R. New Zealand	M-F	Late Edition*
1120	BBCWS(am,eu,wcaf)	D	British News
	BBCWS(me)	S	British News
	BBCWS(esaf)	S-F	British News
	BBCWS(eas)	S/A	British News
1130	R. Korea Int.	D	News

Shortwave Guide

Current Affairs Magazines/Features

1105	BBCWS(am)	M-F	Caribbean Report*
	R. Australia	M-F	Asia Pacific
1115	R. Japan	M-F	Asian Top News (region's radio)
1130	BBCWS(am)(eu)	TWFA	News Analysis
		H	From Our Own Correspondent
1140	R. Korea Int.	M-F	News Commentary

(*special to Caribbean on 6195, 15220 kHz only)

Business/Economics

1128	HCJB	M-F	Money Minute
1130	BBCWS(am)(af)	M-F	World Business Report
	BBCWS(am)	A	World Business Review
1145	R. Korea Int.	W	Economic Radar

Science/Technology (incl. Health & Environment)

1105	BBCWS(eas)	M	Health Matters
		T	Science View
		H	One Planet (ecology)
		F	Discovery
1130	BBCWS(eas)	A	Science in Action

Arts and Culture

1105	BBCWS(me)	W	Meridian-Screen (film/cinema)
		F	Meridian-Writing (books)
1130	BBC(am,eu,me,esaf)	S	Arts in Action
1145	R. Korea Int.	T	Cultural Promenade

Local Lives and Views

1105	R. New Zealand	M-H	Kim Hill (interviews)
1115	BBCWS(am)	M-F	Caribbean Magazine*
1130	BBCWS(am)(su)	M	Letter from America
	BBCWS(wcaf)	S	Postmark Africa
	R. Australia	S	Country Breakfast
1135	R. Australia	M-F	Life Matters (social issues)
1145	R. Korea Int.	H	Korea and Its Splendors

(*special to Caribbean on 6195, 15220 kHz only)

Informational Features

1105	BBCWS(me)	M	Omnibus (documentary)
1125	R. Japan	T	Let's Learn Japanese
		H	Brush Up Your Japanese
1130	BBCWS(eas)	M	Everywoman
		T	Focus on Faith
		W	Pick of the World (BBC's best)
		H	People and Places
		F	Essential Guide
1145	R. Korea Int.	M	Exploring the New Millennium

Music

1100	HCJB	S	Morning Song (hymns)
1105	BBCWS(me)	T	Meridian-Masterpiece
		H	Meridian-Music
	R. New Zealand	A	Deep Purple
1125	R. Japan	M	Unforgettable Masterpieces
		W	Japan Music Log
		F	Music Beat (pop)
1130	BBCWS(me)	M	Composer of the Month
		T	Music Mix*
		W	UK Top 20
		F	World of Music
	BBCWS(esaf)	A	Greenfield Collection (classical requests)
	R. Australia	A	Find Music Australia (classical)
1145	R. Korea Int.	F	Notes of Nostalgia

Entertainment/Variety, Magazine Shows

1105	BBCWS(me)	A	Wright Around the World (pop requests)
	BBCWS(esaf)	A	Westway Omnibus (drama serial)
1130	BBCWS(me)	H	Panel game or Quiz
	BBCWS(eas)	S	Play of the Week (radio theatre)
1130	HCJB	M-F	Morning in the Mountains

SWL, Media and Communications

1140	R. Korea Int	S	Multiwave Feedback

Listener Contact/Interactive

1110	R. Japan	S	Hello From Tokyo
1140	R. Korea Int	A	From Us to You

Sport

1105	R. New Zealand	S	Sportsworld
		A	The World in Sport
		F	Sports Story
1110	BBCWS(am)	M-F	Caribbean Sport*
1130	BBCWS(wcaf)	F	Fast Track
	BBCWS(eas)	W	Sports International
	R. Australia	M-F	Sports Report
1145	BBCWS(am)(eu)	M-H/A	Sports Roundup
	BBCWS(am,eu,af)	F	Football Extra
	BBCWS(af)	M-H	Sports Roundup

(*special to Caribbean on 6195, 15220 kHz only)

1200 UTC - Page 48 Freqs

Newscasts (*extended)

1200	BBCWS(am,me,wcaf)	D	Newshour*
	BBCWS(eu)	D	News
	BBCWS(esaf)	S/A	Newshour*
		M-F	News
	BBCWS(eas)	M-A	News
	HCJB	M-F	Latin American & World News
	R. Australia	D	News
	R. New Zealand	M-F	Late Edition*
1210	BBCWS(am)	M-F	Caribbean Report ^
1230	HCJB	M-F	Latin American & World News
	R. New Zealand	S	New Zealand News

(^ special to Caribbean on 6195, 15220 kHz only)

Current Events Magazines/Features

1205	BBCWS(eu,esaf,eas)	M-F	Outlook (magazine)
1230	BBCWS(eas)	S	Agenda (trends)
		A	Assignment
	R. Sweden	M-F	60 Degrees North

Business/Economics

1205	BBCWS(am)	M-F	Caribbean Business*
1230	BBCWS(eu)	A	Global Business
1245	R. Sweden	W	Money Matters

(*special to Caribbean on 6195, 15220 kHz only)

Science/Technology (incl. Health & Environment)

1230	BBCWS(eu)(escf)	H	Body and Mind (health)
1245	BBCWS(esaf)	F	Body and Mind (health)
	R. Sweden	H	Greenscan (ecology-2nd wk.) Heartbeat (3rd wk.)

Arts and Culture

1230	R. Sweden	A	Spectrum (3rd wk.)

Local Lives and Views

1205	R. Australia	M-H	Late Night Live (discussion)
1230	R.Sweden	A	Weekend (Europe magazine-1st wk.) Sweden Today (2nd) Studio 49 (discussion-3rd)
1245	R. Sweden	H	Nordic Report (1st) The S Files (things Swedish-4th)
		F	Review of the Newsweek

Informational Features

1205	R. Australia	A	The Spirit of Things (spiritual matters)
1224	HCJB	M-F	Mission Network News
1230	HCJB	A	Adventures in Odyssey (stories)
1245	BBCWS(eu)(esaf)	M	A Radio History of the World
		T	Heart and Soul (religion)
		F	Patterns of Faith
	BBCWS(eas)	M	Patterns of Faith
		T	A Radio History of the World
		W	Heart and Soul (religion)

Music

1205	BBCWS(eu)	S	The Alternative (eclectic)
	R. Australia	S	Country Club
		F	Sound Quality (innovative)
1230	R. Sweden	S	Sounds Nordic (rock-exc. 1st wk.)

Entertainment/Variety, Magazine Shows

1200	BBCWS(eas)	S	Play of the Week (from 1130)
	HCJB	M-F	Morning in the Mountains (from 1130)
1205	BBCWS(eu)(esaf)	W	Best of "The Edge" (youth culture)
	BBCWS(eu)	A	Wright Around the World (pop requests)
	BBCWS(eas)	A	Panel game or Quiz
1245	BBCWS(eas)	H	Best of "The Edge" (youth culture)

SWL, Media and Communications

1200	WWCR(15685kHz)	T	World of Radio
		W	Communications World
1230	WHRI(9495 kHz)	A	DXing with Cumbre
	WWCR(15685kHz)	A	World of Radio

Listener Contact/*Interactive

1215	WWCR(15685kHz)	S/M	Ask WWCR
1230	R. Sweden	S	In Touch with Stockholm (1st wk.)

Sport

1205	HCJB	M-F	Sports News
	R. New Zealand	S	The World in Sport
		A	Sports Story
1245	R. Sweden	M	Sportscan

1300 UTC - Page 49 Freqs

Newscasts

1300	BBCWS(am,me,af)	D	News
	BBCWS(eu)	S/A	Newshour*
		M-F	News
	BBCWS(eas)	D	Newshour*
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	D	News

Current Affairs Magazines/Features

1305	BBCWS(am)	M-F	Outlook
1310	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	R. Canada Int.	M-F	This Morning
1330	R. Sweden	M-F	60 Degrees North

Business/Economics

1305	BBCWS(am)	A	Global Business
1320	China R. Int.	W	China Horizons
1330	BBCWS(me)	S	Global Business
1345	R. Sweden	W	Money Matters
1350	BBCWS(eas)	M-F	World Business Report

Science/Technology (incl. Health & Environment)

1305	BBCWS(me)	M	Discovery
		T	Health Matters
		W	Science View
		F	One Planet (ecology)
	R. Australia	A	The Science Show
1345	R. Sweden	H	Greenscan (ecology-2nd wk.) Heartbeat (health-3rd wk.)

Arts/Culture

1305	BBCWS(eu)(af)	W	Meridian-Screen (film/cinema)
		F	Meridian-Writing (books)
1320	China R. Int.	S	In the Spotlight
1330	R. Sweden	A	Spectrum (3rd Sat.)

Local Lives and Views

1305	BBCWS(am)	A	People & Politics (Parliament)
1310	R. Canada Int.	A	The House (Canadian politics)
1330	BBCWS(am)(esaf)	A	People & Politics (Parliament)
	China R. Int.	M	People in the Know
		F	Life in China
	YLE R. Finland	S	Capital Cafe (conversations)
		M-F	Finland This Morning
		A	Finland This Week
	R. Sweden	A	Weekend (Europe magazine-1st wk) Sweden Today (2nd wk.) Studio 49 (discussion-4th wk.)
1345	R. Sweden	H	Nordic Report (1st wk.) The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek

Informational Features

1305	BBCWS(eu)(af)	M	Omnibus (documentary)
1320	China R. Int.	H	Voices from Other Lands
1330	BBCWS(am)	S	In Praise of God
	BBCWS(me)	M	Essential Guide
		T	Everywoman
		W	Focus on Faith
		F	People and Places
	HCJB	M-F	Focus on the Family
1345	YLE R. Finland	A	Starting Finnish
1356	HCJB	M-F	Today's Father
1358	HCJB	M-F	Parent Talk Tip

Music

1305	BBCWS(am)	S	Jazzmatazz
	BBCWS(eu)(af)	T	Meridian-Masterpiece*
		H	Meridian-Music
	BBCWS(me)	S	The Alternative (eclectic)
	BBCWS(me)(wcaf)	A	Jazzmatazz
	BBCWS(af)	S	Concert Hall (classical)
	R. Australia	S	Country Club (from 1205)
	WWCR(5070 kHz)	A	Rock the Universe (Christian rock)
1315	R. Australia	M-F	The Planet (international)
1330	BBCWS(eu)(af)	M	Composer of the Month
		T	Music Mix
		W	UK Top 20
		F	World of Music
	BBCWS(esaf)	A	Jazzmatazz
	R. Sweden	S	Sounds Nordic (rock/pop-exc. 1st wk.)

Entertainment/Variety, Magazine Shows

1300	Channel Africa	S/A	Channel Africa Extra (weekend variety)

	HCJB	S	Weekend Magazine
1330	BBCWS(eu)(af)	H	Panel game or Quiz
	BBCWS(me)	H	Pick of the World (BBC's best)
1345	BBCWS(am)	M-F	Off the Shelf (book readings)

Listener Contact/Interactive

1320	China R. Int.	A	Listeners' Garden
1330	R. Sweden	S	In Touch with Stockholm (1st wk.)

Sport

1310	R. Australia	M-F	Sport (daily report)
1330	China R. Int.	T	Sports World
1345	R. Sweden	M	Sportscan

1400 UTC - Page 49 Freqs

Newscasts (*extended)

1400	BBCWS(am,eu,wcaf)	D	News
	BBCWS(me,esaf,eas)	S/A	News
	BBCWS(me)(esaf)	M-F	World Briefing*
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	D	News
	R. Japan	D	News
	R. Prague	D	News
1430	BBCWS(me,esaf,eas)	M-F	British News

Current Affairs Magazines/Features

1400	BBCWS(eas)	M-F	East Asia Today
1405	R. Canada Int.	S	The Sunday Edition
		M-F	This Morning (from 1310)
1410	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	R. Japan	S	Roundup Asia
1415	R. Japan	M-F	44 Minutes
1430	R. Sweden	M-F	60 Degrees North

Business/Economics

1420	China R. Int.	W	China Horizons
	R. Prague	H	Economic Report
1445	R. Sweden	W	Money Matters

Science/Technology (incl. Health & Environment)

1405	BBCWS(eu)(wcaf)	M	Discovery
		T	Health Matters
		W	Science View
		F	One Planet (ecology)
1445	R. Sweden	H	Greenscan (ecology-2nd wk.) Heartbeat (health-3rd wk.)

Arts and Culture

1405	BBCWS(am)	T	Meridian-Screen (film)
		H	Meridian-Writing (books)
	R. Australia	S	Books and Writing
	R. Prague	S	The Arts
		A	Readings from Czech Literature
1420	China R. Int.	S	In the Spotlight
1430	R. Sweden	S	Spectrum (3rd wk.)

Local Lives and Views

1405	R. Canada Int.	A	The House (Parliament)
	R. Prague	S	Letter from Prague
		M-F	Current Affairs
1410	R. Japan	S	Weekend Square
	R. Prague	H	From the Weeklies
1415	R. Prague	M	Spotlight (Czech events) or One on One (interview)
		W	Czechs in History or Central Europe Today
1420	R. Prague	T	Talking Point
1430	China R. Int.	M	People in the Know
		F	Life in China
	R. Sweden	A	Weekend (Europe magazine-1st wk.) Sweden Today (2nd wk.) Studio 49 (discussion-4th wk.)
1445	R. Sweden	H	Nordic Report (1st wk.) The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek

Informational Features

1405	BBCWS(am)	M	Meridian-Ideas
	R. Australia	A	New Dimensions ("progressive" ideas)
1420	China R. Int.	H	Voices from Other Lands
1430	BBCWS(eu)(wcaf)	M	Essential Guide
		T	Everywoman
		W	Focus on Faith
		F	People and Places

Music

1400	R. Sweden	S	Sounds Nordic (rock/pop-exc. 1st wk.)
1405	BBCWS(am)	M	Meridian-Masterpiece
		W	Meridian-Music
	R. Australia	M-F	The Planet (from 1315)
	R. Japan	S	Pop Goes Asia
1410	R. Prague	A	Saturday Music (classical/folk/jazz)
1430	BBCWS(am)	M	Music Mix
		T	UK Top 20
		H	World of Music
1445	BBCWS(am)	W	UK Album Chart
		F	Music X-Press

Entertainment/Variety, Magazine Shows

1400	Channel Africa	S/A	Channel Africa Extra (from 1300)
1405	BBCWS(eu)(wcaf)	H	Pick of the World (BBC's best)
1430	BBCWS(am)	W/F	Westway (drama serial)
	HCJB	A	Alive! (Christian lifestyles)

Listener Contact/Interactive

1405	BBCWS(am)	S	Talking Point (current events call-in)
1415	R. Prague	F	Mailbox
	WWCR(15685kHz)	A	Ask WWCR
1420	China R. Int.	A	Listeners' Garden
1430	R. Sweden	S	In Touch with Stockholm (1st wk.)

Sport

1405	BBCWS(am)	A	Sportsworld (live action)
	BBCWS(eu)(wcaf)	H	Sports International
1430	China R. Int.	T	Sports World
1445	R. Sweden	M	Sportscan
	BBCWS(me,esaf,eas)	M-H	Sports Roundup
		F	Football Extra

1500 UTC - Page 50 Freqs

Newscasts

1500	BBC(am,me,af,eas)	D	News
	BBCWS(eu)	S/A	News
		M-F	World Briefing*
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	D	News
	Voice of Russia	D	News
1530	Voice of Russia	D	News in Brief

Current Events Magazines/Features

1505	BBCWS(am)	S	From Our Own Correspondent
	BBCWS(me)	M-F	Outlook (topical magazine)
	BBCWS(af)	M-F	Focus on Africa
	R. Australia	M-F	Asia Pacific
	R. Canada Int.	S	The Sunday Edition (from 1410)
		M-F	This Morning (from 1310)
1510	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
1511	Voice of Russia	S	Sunday Panorama
		M-A	News and Views
1530	R. Austria Int.	D	Report from Austria
1545	BBCWS(eu)	M/T/H	Analysis
		W	From Our Own Correspondent
		F	Analysis (exc. last wk.)

Business/Finance

1530	China R. Int.	W	China Horizons

Science/Technology (incl. Health & Environment)

1505	BBCWS(am)	M	One Planet (ecology)
		T	Discovery (research)
		W	Health Matters
		H	Science View
1530	R. Australia	M	The Health Report
1545	BBCWS(me)	F	Body and Mind (health)

Arts and Culture

1505	BBCWS(eas)	T	Meridian-Screen (film/cinema)
		H	Meridian-Writing (books)
1520	China R. Int.	S	In the Spotlight

Local Lives and Views

1530	BBCWS(am)	S	People and Politics (Parliament)
	China R. Int.	M	People in the Know
		F	Life in China
	R. Australia	T	The Law Report
		W	The Religion Report
	R. Canada Int.	F	C'est La Vie (life in Quebec)
1532	Voice of Russia	S	Kaleidoscope (Russian events)
		F	Moscow Yesterday and Today
1540	R. Austria Int.	A	Radio E (on Europe)
1545	BBCWS(eu)	F	The New Europe (last wk.)
	R. Canada Int.	M-H	Out Front (experimental radio)

Informational Features

1505	BBCWS(eas)	F	Omnibus (documentary)
	R. Australia	S	Encounter (spiritual beliefs)
1520	China R. Int.	H	Voices from Other Lands
1530	BBCWS(am)	M	People and Places
		T	The Essential Guide
		W	Everywoman
		H	Focus on Faith
		F	Pick of the World (best of the BBC)
	BBCWS(af)	M-F	World Learning
1545	BBCWS(me)	M	Patterns of Faith
		T	A History of the World
		W	Heart and Soul (religion)
		H	Best of "The Edge" (youth culture)

Music

1505	R. Australia	A	Melisma (innovative)
1532	Voice of Russia	M	Folk Box
		T/H	Yours for the Asking
		W	Jazz Show
1546	Voice of Russia	T/H	Music at Your Request

Entertainment/Variety, Magazine Shows

1500	HCJB	A	Alive! (from 1430)
1505	BBCWS(af)	S	Play of the Week (radio theatre)
	R. Canada Int.	A	Vinyl Cafe
1530	BBCWS(eas)	W/F	Westway (drama serial)
	HCJB	A	Weekend Magazine
1532	Voice of Russia	A	Timelines

SWL, Media and Communications

1530	R. Australia	H	The Media Report
	WHRI(6040 kHz)	S/A	DXing with Cumbre

Listener Contact/Interactive

1520	China R. Int.	A	Listeners' Garden

Sport

1505	BBCWS(am)	F	Sports International
		A	Sportsworld (from 1405)
1530	China R. Int.	T	Sports World
		F	The Sports Factor
	R. Australia	F	The Sports Factor

1600 UTC - Page 50 Freqs

Newscasts (*extended)

1600	BBCWS(am,eu,eas)	S	News Summary
		M-F	World Briefing*
		A	News
	R. Australia	D	News

Current Events Magazines/Features

1630	BBCWS(am)	M/T/H/F	News Analysis
		W	From Our Own Correspondent
	R. Austria Int.	D	Report from Austria

Science/Technology (incl. Health & Environment)

1605	R. Canada Int.	A	Quirks and Quarks

Local Lives and Views

1605	R. Australia	S	The National Interest
		T	The Comfort Zone (homes/gardens/food)
		W	Verbatim (oral histories)
		H	Hindsight (history)
		F	Awaye! (Aboriginal culture)
	R. Canada Int.	S	The Sunday Edition (from 1405)
1630	BBCWS(af)	W	Talkabout Africa
	R. Australia	W	Earshot (Australian voices)
1640	R. Austria Int.	A	Radio E (on Europe)

Informational Features

1605	BBCWS(me)(af)	F	Omnibus (documentary)
1630	BBCWS(af)	T	The Story of Africa

Music

1601	BBCWS(am)	S	Concert Hall (classical)
1605	BBCWS(me)	M	Meridian-Masterpiece
		W	Meridian-Music
	R. Australia	M	Music Deli
		A	Melisma (from 1505)
1630	BBCWS(me)(af)	M	Music Mix
		T	UK Top 20
		H	World of Music

Shortwave Guide

1645 BBCWS(me)(af) W UK Album Chart
F Music X-Press

Sport
1605 BBCWS(am) A Sportsworld (from 1405)
1645 BBCWS(am) M-F Sports Roundup

2100 UTC - Page 53 Freqs

Newscasts
2100 BBCWS(am,eu,wcaf) D News
R. Australia D News
2120 BBCWS(am)(eu) M-A British News

Current Events Magazines/Features
2110 R. Australia S-H AM (morning news magazine)
2145 BBCWS(am) M/T/H/F Analysis
W From Our Own Correspondent

Business/Finance
2105 BBCWS(am) S Global Business
A World Business Review
BBCWS(am)(eu) M-F World Business Report

Science/Technology (incl. Health & Environment)
2105 BBCWS(wcaf) M Health Matters
T Science View
H One Planet (ecology)
F Discovery
A Science in Action
2130 R. Australia M Health Report
T Innovations

Local Lives and Views
2105 BBCWS(am) M-F Caribbean Report*
R. Australia A Australia All Over^
2130 BBCWS(am) T/F Calling the Falklands ^
BBCWS(wcaf) A People and Politics
R. Australia H Rural Reporter
2145 BBCWS(am) A Letter from America
(*special service on 5975, 11675, 15390 kHz only.)
(^ special service on 5975, 11680 kHz

Informational Features
2130 BBCWS(am) M Everywoman
T Focus on Faith
H People and Places
F Essential Guide
R. Australia S Educational series
W Religion Report
2145 BBCWS(am) S Reporting Religion

Music
2130 BBCWS(eu) A Composer of the Month
R. Australia F Jazz Notes

Entertainment/Variety, Magazine Shows
2105 BBCWS(wcaf) S Wright Around the World (pop requests)
2130 BBCWS(eu) S Panel game or Quiz
BBCWS(wcaf) W Pick of the World (BBC's best)
2145 BBCWS(eu) M-F Off the Shelf (readings)

Listener Contact/Interactive
2105 R. Australia F Feedback

Sport
2105 BBCWS(wcaf) W Sports International
2130 BBCWS(am) D Sports Roundup
BBCWS(eu) M-F Sports Roundup

2200 UTC - Page 54 Freqs

Newscasts (*extended)
2200 BBCWS(am) D The World Today*
BBCWS(wcaf) D News
R. Australia D News
2230 R. Vlaanderen Int. M-F News

Current Events Magazines/Features
2205 BBCWS(wcaf) M-F Outlook (topical magazine)
2210 R. Australia S-H AM (morning news magazine)
F Asia Pacific
A Correspondents' Report
2230 BBCWS(am) S Agenda (trends)
BBCWS(am)(wcaf) A From Our Own Correspondent
2243 R. Vlaanderen Int. M Focus on Europe
2248 R. Vlaanderen Int. H International Report

Business/Finance
2243 R. Vlaanderen Int. H Economics

Science/Technology (incl. Health & Environment)
2243 R. Vlaanderen Int. T Green Society (ecology)
2245 BBCWS(wcaf) F Body and Mind

Arts and Culture
2243 R. Vlaanderen Int. W/F Around the Arts

Local Lives and Views
2230 BBCWS(am) F People and Politics
2234 R. Vlaanderen Int. M-F Belgium Today
2238 R. Vlaanderen Int. S Tourism in Flanders
M-F Press Review
2248 R. Vlaanderen Int. W Around Town
F Tourism in Flanders

Informational Features
2205 BBCWS(wcaf) A Omnibus (documentary)
2245 BBCWS(wcaf) M Patterns of Faith
T A Radio History of the World
W Heart and Soul (religion)

Music
2230 BBCWS(wcaf) S World of Music
R. Vlaanderen Int. A Music from Flanders
2240 R. Australia S Australian Music Show (rock)
M/H Music Deli (international)
T Blacktracker (Aboriginal contemporary)
W Australian Country Style
2254 R. Vlaanderen Int. S-F Soundbox

Entertainment/Variety, Magazine Shows
2205 BBCWS(wcaf) S Panel game or Quiz
2245 BBCWS(wcaf) H Best of "The Edge" (youth culture)

SWL, Media and Communications
2230 R. Vlaanderen Int. S Radio World

Listener Contact/Interactive
2244 R. Vlaanderen Int. S Brussels 1043

Sport
2230 R. Canada Int. S Inside Track (anthologies)
2248 R. Vlaanderen Int. M Sports

2300 UTC - Page 54 Freqs

Newscasts (*extended)
2300 BBCWS(am)(eas) D The World Today*
China R. Int. D News
R. Australia D News
R. Canada Int. M-F The World at Six*
R. New Zealand S-H Midday Report*
E/A News
2330 R. Netherlands S/A News
R. Prague D News

Current Events Magazines/Features
2300 R. Canada Int. S/A The World This Weekend
2310 China R. Int. S-H Current Affairs
F Global Review
A Report on Developing Countries
R. Australia S-H Asia Pacific
2330 R. Canada Int. M-F As It Happens
R. Netherlands M-F Newsline
2355 R. Netherlands F Insight (commentary)

Business/Economics
2330 BBCWS(am) F Global Business
China R. Int. T China Horizons
R. Australia M Innovations
2350 R. Prague H Economic Report

Science/Technology (incl. Health & Environment)
2305 R. Australia A Ockham's Razor (opinion)
2330 R. Australia S Earthbeat (ecology)
F In Conversation-Science

Arts and Culture
2320 China R. Int. A In the Spotlight
2330 BBCWS(am) A Arts in Action
R. Australia T Arts Talk
2335 R. Prague S The Arts
R. Prague A Readings from Czech Literature

Local Lives and Views
2310 R. New Zealand F Focus on Politics
A The Week in Parliament
2330 China R. Int. S People in the Know
H Life in China
R. Australia W Rural Reporter (outback)
R New Zealand S Spectrum (life in NZ)
2335 R Netherlands A Europe Unzipped
R. Prague S Letter from Prague
M-F Current Affairs
2340 R Prague H From the Weeklies
2345 R Prague M Spotlight (current events) or
One on One (interview)
W Czechs in History or Central Europe Today
2350 R. Prague T Talking Point

Informational Features
2315 R Australia F Lingua Franca (about language)
2330 China R. Int. W Voices from Other Lands

Music
2330 BBCWS(am) S Greenfield Collection (classical requests)
R. New Zealand F The Sampler (latest CDs)
2340 R. Prague A Saturday Music (classical/folk/jazz)

Entertainment/Variety, Magazine Shows
2305 R. Australia F Book Reading
2330 R. Canada Int. A Madly Off in All Directions (comedy/satire)

SWL, Media and Communications
2330 R. Australia H The Media Report

Listener Contact/Interactive
2320 China R. Int. F Listeners' Garden
2335 R. Netherlands S Sincerely Yours
2345 R. Prague F Mailbox

Sport
2330 China R. Int. M Sports World
R. Canada Int. S The Inside Track

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

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Satellite Service Guide

Robert Smathers
roberts@nmia.com
www.grove-ent.com/mtssg.html

All Frequencies MHz

Panamsat Galaxy 6 - C-Band

74 degrees West longitude

1(H)	3720	(none)
2(V)	3740	Data Transmissions
3(H)	3760	(none)
4(V)	3780	(none)
5(H)	3800	(none)
6(V)	3820	(none)
7(H)	3840	(none)
8(V)	3860	(none)
9(H)	3880	(none)
10(V)	3900	(none)
11(H)	3920	(none)
12(V)	3940	(none)
13(H)	3960	(none)
14(V)	3980	(none)
15(H)	4000	(none)
16(V)	4020	(none)
17(H)	4040	(none)
18(V)	4060	(none)
19(H)	4080	(none)
20(V)	4100	(none)
21(H)	4120	(none)
22(V)	4140	(none)
23(H)	4160	(none)
24(V)	4180	(none)

Panamsat SBS-6 - Ku-Band

74 degrees West longitude

T01(H)	11725.0	Data Transmissions
T02(V)	11749.5	CONUS Communications (onolog/digital)
T03(H)	11774.0	CONUS Communications (onolog/digital)
T04(V)	11798.5	Occasional video
T05(H)	11823.0	CONUS Communications (onolog/digital)
T06(V)	11847.5	Occasional video
T07(H)	11872.0	Occasional video
T08(V)	11896.5	Occasional video
T09(H)	11921.0	Occasional video
T10(V)	11945.5	CONUS Communications (digitol)
T11(H)	11970.0	Occasional video
T12(V)	11994.5	Occasional video
T13(H)	12019.0	Occasional video
T14(V)	12043.5	Occasional video
T15(H)	12068.0	Occasional video
T16(V)	12092.5	Occasional video
T17(H)	12110.0	Occasional video
T18(V)	12141.5	Occasional video
T19(H)	12166.0	Occasional video

Panamsat SBS-4 - Ku-Band

77 degrees West longitude

T01(H) 11725 (none)
T02(H) 11780 (none)
T03(H) 11823 (none)
T04(H) 11872 (none)
T05(H) 11921 (none)
T06(H) 11970 (none)
T07(H) 12019 (none)
T08(H) 12068 (none)
T09(H) 12117 (none)
T10(H) 12166 (none)

GE Americom Satcom C1 - C-band

79 degrees West longitude

1(H)	3720	(none)
2(V)	3740	(none)
3(H)	3760	(none)
4(V)	3780	(none)
5(H)	3800	(none)
6(V)	3820	(none)
7(H)	3840	(none)
8(V)	3860	(none)
9(H)	3880	(none)
10(V)	3900	(none)
11(H)	3920	(none)
12(V)	3940	(none)
13(H)	3960	(none)
14(V)	3980	(none)
15(H)	4000	(none)
16(V)	4020	(none)
17(H)	4040	(none)
18(V)	4060	(none)
19(H)	4080	(none)
20(V)	4100	(none)
21(H)	4120	(none)
22(V)	4140	(none)
23(H)	4160	(none)
24(V)	4180	(none)

GE Americom GE-5 - Ku-Band

79 degrees West longitude

1(V)	11730.0	Utah State University (digitol)/Data Transmissions
2(H)	11743.0	Data Transmissions
3(V)	11791.0	Data Transmissions
4(H)	11804.0	Empire Sports Network (digitol)/Data Transmissions
5(V)	11852.0	CBS SNG (digital)
6(H)	11865.0	Occasional video
7(V)	11913.0	Data Transmissions
8(H)	11926.0	Occasional video
9(V)	11974.0	ABC SNG (digital)
10(H)	11987.0	ABC SNG (digital/onolog)
11(V)	12035.0	CNN SNG (digitol)
12(H)	12048.0	CNN SNG (digital/anolog)
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/SUNY (digitol)/Occasional video

GE Americom Satcom K2 - Ku-Band

81 degrees West longitude

T01(H)	11729.0	(none)
T02(V)	11773.0	Data Transmissions
T03(H)	11788.0	(none)
T04(V)	11821.0	(none)
T05(H)	11847.0	(none)
T06(V)	11874.0	(none)
T07(H)	11921.0	(none)
T08(V)	11942.0	(none)
T09(H)	11970.0	NBC Mountain Time Zone feed
T10(V)	11994.5	(none)
T11(H)	12019.0	NBC feeds / NBC HDTV (occosional)
T12(V)	12067.0	(none)
T13(H)	12083.0	NBC feeds
T14(V)	12117.0	(none)
T15(H)	12142.0	NBC feeds
T16(V)	12166.0	(none)

GE Americom GE-2 - C-Band

85 degrees West longitude

1(V)	3720	(none)
2(H)	3740	(none)
3(V)	3760	RAI International (occosional) / Occasional video
4(H)	3780	Occasional video
5(V)	3800	NASA Contract Chonnel (occasional data/video feeds)
6(H)	3820	Occasional video
7(V)	3840	Horse Racing (digital)
8(H)	3860	Data Transmissions
9(V)	3880	NASA TV
10(H)	3900	Data Transmissions
11(V)	3920	Horse Racing (digitol)
12(H)	3940	Data Transmissions
13(V)	3960	Data Transmissions/SCPC Service
	1178.70	81.30 NASA International Space Station / Space Shuttle Audio
14(H)	3980	Data Transmissions
15(V)	4000	Data Transmissions/Pennsylvania Cable Network (digitol)
16(H)	4020	Data Transmissions
17(V)	4040	Data Transmissions
18(H)	4060	Data Transmissions
19(V)	4080	Data Transmissions
20(H)	4100	Data Transmissions
21(V)	4120	Horse Racing (digitol)
22(H)	4140	USIA Worldnet/Voice of Americo rodio (digitol)
23(V)	4160	Horse Racing (digitol)
24(H)	4180	Horse Racing (digital)

GE Americom GE-2 - Ku-Band

85 degrees West longitude

1(V)	11720	Occosional video
2(H)	11740	NBC SNG (digitol)
3(V)	11760	Occosional video
4(H)	11780	NBC SNG (digitol)
5(V)	11800	Occosional video
6(H)	11820	Occosional video
7(V)	11840	Action Sports Cable Network (digitol)
8(H)	11860	NBC SNG (digital)
9(V)	11880	Occosional video
10(H)	11900	Occosional video
11(V)	11920	Occosional video
12(H)	11940	Occosional video
13(V)	11960	Occosional video
14(H)	11980	Occosional video
15(V)	12000	Occosional video
16(H)	12020	NBC SNG (digital)
17(V)	12040	Occosional video
18(H)	12060	Occosional video
19(V)	12080	Occosional video
20(H)	12100	Occosional video
21(V)	12120	Occosional video
22(H)	12140	Occosional video
23(V)	12160	Occosional video
24(H)	12180	Occosional video

See ad on page 79 for satellite equipment from Universal Electronics

Lawrence Harris
Lawrence@itchycoo-park.freeserve.co.uk
http://www.itchycoo-park.freeserve.co.uk/wxsats.htm

Digital Satellites on the Horizon

I have been checking out the plans published by NOAA (National Oceanic and Atmospheric Administration), the World Meteorological Organization and EUMETSAT (Europe's meteorological satellite organization) for the transition to digital weather satellites (WXSATs), and realized just how much will change – though fortunately not for some time!

After several decades providing hobbyists and professional weather forecasters with near-continuous transmissions from the NOAA constellation, for which low-cost equipment is required for its reception, NOAA is planning to take advantage of the new technology for the next generation of WXSATs. I am looking at the plans for the new digital satellites in future editions because there is much to consider.

Decoding 1980s' style

First we built frame-stores – electronic circuitry that decoded the incoming audio signal from a WXSAT receiver – that produced an image. The design for the most popular system came from an original article by a radio amateur with the call-sign YU3UMV (sorry, I cannot locate my copy of this article to confirm his name). With the costly electronic memory of that era, resolution was very limited, so displayed images could not be further enhanced. Photography was the only way to record images. I disposed of my frame-store in July, reluctantly accepting that despite its original cost, it had no further use.

In the late 1980s I bought an extremely expensive interface card that fit into my non-standard computer and could decode the audio previously done by the frame-store. Doing the same job by computer was vastly more efficient because the image could be manipulated.

Over a decade later, we can decode the high resolution digital images from NOAA WXSATs because they have remained in the same format, but technology has advanced enough for an advanced hobbyist to be able to buy or build reception hardware.

Timetable for Digital WXSATs

Data supplied by World Meteorological Organization. Current scheduled polar WXSAT launch timetable:

NOAA-M - previously scheduled for April 2001, but currently listed for March 21, 2002: APT and HRPT

NOAA-N - scheduled for December 2003: APT and HRPT

NOAA-N' - scheduled for July 2007: APT and HRPT

NPOESS-1 - scheduled for 2010: tentatively AHRPT and X-band (digital)

This launch list indicates that APT should continue to be available from NOAA satellites through to NOAA-N' in 2007. With a lifetime of two years, we can anticipate APT remaining with us until at least 2009. Anyone just entering the hobby of WXSAT monitoring need not become concerned about acquiring redundant equipment just yet! For further information, there are a few web sites that carry (not always consistent) schedules. Watch this column for regular updates on other future digital WXSATs.

http://spaceflightnow.com/tracking/index.html
http://www.earth.nasa.gov/missions/ref_web/mnoaam.htm
http://www.wmo.ch/index-en.html

WXSATs to monitor

During the recent cessation of transmissions from Meteor 3-5, its replacement, the elderly Meteor 2-21, was reactivated. Both these Russian WXSATs are long past their best, and both have developed problems of one form or another. Although picture quality remains limited, Meteor 3-5 can at least provide a reliable transmission from horizon to horizon.

Monitors have noticed the severe reception problems caused by the partly unfurled VHF antenna on Meteor 2-21 that results in very low signal strength during parts of its orbit. However, it is usually only transmitting during those periods when Meteor 3-5's orbital plane crosses through the zone of twilight where the illumination of its solar panels is at a low angle.

Meanwhile, NOAA-15 has suffered further image synchronization problems, and NOAA-12's APT has been off during its frequency clash with NOAA-15. APT has been thin this month!

Pictures

Victor Beaulieu kindly sent me one of his first NOAA WXSAT pictures, showing Florida, the Great Lakes, and Cuba. Victor is still experimenting with the settings in his software, but the reception of a first image is always an exciting event!

Fig 1: NOAA-15 image of USA from Victor Beaulieu

Fig 2: NOAA-12 0157UTC August 22, 2001

Dick Mobley examines his high quality HRPT images more carefully than I believe I do. He spotted a tiny "strange ring formation" in one of his Alaskan images – see figure 2. The "ring" is in the center of this close-up, and appears tiny. Dick analyzed the image and measured it at about 15km across. The close-up image suggested to me that it was the center of a low pressure system. An earlier pass (at 0125UTC) by NOAA-14 showed no sign of the ring, though the following pass showed it well defined.

Frequencies

NOAA-14 transmits APT on 137.62 MHz
NOAA-12 and -15 normally transmit APT on 137.50 MHz
Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
Resurs 1-4 transmits APT on 137.85 MHz
GOES-8 and GOES-10 use 1691 MHz for WEFAX

Larry Van Horn, N5FPW
larry@grove-ent.com

FEMA Frequencies

In the wake of the most serious attack ever on U.S. soil on September 11, some government communications systems continue to operate at full strength while others have relaxed their operational readiness condition.

In the hours immediately after the attacks monitors reported that the SHARES (Shared Resources) and Federal Emergency Management (FEMA) radio systems carried the heaviest activity on the shortwave radio bands.

◆ SHARES (Shared Resources)

Shortly after the attack, the following message was posted to the SHARES public website:

CURRENT OPERATION:

TIME: 111400Z SEPT 01
FROM: Chairman, SHARES HF Interoperability Working Group
TO: SHARES Points of Contact, SHARES Stations, Emergency Response Personnel, NTCN-HF Stations, NCS RM-HF Stations,
SUBJ: SHARES Coordination Network Operational Level Change Notice 01-2
REF: NCSD 3-3, NCSH 3-3-1, NCSM 3-3-1, NTCN-HF Network Guide

New York City, NY, September 20, 2001 -- Rescue workers standing next to the antenna that was formerly atop the World Trade Center discuss next steps in thew rescue efforts.

Photo by Mike Rieger/ FEMA News Photo

MESSAGE CONTAINS (7) PARAGRAPHS

MESSAGE FOLLOWS

PARA 1 This is SHARES Coordination Network (SCN) Operational Level Change Notice No. 01-2.

PARA 2 Effective 111430Z SEPT 01 the SCN Operational Level is changed from Operational Level 3 to Operational Level 2.

PARA 3 This SCN Operational Level change is requested by the FBI, the National Coordinating Center for Telecommunications (NCC), and the General Services Administration to support disaster operations in New York City and Washington, DC.

PARA 4 Situation. The SHARES Coordination Network (SCN) will begin Level 2 operations effective 1430Z (10:30 a.m., EST) September 11, 2001, as a result of disaster operations which occurred at the New York City Twin Towers and at locations in Washington DC. Level 2 operations will continue until rescinded.

PARA 5 Special Instructions. SCN check-in windows established for this operation are:

September 11, 2001, - 1430Z to 1630Z (10:30 a.m., to 12:30 p.m., EST)
September 11, 2001, - 2000Z to 2200Z (4:00 p.m., to 6:00 p.m., EST)
'September 12, 2001, - 0100Z to 0300Z (9:00 p.m., to 11:00 p.m., EST)

Check-in windows are established to assess the capability of SHARES to support this operation, and to provide station personnel an opportunity to check equipment and review procedures. Stations participating in this operation are requested to submit a Station Availability Report to one of the SHARES Coordination Stations conducting operations on any of the 10 SCN channels listed in NCSH 3-3-1, Chapter 1.

PARA 6 SCN Operational Levels are designed to improve the responsiveness of the SHARES Coordination Network during emergencies. The three SCN Operational Levels are:

a. Operational Level 3: Conditions normal. No emergency exists. The ten-channel SCN may be used by SHARES station personnel for training and non-emergency operations.
b. Operational Level 2: Emergency potential exists. Non-emergency operations on the SCN suspended. SCN monitoring increased. Check-in windows established on the national and regional nets to receive Station Availability Reports.
c. Operational Level 1: Emergency exists. SHARES message support required. National and regional nets maintain full-period operations to receive Station Availability Reports, to list SHARES message traffic, and to coordinate the processing of SHARES messages.

Arlington, VA, September 16, 2001 -- Vice President Dick Cheney meets Urban Search and Rescue team members at the Pentagon crash site.

Photo by Jocelyn Augustino/ FEMA News Photo

PARA 7 It is not the intent of this notice to direct the activation or participation of any SHARES station during this emergency. Participation in this or any emergency is on a voluntary basis in accordance with reference documents.

END OF MESSAGE

Within a week of the attack the Shares Coordination Net (SCN) had returned to operational level three (normal operations). See the above definitions of the three operational levels, and the Shares website (**http://www.ncs.gov/~shares/shares.htm**).

Radio hobbyists all across the United States heard a variety of communications on all of the SCN frequencies during the days immediately after the attacks. Here is a list of known SCN frequencies.

SHARES Coordination Network (SCN)

4490.0	Channel 3	SCN ALE Net
5236.0	Channel 1	SCN Voice Net
5711.0	Channel 4	SCN ALE Net
6800.0	Channel 9	SCN BBS Net
9106.0	Channel 5	SCN ALE Net
10586.5	Channel XF	
11217.0	Channel 6	SCN ALE Net
13242.0	Channel 10	SCN BBS Net (G-TOR)
14396.5	Channel 2/	CN Voice Net Shares
15094.0	Channel 7/	CN ALE Net
17487.0	Channel 8/	CN ALE/STI Net

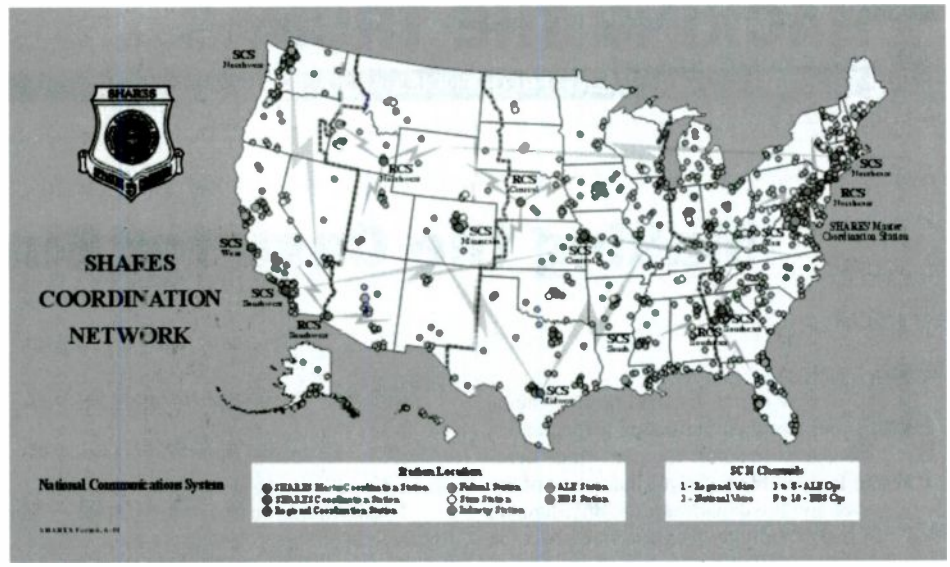
Even though the SHARES network has returned to normal operations, you can still follow net operations on a weekly basis. SHARES Coordination Stations nationwide conduct a weekly SHARES Net on the ten channels assigned to the SHARES Coordination Network (SCN) every Wednesday from 1600 to 1800 UTC. This Net is intended to give SHARES stations practice in sending Station Availability Reports, to allow propagation checks to different SHARES Stations, and to provide the opportunity to test equipment and antennas.

◆ FEMA Swings into Action

As in most disasters one of the more prominent federal agencies working the disaster scenes in New York and Washington is the Federal Emergency Management Agency.

At presstime a total of 6,547 federal employees were working in direct support of operations in New York and Virginia (Pentagon). This included 1,544 personnel from the Federal Emergency Management Agency (FEMA) and its Urban Search and Rescue task forces.

Freq (kHz)	Channel Designator/Mode
2320	F01
2360	F02
2377	F03
2445	F04
2658	F05/ALE
3341	F06/ALE
3379	F07
3388	F08
4603	F09
4780	F10
5211	F11/Primory nighttime voice channel
5378	F12
5402	F13/ALE
5821	F14
5961	F15
6049	F16/ALE
6106	F17
6108	F18
6151	F19
6176	F20
6809	F21/ALE
7348	F22/ALE
7428	F23
9462	F24/ALE
10194	F25/ALE
10437	Unknown designator (this freq replaced 11696.5)
10493	F26/Primory daytime voice channel
10588	F27/ALE
10899	F31 (this freq replaced 11994)



11108	F32 (this freq replaced 12009)
11544	F35 (this freq replaced 12219)
11721	F28
11801	F29
11957	F30
12112	Unknown (this freq replaced 12270)
12129	F33
12216	F34
13446	F36/ALE/ANDVT
13783	F40
13894	F38 (this freq replaced 13744)
13935	F37/ALE (this freq replaced 13633)
13956	F48 (this freq replaced 15509)
14450	F41
14567	F39 (this freq replaced 13780)
14776	F42/ALE
14836	F43
14872	F47 (this freq replaced 15464)
14885	F44/ALE
14899	F45
14908	F46
15708	F50/ALE
15840	F49 (this freq replaced 15532)
16201	F51/ALE
16238	F52 (this freq replaced 16431)
17519	F53/ALE
18483	F54 (this freq replaced 17649)
18744	F55
19969	F57/ALE
20027	F58
20063	F59
20361	F56 (this freq replaced 19757)
21866	F60/ALE
21919	F61
22983	F62/ALE
23028	F63
23390	F64
23451	F65
23550	F66
23814	F67
24008	F68
24282	F69
24526	F70/ALE
24819	F71

Note: In addition to the modes indicated, listeners should check both USB and LSB on each of the frequencies above for FEMA activity.

FEMA VHF/UHF Frequencies

The primary mode of local field communications within FEMA occurs on their VHF/UHF networks. Here is an extensive list of these networks used nationwide and within selected FEMA regions.

Disaster Response

138.125/141.875	Nationwide
138.575/141.950	FEMA Region 5/8
139.450/142.425	FEMA Region 4
139.775/143.475	FEMA Region 4/6
139.825/143.000	FEMA Region 2/9
139.925/143.000	FEMA New York City (Region 2)
139.925/142.975	FEMA Region 6
139.950/143.250	FEMA Region 3/Region 10
140.025/143.000	FEMA Region 1/Region 7
140.900 Simplex	FEMA Region 1/9
140.925 Simplex	FEMA Region 5/8
141.725 Simplex	Nationwide
141.850/143.850	FEMA Region 4/6
142.350 Simplex	FEAM Region 9
142.375 Simplex	FEMA Region 9/10
142.400 Simplex	FEMA Region 4
142.925 Simplex	FEMA Region 9
142.950 Simplex	New York City (Region 2)
142.975 Simplex	FEMA Region 9
143.050 Simplex	FEMA Region 10 (Repeater input to 142.375)
143.600/143.000	FEMA Region 1
143.625 Simplex	FEMA Region 6
165.6625/164.8625	Nationwide
173.7875 Simplex	Nationwide
408.4000 Simplex	Nationwide
417.6000 Simplex	Nationwide
417.7000 Simplex	Nationwide
418.0500 Simplex	Nationwide
418.0750 Simplex	Nationwide
418.5750 Simplex	Nationwide

FEMA Urban Search and Rescue Cache

418.050	FEMA Command 1
406.450	FEMA Search and Rescue Team 1
415.950	FEMA Search and Rescue Team 1 Tactical 3
416.275	FEMA Search and Rescue Team 1 Tactical 4
407.125	FEMA Search and Rescue Team 2 Tactical 5
416.475	FEMA Search and Rescue Team 2 Tactical 6
416.725	FEMA Search and Rescue Team 3 Tactical 7

And that does it for this month. Until next time, 73 and good hunting.

Dan Veeneman
dan@signalharbor.com

Making the Case for Simulcasting

As new digital trunked radio systems replace their old analog predecessors, many scanner listeners find themselves no longer able to follow the action of the local police and fire departments. Until scanners that can monitor digital transmissions become commercially available, one option may be to simultaneously broadcast ("simulcast") some of the trunked radio transmissions on an analog radio channel that can easily be monitored.

Having been an avid monitorist since the OLD regency 10 channel through the Bearcat BC101 and so many others I cannot recall, I am stumped at trunking. I have recently moved back to my hometown of Springfield, Ohio. Here we used to have one fire repeater and PD the same. Now just this month they switched over to ComNet Ericcson digital and all is gone.

They are on five channels with the intent to go with mobile data terminals down the road. My problem is, as a monitorist and former volunteer firefighter, this town has lost eyes and ears of all the civilians who used to monitor. I am ready to compose a letter to mayor and city council requesting they patch the new system with the old and if something confidential comes up, kill the patch.

Have you heard of any other communities doing such a thing? I know Dayton fire continues to simulcast dispatch on VHF and hope that they will understand how many people they have cut out.

They have no intention of having a backup. High band will be forfeited back to the FCC. Local communication between the Sheriff's office and township fire departments is gone. Why and how can technology eliminate monitoring as we used to sit and passively listen to one channel? Most people think their scanner quit working. Well it did. I unplugged and put away an old pager I had used for almost 20 years, most recently as a monitor. It was a sad day.

Stephen

❖ Springfield, Ohio

Yes, the old Springfield, Ohio, Police dispatch frequency of 159.090 MHz and Fire dispatch on 154.370 MHz appear to be gone. City Police and Fire services have transitioned to the new M/A Com EDACS system and are using ProVoice digital audio radios, which cannot be monitored by current scanners. Other city services are expected to stay in analog voice, so not everything is out of reach. The new system uses the following frequencies, listed in Logical Channel Number (LCN) order:

LCN 1	866.1000
LCN 2	866.8875
LCN 3	867.3875
LCN 4	867.9125
LCN 5	868.4625

I understand your frustration, Stephen, and I would encourage you to write those letters to the mayor and city council. I hope the information in this column will help you and so many others make the case in their community that other enlightened municipalities have made their public safety communications open and available to the public.

❖ Cape Cod, Massachusetts

The Massachusetts State Police is the primary user of a statewide Motorola trunked radio system that has both Type I and Type II radios in service, referred to as a "hybrid." Because there are Type I radios in use, you'll need to use a fleetmap in your TrunkTracker scanner to properly display and follow the active talkgroups. The fleetmap for the Massachusetts statewide system is:

Block 0	S4
Block 1	S0
Block 2	S12
Block 4	S0
Block 5	S0
Block 6	S0
Block 7	S0

Out on Cape Cod, each fire department generally has their own dispatch center with their own talkgroup on the statewide system. These departments also simulcast their dispatches on a separate 33 MHz lowband frequency. For instance, Falmouth Fire uses talkgroup 37552 and simulcasts on 33.78 MHz while Brewster simulcasts their talkgroup 37328 on 33.52 MHz.

The frequencies in use on the statewide system in western Cape Cod (referred to as "Zone 4") are 854.2125, 855.6625, 855.8875, 857.2375, 857.2625, 858.2125, 859.2125, 859.2375, 860.2125, 860.2375 and 860.4625 MHz.

Eastern Cape Cod uses another set of frequencies, but I don't have clear information about which ones are active and which ones overlap with Zone 4.

❖ Ocean City, Maryland

The coastal resort town of Ocean City, Maryland, has operated an 11-channel EDACS system since 1993. Their frequencies, in LCN order, are 859.9875, 853.9625, 855.2375, 860.9875, 856.7375, 857.7375, 858.7375, 859.7375, 860.7375, 856.2375 and 857.2375 MHz.

Although their trunking system works fine, the Fire Department simulcasts several frequencies including dispatch on 158.895, fireground operations on 154.085 and medevac on 154.025 MHz. Coast Guard operations can be heard on 157.150 and County Fire Operations are available on 46.380 MHz.

❖ Anne Arundel County, Maryland

Anne Arundel County in Maryland operates a Motorola Type II trunked radio system on: 856.3625, 856.3875, 856.4125, 857.3625, 857.3875, 857.4125, 858.3625, 858.3875, 858.4125, 859.3625, 859.3875, 859.4125, 860.3625, 860.3875 and 860.4125 MHz.

Fire and Mutual Aid are simulcast on the following VHF frequencies:

154.010	Fire Dispatch
154.340	Fire Operations
154.175	Fireground Operations
154.280	Regional Mutual Aid (channel 1)
154.295	Regional Mutual Aid (channel 2)

❖ Fairfax County, Virginia

Fairfax County, Virginia, is using an eight site Motorola ASTRO digital trunked system on the following 20 frequencies:
852.9625, 853.1875, 853.3375, 853.4625, 853.4875, 853.6375, 853.7875, 853.9125, 853.9625, 854.1375 and 854.2625, 854.2875, 854.4625, 855.9625, 855.9875, 856.2625, 857.2625, 858.2625, 859.2625 and 860.2625 MHz.

Dispatch for Fire and Rescue, using talkgroup 00176, will also be simulcast on 460.575 MHz, although it's not clear whether that arrangement will be permanent.

❖ Kempsville, Virginia

Continuing down the Atlantic coast, the community of Kempsville in the Hampton Roads area uses the Virginia Beach, Virginia, trunked radio system for their fire and rescue communications. A simulcast of their activity is transmitted on 155.175 MHz. Their reasoning is that the rescue squad, which is all-volunteer, makes heavy use of scanners and pagers!

The Virginia Beach municipal trunked radio system is a Motorola Type IIi (hybrid) system and uses the following frequencies:
856.4625, 856.4875, 856.7125, 856.7375, 857.4625, 857.4875, 857.7125, 857.7375, 858.4625, 858.4875, 858.7125, 858.7375, 859.4625, 859.4875, 859.7125, 859.7375, 860.4625, 860.4875, 860.7125 and 860.7375 MHz.
The fleetmap for this system is

Block 0	S12
Block 2	S12
Block 4	S0

Block 5	S4
Block 6	S12

There is a Fire and Rescue talk-around channel on 852.4125 MHz that is occasionally used while on-scene, but you have to be fairly close to the action to hear it.

Kempville Fire and Rescue units are also equipped with backup VHF radios set for the following frequencies:

155.175	Virginia Beach EMS Command Channel (simulcast)
154.295	Hampton Roads Fire & Rescue (Mutual Aid, South)
155.205	Virginia EMS (statewide)
155.400	Original Hospital Emergency Administration Radio (HEAR)
154.370	Virg nia Beach Fire Department

◆ Lapeer County, Michigan

Lapeer County in southeast Michigan operates a three-site Motorola Type II trunked radio system on the following frequencies:
866.5875, 866.8125, 867.0625, 867.3125, 867.5375, 867.7625, 867.8125, 868.0625, 868.3500, 868.6000 and 868.7875 MHz.

Lapeer County Fire Dispatch simulcasts on 151.130 primarily for department members with pagers and scanners. It's also reported that some municipalities in the county are using 46.42 MHz as a backup fire frequency.

◆ Saginaw County, Michigan

Located to the northwest of Lapeer County, Saginaw County operates a Motorola Type II system on the following frequencies:
851.0125, 851.3625, 851.7125, 852.0125, 852.2375, 852.3125, 852.7125, 853.0125, 853.1125, 853.3625, 853.7125, 854.0375, 855.1125, 885.3875 and 855.7125 MHz.

Central Dispatch for City and County Fire uses talkgroup 1360 and simulcasts on 154.250 MHz.

As a reminder, listeners should be aware that Michigan law requires a permit in order to legally possess and use a scanner in a motor vehicle. This silliness was covered in my August 2001, column, and I've got more details on my website at **http://www.signalharbor.com/michigan.html**.

◆ Fulton County, Georgia

Fulton County, Georgia, covers part of the Metro Atlanta area and operates a hybrid Motorola system using:
853.0375, 854.5125, 854.5625, 855.6625, 855.7375, 856.3875, 856.4125, 857.3875, 857.4125, 858.3875, 858.4125 and 859.3875 MHz.
The fleetmap for this system is:

Block 0	S3
Block 1	S3
Block 2	S11
Block 3	S4
Block 4	S4
Block 5	S0
Block 6	S0
Block 7	S0

This corresponds to preset E1P13 on TrunkTracker scanners.

The Fulton County Fire Dept uses talkgroup 101-1 and simulcasts on 154.325 MHz.

◆ Dayton, Ohio

The city of Dayton, Ohio, home of Hara Arena and the annual Dayton Hamvention, operates a Motorola Type IIi (hybrid) trunked radio system that includes the Cox-Dayton International Airport. Frequencies used are:
856.2125, 856.4625, 856.7125, 856.9625, 857.4625, 857.2125, 857.7125, 857.9625, 858.2125, 858.4625, 858.7125, 858.9625, 859.2125, 859.4625, 859.7125, 859.9625, 860.2125, 860.4625, 860.7125 and 860.9625 MHz.
The fleetmap for this system is:

Block 0	S7
Block 1	S4
Block 2	S4
Block 3	S11
Block 4	S0
Block 5	S0
Block 6	S12

Dispatch and paging from the Dayton Fire Department are simulcast on 154.430 MHz.

◆ Other Simulcast Cities?

The municipalities I've listed here are just a few of the many places that make it easy for the casual scanner listener to hear public safety communications. Many towns make their frequency lists and talkgroup assignments available to anyone who asks, and a few cities even put their transmissions on the Internet!

I welcome further input from readers on trunked systems they monitor that also simulcast on a VHF or UHF channel. Perhaps with enough examples of open and available radio systems, people like Stephen will be able to convince their local officials to reconsider closing out scanner listeners.

◆ Arkansas

In the Sept. 2001 issue, there was a list of Arkansas State Police frequencies, and a question was asked if anyone could confirm that the Arkansas Highway Police are still using 150.995 MHz. Yes they are, and I believe the input is 154.665 MHz. They also use 155.475 MHz simplex for chit-chat. Also the Arkansas State Troopers use 154.785 MHz for their car extenders.

Lynn, Springdale, Arkansas

Several other readers also wrote in to confirm 150.995 MHz as the primary VHF frequency used by the Arkansas Highway Patrol.

◆ Phoenix, Arizona

In response to your article in the Sept 2001 issue of Monitoring Times "Trucking the Trunks," you asked readers for additional information on the status of Phoenix's digital radio system. The digital radio system for all city departments was originally set to be in place by 1994, the dates were rolled back further and further due to costs and other factors. Finally the city was able to pass a bond initiative to get funds for the 800 MHz ASTRO digital radio system. When the bond was passed, voters were told the system would be in place by 2001, now the target date is approximately 2003 or 2004. The city has licensed a number of 800 MHz frequencies and has begun doing testing on the system throughout the city. Recently the Phoenix Chief of Police advised that he was pushing for the city to use a 700 MHz radio system to avoid congestion in the 800 MHz band caused by other trunked systems including Nextel. There has not been any further discussion on the proposed 700 MHz system.

The city of Phoenix dispatches 20 fire departments and fire districts throughout Maricopa County using the Phoenix Regional Communications Center located in downtown Phoenix. It is unclear how the other agencies would be affected by the new radio system. The police department is supposed to go digital once the system is in place, however one positive thing for scanner listeners is that the Fire Department has stated that they do not wish to go digital until there is a digital-capable scanner on the market, available to the media and general public. The Phoenix Fire Department has made it clear that they do not wish to provide digital radios to the media for monitoring purposes.

At this point, the Phoenix Fire Department and the many agencies they dispatch can all be heard on VHF frequencies in the 154 MHz band. The Police Department uses both VHF and UHF frequencies. I hope this helps, and if there are any further questions I will try to be of help.

Charles Simmont
http://www.incidentcommandpage.com

Great information, Charles, thanks for the detailed update.

That's all for this month. More information is available on my website at **http://www.signalharbor.com**, and I welcome your e-mail at *dan @ signalharbor.com*. Until next month, happy monitoring!

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

Larry Van Horn
larry@grove-ent.com

SCATANA's Trial by Fire

Shortly after the attacks on the World Trade Center and Pentagon in September, the President invoked a little known Air Defense Emergency plan – one that had never been used since its inception. Under this plan the North American Air Defense Command (NORAD), in conjunction with the Federal Aviation Administration (FAA) and the Federal Communications Commission (FCC), would order the immediate grounding of all commercial aircraft in U.S. airspace and off the U.S. coast.

Developed in the 1960s, SCATANA – Security Control of Air Traffic and Navigation Aids – authorizes NORAD, the FAA, and the FCC to impose these restrictions in order to clear the skies for bomber and missile operations. According to the FAA, "Emergency security control of air traffic and/or the actual securing of navigational aids has never been accomplished."

Once SCATANA was implemented, a wartime air traffic priority list (WATPL) was established to allow essential personnel and aircraft to use U.S. airspace. Designated "priority one" on the WATPL was the President of the United States, the Prime Minister of Canada, their respective essential national security staffs, aircraft engaged in continental defense missions, retaliatory aircraft and their support aircraft (for example, refueling tankers), and airborne command posts.

While the military rationale for SCATANA is understandable, the feasibility of its implementation (particularly given the significant increase in air travel since the 1960s) was dubious. Until September 11, 2001, the program was tested regularly only via simulations. According to the FAA, "Emergency security control of air traffic and/or the actual securing of navigational aids has never been accomplished."

SCATANA has apparently been activated only once, by accident. During a false alert on November 9, 1979 – triggered when a technician at NORAD inserted a computer tape used to simulate a nuclear attack into the online warning system – FAA controllers at some locations were directed to order commercial airliners to prepare to land immediately. After six agonizing minutes, the indications of a full-scale Soviet attack were determined to be false, based on contrary data from early warning sensors, and the order was rescinded.

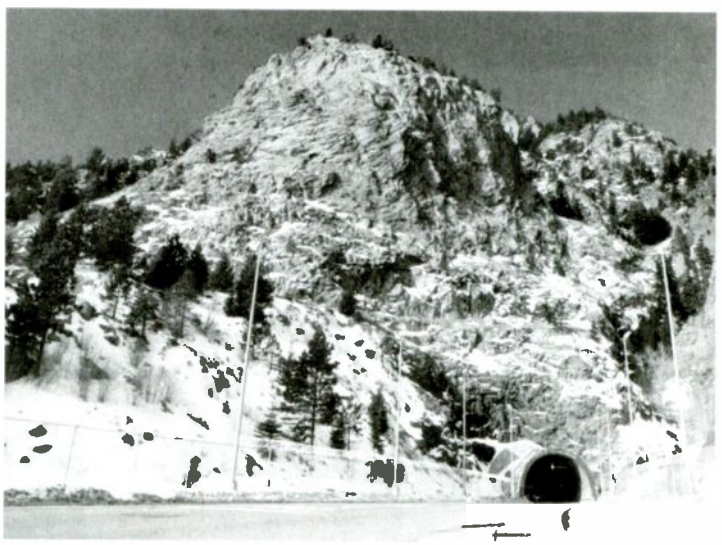
❖ Who is NORAD?

The North American Aerospace Defense Command (NORAD) is a binational United States and Canadian organization charged with the missions of aerospace warning and aerospace control for both countries. Aerospace warning includes the monitoring of man-made objects in space, and the detection, validation, and warning of attack against North America whether by aircraft, missiles, or space vehicles, utilizing mutual support arrangements with other commands.

The military head of NORAD is known as CINCNORAD or Commander-in-Chief NORAD. That flag officer is appointed by, and is responsible to, both the President of the United States and the Prime Minister of Canada. The CINC maintains his headquarters at Peterson Air Force Base, Colorado, and a command and control center a short distance away at the Cheyenne Mountain Air Station.

Cheyenne Mountain serves as a central collection and coordination facility for a worldwide system of sensors designed to provide the CINC and the National Command Authorities of the U.S. and Canada with an accurate picture of any aerospace threat.

NORAD's surveillance and control responsibility for North American airspace is divided among its three NORAD Regions headquartered at Elmendorf AFB, Alaska (Alaska NORAD Region, ANR), Canadian Forces Base Winnipeg, Manitoba (Canadian NORAD Region, CANR), and Tyndall AFB, Fla. (Continental U.S. NORAD Region, CONR)



The Canadian NORAD Region (CANR), which covers the entire country, is divided into two parts, Canada East and Canada West, each having a Sector Air Operations Center (SAOC). Both SAOCs are located in the underground complex at Canadian Forces Base (CFB) North Bay, Ontario. Each SAOC compiles and analyzes the data from its radars, then forwards any significant information to Headquarters CANR, at CFB Winnipeg. Pertinent information is then sent to NORAD in Colorado.

The Continental U.S. NORAD Region also covers the entire country and is divided into three SAOCs – West, Southeast and Northeast. Each SAOC compiles and analyzes the data from its radars, then forwards any significant information to the Region Headquarters at Tyndall. Pertinent information is then sent on to NORAD at Cheyenne Mountain.

❖ How do they do their job?

To accomplish the aerospace warning mission, CINCNORAD is responsible for providing integrated tactical warning and attack assessment (ITW/AA) of an aerospace attack on North America to the governments of Canada and the United States. This is done using information made available by the ITW/AA system. Portions of that system are under the operational control of CINCNORAD and other portions are operated by commands supporting NORAD.

For example, ground based radars to detect air-breathing threats are under operational control of CINCNORAD, while missile warning and space surveillance are provided by U.S. Space Command. To ensure the timely flow of warning information to NORAD, CINCNORAD is also the Commander in Chief of U.S. Space Command.

NORAD's aerospace control mission includes detecting and responding to any air-breathing threat to North America. To accomplish this mission, NORAD utilizes a network of ground based radars and fighters to detect, intercept and if necessary engage any air-breathing threat to the continent. These fighters consist of U.S. F-15s and F-16s and Canadian CF-18s. As a part of its aerospace control mission NORAD also assists in the detection and monitoring of aircraft suspected of illegal drug trafficking. This information is passed to civil-

ian law enforcement agencies to help combat the flow of illegal drugs into North America.

To accomplish its surveillance mission, NORAD employs a variety of sensors. Aircraft penetrating each sensor's area of responsibility are detected and reported to the appropriate SAOC for identification.

One of those sensor systems is the North Warning System (NWS) which consists of 15 minimally-manned, long-range radars (11 in Canada, four in Alaska) and 39 unattended short-range radars (36 in Canada, three in Alaska), which form a 3,000 mile long and 200 mile wide "tripwire" along the Arctic Circle from Alaska to Newfoundland. The NWS provides surveillance of potential attack routes via Arctic airspace and is currently operational.

❖ E-3 Airborne Warning and Control System (AWACS)

Airborne radar coverage is provided to NORAD by the E-3 AWACS aircraft on an as-required basis. Canada contributes military personnel to AWACS operations. The United States Air Force AWACS assets provide an improvement in coverage over ground-based radars and augment the perimeter radar system in times of increased alert. AWACS aircraft can detect targets out to ranges of about 350 miles, then guide Canadian or U.S. interceptors to visually identify the unknown aircraft.

Two Canadian bases are used for AWACS operations: CFB Cold Lake, Alberta, and Base des Forces Canadiennes (BFC) Bagotville, Quebec. The main base in the United States for AWACS aircraft operation is at Tinker AFB in Oklahoma.

❖ Air Defense

The Canadian Air Division is the military organization responsible for providing combat-ready air forces to meet Canada's commitments to the defense of North America and to maintain the sovereignty of Canadian airspace.

Canadian air defense forces assigned to NORAD include 441 and 416 Tactical Fighter Squadrons at CFB Cold Lake, Alberta, and the 425 and 433 Tactical Fighter Squadrons at BFC, Bagotville, Quebec. All four squadrons fly the CF-18 fighter aircraft. Additionally, 21 Aircraft Control and Warning Squadron performs the surveillance and control functions.

NORAD's air sovereignty mission in the far north has been significantly enhanced by the construction of Forward Operating Locations (FOLs). Through training exercises, fighters have demonstrated the capability to execute sustained operations at Inuvik, Yellowknife, Rankin Inlet, and Iqaluit in the North West Territories, thus extending NORAD's inherent intercept capability well into the Arctic archipelago.

The First Air Force is one of four numbered air forces assigned to Air Combat Command and has the responsibility for ensuring the air sovereignty and air defense of the continental United States. Its headquarters is located at Tyndall Air Force Base, near Panama City, Florida. First Air Force has been an Air Combat Command organization since June 1, 1992. Its subordinate units are located throughout the continental United States. Since October 1997, all combat and support elements have come from the Air National Guard.

First Air Force Direct Reporting Units and Locations

Western Air Defense Sector, McChord Air Force Base, Washington
Northeast Air Defense Sector, Rome, New York
Southeast Air Defense Sector, Tyndall Air Force Base, Florida

Assigned Units and Detachment Locations

102nd Fighter Wing, Otis ANG Base, Massachusetts, F-15 aircraft
119th Fighter Wing, Hector Field, Fargo, North Dakota, F-16 aircraft
119th Fighter Wing, Detachment 1, March ARB, California, F-16 aircraft
120th Fighter Wing, Great Falls IAP, Montana, F-16 aircraft
120th Fighter Wing, Detachment 1, Davis Monthan AFB, Arizona F-16 aircraft
125th Fighter Wing, Jacksonville IAP, Florida., F-15 aircraft
125th Fighter Wing, Detachment 1, Homestead ARS, Florida , F-15 aircraft
142nd Fighter Wing, Portland IAP, Oregon , F-15 aircraft
144th Fighter Wing, Fresno ANG Base, California, F-16 aircraft
147th Fighter Wing, Ellington ANG Base, Texas, F-16 aircraft
148th Fighter Wing, Duluth IAP, Minnesota, F-16 aircraft
148th Fighter Wing, Detachment 1, 148th FW, Tyndall AFB, Florida, F-16 aircraft
158th Fighter Wing, Burlington IAP, Vermont, F-16 aircraft
158th Fighter Wing, Detachment 1, Charleston AFB, South Caralina, F-16 aircraft

❖ NORAD's Newest Mission – Counter Drug Surveillance

In 1989 the U.S. government decided to attack the drug problem along three lines: countering the production of illegal drugs at their source; detecting and stopping their transit into North America; and, reducing distribution and use throughout the United States. In 1991, NORAD was tasked with carrying out the second line of defense – the detection and monitoring of the aerial drug smuggling threat into North America.

The U.S. government consulted with the Canadian government on the counterdrug mission and Canada fully concurred with proposed NORAD drug interdiction efforts. In cooperation with U.S. drug law enforcement agencies and the Royal Canadian Mounted Police (RCMP), NORAD monitors all air traffic approaching the coast of North America. Any aircraft that has not filed a flight plan may be directed by NORAD assets to land and be inspected by the law enforcement authorities.

❖ On September 11th where did everyone go?

Shortly after the attack on New York and Washington, civilian aircraft frequencies went quiet as aircraft were commanded to land at the nearest airport. By early evening on September 11 there was an eerie silence throughout the 108-137 MHz civilian aircraft band. But just 1 MHz above the band edge, military air-to-air frequencies were hopping and the 225-400 MHz band was brimming with activity. For future reference, Table 1 is a list of NORAD air defense frequencies used nationwide.

And that does it for this edition of Milcom. Until next time, 73 and good hunting.

Table 1: NORAD Air Defense Frequencies

Nationwide:
148.125 276.4 276.65 279.4 285.9 298.3 364.2 397.25

Alaska NORAD Region (ANR) RAOC/SAOC, Elmendorf AFB, Alaska (Callsign Top Rock)
229.1 238.4 240.2 254.5 254.6 261.6 261.7 262.4 264.4 269.9 278.0 287.5 288.4 292.0 293.2 297.6 297.8 315.4 325.0 325.8 397.8

Western Air Defense Sector (WADS) SAOC, McChord AFB, Washington (Callsign Bigfoot)
228.6 228.9 234.6 235.9 238.4 239.7 252.0 (Primary) 254.2 260.8 265.4 267.0 270.2 271.0 274.4 277.6 281.6 282.6 288.4 298.1 309.4 316.3 320.6 324.0 327.9 328.0 336.6 341.8 346.2 348.2 351.5 355.2 359.8 374.0 377.0 386.0 387.8 390.2 394.2 397.8 398.0

NORAD Aerial Refueling Discretes:
225.0 303.0 319.5

Northeast Air Defense Sector (NEADS) SAOC, Rome New York (Callsign Huntress)
228.7 228.8 229.1 233.6 235.8 239.2 239.4 251.8 258.0 273.4 278.2 278.4 282.5 284.8 292.4 292.8 293.6 297.7 298.8 303.9 309.5 312.8 316.2 318.1 318.4 326.4 327.2 338.8 342.1 347.4 348.8 351.6 357.1 371.0 371.8 376.2 379.0 384.0 389.2 394.8 396.8 399.0

CONUS Regional Air Operations Center (RAOC)/Southeast Air Defense Sector (SEADS) SAOC, Tyndall AFB, Florida (Callsign Oak Grove)
228.8 234.7 238.5 251.0 256.6 263.2 270.4 275.0 278.6 292.7 298.5 302.4 306.4 325.5 338.4 344.0 356.0 369.0 375.1 386.2 392.8

In addition to the VHF/UHF frequencies listed above, NORAD activity has been noted in the High Frequency (HF) spectrum on the following frequencies:
6751.0 9023.0 11214.0 18027.0

Canadian Forces/NORAD Charlie Designators (other than those listed above)

4721	C1
6735	C2
6750	C3
8967 or 8968	C4
13206 or 13207	C7

Note: On March 16, 1996, the Commander-in-Chief NORAD (CINCNORAD) directed a change in names of the Region and Sector Operations Control Centers (ROCC/SOCC) to Region and Sector Air Operations Centers (RAOC/SAOC) to put them in line with Joint Command and U.S. Air Force doctrine.

Doug Smith, W9WI
w9wi@w9wi.com

RDS and Automatic IDs

One of the biggest challenges for most radio hobbyists is identifying the stations they hear. Murphy's First Law of Broadcast DXing is "The station will fade into the noise exactly on the hour, just in time to miss the identification announcement." DXers would love to see a scheme that would allow automatic identification of their catches.

For FM DXers, such a system already exists. The "Radio Data System," or "RDS," got its start in Europe. In most European countries, large networks of simulcasting FM stations exist. For example, BBC Radio 3 is carried on over 100 transmitters throughout the British Isles. A system that would make it easier for the British listener to quickly find BBC-3 frequencies as he travels would be quite useful. Today, the use of RDS is nearly universal among European stations – even unlicensed "pirate" stations have been reported using it. European FM DX reports include long lists of RDS codes.

Here in North America, adoption has been much slower. Wide-area networks of simulcasting stations are a recent development; systems for automatically tuning radios to alternate transmitters aren't nearly as important. However, a number of U.S. and Canadian stations *are* using RDS. Here, too, RDS can be a valuable tool for the DXer.

Actually, there is no such thing as RDS in North America; for some reason it's called the "Radio Broadcast Data System," or "RBDS," instead. RDS and RBDS are essentially identical from a technical standpoint. A stream of digital data is transmitted at 1187.5bps on a 57 kHz subcarrier. FM signals have long carried subcarriers; broadcasting in stereo requires a "L-R" subcarrier at 38 kHz. Subcarriers are ultrasonic signals, transmitted along with the program audio. (Those familiar with obsolete computer technology may ask why 1187.5bps instead of the more standard 1200? 1187.5 is exactly 1/48 of the 57 kHz subcarrier frequency. This makes it easier to synchronize decoders to the RBDS data stream.)

At least ten different types of message can be transmitted on this data stream. The most important are the Program Identification (PI); the Program Type (PTY); the Program Service (PS); the Alternative Frequency (AF); and the Radiotext (RT) messages.

Program Type indicates the "format" of the station. News, sports, rock, country, etc.. A tourist, looking for a classic rock station, doesn't have to wait through an interminable block of commercials to tell what kind of music he'll hear when the ads end. The codes used in North America are different from those used in Europe; if you get a European RDS decoder, it may tell you your local top-40 station is religious...

Program Service is the name of the station. Transmitted about once a second, it's intended to be the name the station is known by among its listeners. Luckily for the DXer, most stations choose to put their callsign in this field. However, there are a few exceptions – for example, WQLT in Florence, Alabama, uses "Q107." Also, this message is sent only about one-tenth as often as the Program Identification.

Alternative Frequency messages inform the receiver of other transmitters carrying the same program. Code 005 tells the receiver to check 88.1 MHz; 007 checks 88.3; etc. Special codes indicate there are no other frequencies; or that between one and 25 alternate frequencies follow; or that an there's an alternate frequency on AM. (Unfortunately there don't appear to be any provisions for AM alternate frequencies in the Americas. AM AF codes are for the 9kHz European channels.)

Radiotext allows the display of short messages. On the stations I've seen, such messages simply display the station's slogan. ("WYNU - Jackson / Classic rock that ROCKS") In some other cities, stations are transmitting the name of the record that's on the air. That doesn't help the DXer very much, but it's certainly valuable if you hear a record you like on one of those stations that never tells you what they play!

The most important code to the DXer is the **Program Identification**. It's transmitted roughly 11 times a second. It's a four-digit hexadecimal number, and maps directly to the station's call letters. (A DXer's dream – 11 IDs every second!) KAAA is assigned the code 1000; KAAB is 1001; KAAC is 1002, etc. KZZZ is 54A7; WAAA is 54A8. Mapping in Canada is less structured. Some Canadian stations are simply replacing the C in their callsign with a W and using the appropriate U.S. code. Blocks between C000 and CFFF are assigned specifically to Canada, and many CBC stations are using them.

The bad news: RDS receiving equipment is relatively difficult to find in North America. The Radio Shack DX-398 is probably the only reasonably-priced receiver available here that will decode RDS. (As I write, the DX-398 is on sale for $100 off, a very good deal! Whether it will still be on sale when you read this is a good question.) A number of DXers have obtained European decoders like the one in the photograph, but this model has been discontinued and is no longer available either in Europe or here. A demodulator is easy to build, provided you can obtain the necessary parts. (U.S. vendors seem to be demanding an unreasonable minimum order.) Some car radios now include RDS decoders. If your radio offers this feature, be sure to check it from time to time. You might find some surprise DX!

"Cat Country 98.7" is easily identifiable as WHOP-FM with the help of RDS

❖ Bits and Pieces

Another long-standing radio tradition in New York City is going by the wayside. According to a *Daily News* item forwarded by Robert Thomas, WEVD-1050 has been leased to ABC for two years for $78 million, with an option for ABC to buy the station. WEVD will drop its liberal talk format and switch to ESPN Radio, an all-sports format. WEVD has a decades-long presence on the NYC dial. It's moved around a bit – sharing 1330 with another station for years, moving to 97.9 FM, then trading that FM frequency to a Hispanic broadcasting company for the 1050 AM spot. ABC is already leasing WQXR-1560 for their Radio Disney network.

Have you been DXing with RDS? Write me at Box 98, Brasstown NC 28902-0098, or by email to *w9wi@w9wi.com*. Good DX!

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
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Kirk Trummel, 1963-2001

Kirk Trummel, 37, one of the most prominent leaders of the North American free radio movement, passed away on August 15. Trummel lost a fight against pancreatic and liver cancer. It was Kirk's desire that memorial contributions should be made to the Sloane Kettering Institute for Cancer Research.

Trummel's influence on shortwave pirate radio was enormous. With John Cruzan, he started the Free Radio Network web site, still the best pirate radio web site on the internet at the **http://www.frn.net/** URL. He operated a number of pirate radio stations, most notably the widely heard Radio Doomsday using an alias of Nemesis. He edited the DiaLogs logging column in *The ACE* for a number of years. Kirk edited the very comprehensive "Black Book" Europirate address directory. His frequency coordination work is largely responsible for the fact that most North American pirates still operate in the vicinity of 6955 kHz.

Kirk had many scores of friends in the shortwave radio hobby, and we all miss him.

Biafra Back On

Veteran DXers will remember the Biafran separatist movement in Nigeria during the 1960's. This old political struggle has now returned to shortwave via the clandestine Voice of Biafra International. It's been widely heard for an hour at 1900 UTC on 12150 kHz. Interval signals from the Voice of Russia on the frequency have created speculation that the transmitter site might be in Russia.

An internet site at **http://www.biafraland.com** provides more information on the sponsoring rebel group. Thus far **biafraland@biafraland.com** has been announced for e-mail contact, and their postal address appears to be Voice of Biafra International, 733 15th Street, North West, Suite 700, Washington, DC 20005 .

What We Are Hearing

MT readers heard all of these stations this month. Unless noted they operate near 6955 kHz, but it pays to tune around about 5 kHz on either side of this standard North American pirate frequency.

All Your Base Radio- We start with a new one this month. It features computer generated music. (Uses aybradio@yahoo.com e-mail)

Blind Faith Radio- Dr. Napalm's classic rock tunes still hold forth on the pirate bands. (Uses blindfaithradio@yahoo.com e-mail)

Boredom Radio- The miscellaneous music on this new one is hosted by an announcer with a British accent. (None)

Crunch Radio- Their musical programming is not strictly formatted. One recent show specialized in female vocalists. (None)

High Sierra Radio- Best heard on the west coast, Houn-Toad Hal's country music station uses a "station of the high desert" slogan. (None)

KBFA- This veteran has returned with rock music and pirate radio discussions. (None; asks for logs in *The ACE*)

KIPM- Alan Maxwell's bizarre and elaborate dramas will either fascinate or repel you. (Elkorn)

KRAQ- With an ID of "The Voice of Castlegar," this new west coast Canadian pirate has created a stir with its occasional activity on 6940 kHz. (None)

KRMI- Radio Michigan International claims to broadcast its rock music from Port Huron. (Uses KRMI6955@hotmail.com e-mail)

Mystery Science Radio- Cherokee Jack normally hosts music on this evolving pirate. Note the return of a famous maildrop location. (Wellsville)

Paragon Radio- The format on this one's early shows was poetry read over blues music, but there has also been religious content. (None)

Psyco Radio- The new spelling that we use here this month is derived from this very active pirate's new e-mail address. (Uses psycoradiodh@yahoo.com e-mail)

Radio Bingo- The radio bingo game usually includes cameos by other pirates and various audio clips in addition to the game. (Merlin)

Radio Doomsday- Some pirates fired up tapes of old programs from Nemesis, in memorium to Kirk Trummel. (None, of course)

Rock N Roll Radio- You won't need three guesses to name the format on this pirate. (None)

United Patriot Militia Bingo- Although it's probably a division of Radio Bingo, this very well produced parody of United Patriot Radio has become a pirate DX favorite. (Merlin)

United Patriot Radio- Despite occasional threats to shut down, the USA's longest running clandestine still blasts forth in the evening on 6900 kHz in upper sideband. (Somerset, but does not QSL)

Voice of the Angry Bastard- Despite his ID, this guy normally plays music and fails to display the anger. (Belfast)

WAIR- Not to be confused with Partial India Radio, this pirate is a new parody of the international broadcaster in India. (None)

WMFQ- They still plug away with rock music, heavily laced with ID's and promotion of the QSL process. (Providence)

Z-100- Some pirates emulate commercial rock music formats; this is a fine example. (Uses bigz100fm@yahoo.com e-mail)

Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. This finances postage for a souvenir QSL to your mailbox. Letters go to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 422, Wellsville, NY 14895;PO Box 69, Elkorn, NE 68022; 245 Elrod Martin Road, Somerset, KY 42503; and PO Box 293, Merlin, Ontario N0P 1W0, Canada.

A few pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. Reports to the *Free Radio Network* (FRN) go to **http://www.frn.net/** on the web. *Free Radio Weekly* loggings go via **niel@ican.net** e-mail. Sample copies of *The ACE* are $2 via the Belfast maildrop.

Thanks

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column.

We thank all of our contributors: John T. Arthur, Belfast, NY; Kirk Baxter, North Canton, OH; Artie Bigley, Columbus, OH; David Carpenter, Southern Pines, NC; Ross Comeau, Andover, MA; Michael Folk, Covington, KY; Harold Frodge, Midland, MI; Captain Ganja, Belfast, NY; William Hassig, Mount Prospect, IL; Ralf.Haenggi, Gfell, Switzerland; Vince Havrilko, Beale AFB, CA; Harald Kuhl, Germany; Chris Lobdell, Stoneham, MA; Dr. Love, Belfast, NY; Janice Laws, Montreal, Quebec; Greg Majewski, Oakdale, CT; Bill McClintock, Minneapolis, MN; Frederick Moe,Warner NH; Alan P. Masyga, Winona, MN; Pat Nobel, Eugene, OR; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Martin Schoech, Merseburg, Germany; Tom Sevart, Frontenac, KS; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; and Niel Wolfish, Toronto, Ontario.

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A/N Range Signal Retrospect

From time to time, we've mentioned the "A/N Radio Range" signals commonly heard on the longwave band up until the 1970s. In some ways, these stations were similar to today's NDBs, but they also offered basic flight path navigation, using a directional-antenna array at the transmitter. Depending on which side of the beam an aircraft was flying, the Morse Code letters A or N would be heard by the pilot. Perry Crabill (VA) wrote to share some of his recollections of these stations from the 1930s. It offers unique insight into these now-extinct stations which have been almost forgotten.

"As a youngster, I lived in Washington, DC, and in the 1930s I used to listen to these stations in the band from 200-400 kilohertz (kilocycles in those days). The Washington range station used the call letters WWX, and operated on 332 kHz, the same frequency as DC-332 uses now. It had a four-tower Adcock antenna system on the east bank of the Potomac River, more or less across from Washington National Airport.

"Four-course systems had a radiation pattern with two azimuth quadrants at 180 degrees from each other where aircraft would hear the Morse letter 'A,' keyed with a 1020 Hz tone. If they were in either of the other two quadrants, the letter was 'N.' If you were 'on the beam,' (i.e., on the overlapping boundary between two quadrants), you heard a continuous 1020 Hz tone. The phasing and amplitude of the currents in the four towers was controlled to put the overlap areas on the desired azimuths for leading aircraft to the nearby airport.

"The 'A' and 'N' keying was periodically interrupted to send the call letters (WWX, for example), first in one pair of quadrants, and then in the other, whereupon the navigational keying was resumed.

"The 'beam' frequency was also used for communication to and with aircraft. In addition, local aviation weather information was sent on a broadcast basis on regular schedules. Originally, it was necessary to interrupt the navigation signals to do this. If the broadcast was longer than three minutes, it was stopped and the navigational signals resumed for a period so aircraft would not be without guidance too long.

"Later, techniques were developed that allowed simultaneous voice and range signal operation. Aircraft receivers could be equipped with an L/C filter that had a choice of bandpass operation at 1020 Hz for beacon reception, or band rejection at 1020 Hz for clearer reception of the voice signals. The filter could also be switched out, if desired. One of these was the FL-5 filter, a popular WWII surplus item. Added outboard to a ham receiver, it afforded excellent audio selectivity for CW reception.

"The voice communication capability of the range station was also used to talk to aircraft calling in on shortwave. The planes usually called in on 3105 or 6210 kHz. The lower frequency was the night frequency for itinerant aircraft, and 6210 was the day frequency.

"In those days all airport control towers used 278 kHz to communicate with aircraft, which transmitted to them on shortwave. To the best of my knowledge, these tower stations did not use call letters on the air. US call signs beginning with 'WW' were assigned to the US Department of Commerce, hence WWX for the range station at Washington. A well-known example of such a call is WWV for the standard time and frequency station at Boulder, Colorado, originally located at Greenbelt, Maryland. If you look at the longwave listings in Tom Kneitel's *Radio Station Treasury* you will find a number of these calls listed, and I believe these were all for aeronautical applications."

Longwave Loggings

We have loggings this month from Lou Rossetti, N1PUX (MA) and Bruce Collier, WB3HVV (PA). Lou uses a Sony 2010 receiver coupled to a 15" homebrew loop antenna. His receiving location is roughly 200 feet above sea level, giving him a view of the Boston skyline, and a clear view to the South. He is studying the effects of outside street wiring and solar activity on his LW reception.

Bruce Collier's home QTH is Pennsylvania, but his loggings were made while vacationing in Chincoteague, VA. He used a Realistic DX-390 (Sangean 818) with the built-in antenna. Bruce adds that his loggings were made outdoors under a covered wooden swing bayside – talk about a great DX site!

Table 1 lists this month's loggings. I welcome all reader loggings in this column. Why not gather your best intercepts and send them to me at *Below 500 kHz*, 7540 Hwy 64 West, Brasstown, NC 28902? You may also send loggings via e-mail using the address in the masthead. It is appreciated if logs are submitted in the format shown in the table.

To the Letter

One of the attractions of beacon DXing is that you don't need to know the code to enjoy it. Beacons typically send their IDs slow enough to allow the dots and dashes to be written down and looked up on a Morse code chart. With the DX season now in "prime time," I'm presenting a "clip & save" Morse Code chart in Table 3 for this purpose.

Happy Thanksgiving to all. See you next month.

Table 1. Selected Longwave Loggings

FREQ	ID	LOCATION	BY
388	MFV	Melfa, VA	B.C. (VA)
404	YSL	St. Leonard, NB	B.C. (VA)
366	YMV	Maniwaki, QC	B.C. (VA)
340	YY	Mt. Joli, QC	B.C. (VA)
263	QY	Sydney, NS	B.C. (VA)
216	CLB	Wilmington, NC	B.C. (VA)
198	DIW	Dixon, NC	B.C. (VA)
162	—	Allouis, Fr. (LWBC)	B.C. (VA)
220	IHM	Mansfield, MA	L.R. (MA)
251	SKR	Bedford, MA	L.R. (MA)
327	FC	Fredrickton, NB	L.R. (MA)
332	BE	Bedford, MA	L.R. (MA)
338	DRY	Derry, NH	L.R. (MA)
356	SUH	Rocklond, ME	L.R. (MA)
365	FIT	Fitchburg, MA	L.R. (MA)
375	BO	Boston, MA	L.R. (MA)
382	LQ	Boston, MA	L.R. (MA)
407	ISS	Wiscasset, ME	L.R. (MA)
417	EK	Worcester, MA	L.R. (MA)

Table 2. Morse Code Chart

MORSE CODE

A	•—	N	—•	1	•————
B	—•••	O	———	2	••———
C	—•—•	P	•——•	3	•••——
D	—••	Q	——•—	4	••••—
E	•	R	•—•	5	•••••
F	••—•	S	•••	6	—••••
G	——•	T	—	7	——•••
H	••••	U	••—	8	———••
I	••	V	•••—	9	————•
J	•———	W	•——	0	—————
K	—•—	X	—••—		
L	•—••	Y	—•——		
M	——	Z	——••		

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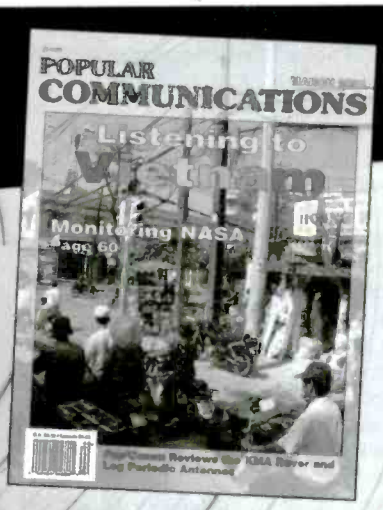

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ON THE HAM BANDS

THE FUNDAMENTALS OF AMATEUR RADIO

T.J. "Skip" Arey, N2EI
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Ham Radio in the Real World

It was a beautiful late summer day when I sat down to start writing this column. I had a repairman scheduled to come by the house, so I took a "Well Day" from work and figured on cranking out the old *MT* column during a leisurely day puttering about the homestead. The neighborhood was nice and quiet, only the birds singing and the sun shining in the windows of my office/radioshack. Life was good!

Then the phone rang. It was my compatriot Jon Cohen WB2KKS. "Somebody flew a plane into the World Trade Center!" Yes, I sat down to start this column on September 11, 2001...The day the world changed forever.

Well, obviously, like many folks, I didn't get much done other than watch TV and listen to scanners for the next couple of days. I knew people who did business in both the World Trade Center and the Pentagon. The folks I know are, thankfully, now accounted for. I have talked with friends and coworkers who were not so lucky. As I pull this column together the United States stands on the brink of what can only be expected to be significant retaliatory action against the entities that perpetrated the horror in New York and Washington DC.

So what does this have to do with ham radio? I think I can make a couple of predictions that will hold true even though this column has been written well ahead of some very fast moving events.

First of all, amateur radio will play a significant role in the ongoing rescue and recovery efforts, especially in New York City. A good chunk of the city's communications infrastructure was knocked out during the attack. Further, the existing system is overtaxed by normal needs as well as emergency and media use. In both the New York and DC areas the Amateur Radio Emergency Service (ARES) and the Radio Amateur Civil Emergency Service (RACES) systems came online without a hitch and began to give communications support to the rescue and relief efforts. ARES and RACES groups in other nearby areas went on standby to offer additional support. This is ham radio at its best, doing what it is chartered to do.

My second prediction has a somber side to it. At the time I write this the leaders of this nation are giving serious consideration to military action that could include the commitment of forces overseas. If this is the case (and I expect by the time you read this we will know the situation), should American men and women find themselves in harms way, amateur radio will once again be involved. The Military Affiliate Radio Service (MARS) will be involved to handling traffic for these brave folks, just as they have done in past conflicts.

If you are a licensed Amateur Radio Operator, please do your part to support your local ARES, RACES or MARS programs. For more information on ARES and RACES you can link to **http://www.arrl.org**. For more information on the MARS program link to **http://www.asc.army.mil/mars/**

Now we turn to information of value to hams in more normal times. Let's start out with a bit of information from Fox Charley Charley.

❖ Lower Amateur Radio Vanity Fee

The FCC announced that the fee for a new or renewed Amateur Radio vanity call sign is $12 effective September 10, 2001. Applications received on or after that date will be subject to the new fee. This is down two dollars from the original $14 fee. This is still a great deal, given that you can have a unique callsign just like N2EI.

A graphic from the VE3BUC HamGuide: A Beginner's Guide to Amateur Radio Web site

When the current Vanity Callsign program first went into effect back in the late '90s a lot of folks with older 1x2 calls groused a bit about the program. Actually, this was not the first time hams could pick their calls. Back when I was first licensed in 1976, hams who passed the Extra Class exam had the option of choosing their callsigns from an existing list of outstanding 1x2 calls. The difference then was that the examinations took place under the auspices of FCC field offices, so it was fairly easy to manage the program given the limited number of folks who sat for the Extra test at any given time. The current Vanity program opened up the opportunity to choose a call to a much wider audience.

Once I had my Extra Class ticket, I wanted to drop WB2GHA in favor of N2TA (my initials), but a funny thing happened along the way. These calls were issued on a first come first served basis and, at the time, the license request and the check sort of went to two different places in the FCC organization. Another local ham applied and initially succeeded in getting N2TA but by an accounting error in his own checkbook he didn't have the funds to cover the fee when the processing went through and he lost the call. N2TA was then awarded to the next on the list, The Russian Speaking Radio Club International. Old Uncle Skip was apparently never in the running.

When I filled out the application I only really wanted N2TA. I hadn't really given any thought to other callsigns at all. But the vanity form required that you enter a total of 25 possible callsigns. I had acquired a list of available calls from the Internet and decided that, if I couldn't get N2TA I would shoot for any combination of letters that would make for quick sending in CW, my mode of choice. I was actually surprised that N2EI was still available after all those years. After all, it is nearly as short as a callsign can be. But while I was unlucky in drawing my initials as my call, I am happy to say that, after being N2EI since 1997, I have the sweetest sounding CW callsign on the air. I put a bit of swing in

UNCLE SKIP'S CONTEST CORNER

Nov 3, 2100 UTC – Nov 5, 0300 UTC
ARRL Sweepstakes Contest (CW)
http://www.arrl.org/contests/announcements/rules-novss.html

Nov 3, 2100 UTC – Nov 5, 0300 UTC
QRPARCI "Running of the Bulls" (CW)
http://personal.palouse.net/rfoltz/arci/bulls.htm

Nov 17, 1400 UTC- Nov 18, 0800 UTC
IARU Region 1 160m Contest (CW)
http://www.arrl.org/contests/announcements/rules-iaru.html

Nov 17, 1700 – 2100 UTC
LI/NJ-QRP Doghouse Operation Sprint (CW)
http://www.njqrp.org
(Look for Uncle Skip N2EI)

Nov 17, 2100 UTC – Nov 19, 0300 UTC
ARRL Sweepstakes Contest (SSB)
http://www.arrl.org/contests/announcements/rules-novss.html

Nov 24, 0000 UTC – Nov 25, 2400 UTC
CQ Worldwide DX Contest (CW)
http://www.cq-amateur-radio.com/cqwwwrules.html

between the E and I. You can't miss it!

SSB is also fun with my call. While the preferred phonetics are "November Two Echo India," it's fun to throw in the occasional "November Two *Electronic Interceptor*" in honor of my years of writing the DC to Daylight *Beginner's Corner* column here at *MT*.

If you, too, want something unique on the air, give the Vanity program a try. Especially now that it costs a bit less. For more information, visit the FCC Amateur Radio Web page, **http://www.fcc.gov/wtb/amateur/VanityCS.html.**

◆ FCC Registration Number Mandatory

Starting December 3, 2001, everyone doing business with the FCC – licensed or not – must obtain and use a 10-digit FCC Registration Number, or FRN. The FCC called the move "a first step" toward streamlining fee collection and tracking. Many amateurs who were registered with the Universal Licensing System (ULS) were assigned a 10-digit FRN by the Commission Registration System (commonly called CORES) in a one-time cross-registration last year and were notified by mail.

There are still a few details to be worked out in this program. Anyone who participated in CORES from the start will tell you that the system has left quite a bit to be desired.

Now, I'd like to ask all my ham friends out there to do me a favor. Once you get yourself set up in the system, check in with some of the older hams in your area. Many of these folks do not have on-line capability, and some don't even realize that their license may be put in jeopardy by failing to participate in the FRN/CORES system. I've helped a couple of Old Timers through the system. These folks gave a lot to the hobby over the years. Why not give something back?

The on-line filing system and further information on CORES is available by visiting the FCC CORES Web page, **https://svartifoss2.fcc.gov/cores/CoresHome.html**. *(See p. 4 for more on FRN/CORES - ed)*

◆ On-Air Code Practice Legal - duh?

I was a little surprised when I read recently that FCC Special Counsel Riley Hollingsworth was asked to give his opinion on the legality of on-air Morse Code practice. The article indicated that Hollingsworth, in concurrence with the FCC's Bill Cross, agreed that it was acceptable under Section 97.111(b)(5) of the Rules.

While I am glad for the official okey-dokey on this practice from the man who single-handedly cleaned up our bands, I guess I was a bit confused, because I can't think of a time in my entire ham career (and even a number of years prior) that on-air Morse Code practice was not...well, common practice. My move up to General so many years ago was largely through the help of Monday night training sessions aired over my local repeater system.

Anyway, for the benefit of folks interested in setting up such training sessions, perhaps on their local repeater system, read over the Rule and then proceed using good amateur radio practice. Use a clear frequency with respect for other hams. Code groups of letters and numbers including callsigns and prosigns are perfectly legit for training purposes so long as they do not violate the regulations of being codes or ciphers with the intent to send a covert message.

◆ Good Web Site

MT HQ sent along information about a new Web site set up by Don Cassel VE3BUC. HamGuide: A Beginner's Guide to Amateur Radio, **http://www.qsl.net/hamguide/** is a web site for newcomers to amateur radio. Whether you are a newly licensed ham or just thinking about getting that first license, there is useful content here for you. Some of the content you will find includes: (a) What is Amateur Radio? (b) Amateur Radio Activities (c) How to get licensed in Canada and the U.S. (d) How to get started operating phone and CW (e) Operating various modes from SSB to IRLP

In addition you will find information on (a) QSLing, QSL bureaus and eQSLs. (b) How to make propagation work for you (c) DXing (d) Contesting (e) Special Events, and much more.

Old Uncle Skip went poking around the site and, as someone who spent a lot of years writing almost exclusively for beginning radio hobbyists, I was very impressed. The site is a great guide for showing someone all that Amateur Radio has to offer and both a hobby and a service.

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SW-54 Conclusion; Building an Isolation Transformer

Editor's Note: This column should have been published in October to complete the SW-54 restoration. We accidentally published the November column instead. Next month we will pick back up with the "Command" set begun in the October issue. Our apologies to the author and our readers!

In September, we realigned our recapped SW-54 to original factory specs (or so I thought) and it acquitted itself well in a casual test on the temporary antenna in my backyard radio shack. But a little more work had to be done before I could button up this radio and put it on the "completed" shelf.

❖ A Mysterious Short Circuit

I had enjoyed my original listening session with the SW-54 so much that I decided to put in some more time SWLing with it. By this time, in addition to my temporary antenna, I had a good ground connection in the shack, so I used it. After I plugged the little set in, I was startled to find that the radio lit up and began to operate even with the power switch off.

Of course one does not use a ground connection with most ac-dc sets. Such a connection is usually made directly to the chassis, where one side of the line is also connected. Depending on the position of the a.c. power plug in the wall socket, grounding the chassis might either bypass the on-off switch and turn on the radio – as happened in my case – or create a direct short across the line and blow a breaker. With this set, though, the ground terminal is supposed to be isolated from the chassis by a .02 mfd capacitor.

Did I have a shorted capacitor? Seemed unlikely because that component was brand new. After a bit of probing and head-scratching, I found that the capacitor was fine. Furthermore, the mysterious ground disappeared when I removed the little metal link connecting the ground terminal to one of the antenna terminals. (Most communication receivers have a pair of antenna terminals to accept a balanced line from a dipole antenna. One of these terminals is link-connected to the ground terminal for use with a single lead-in wire.)

This was peculiar indeed, because the two antenna terminals are connected only to the antenna winding of the r.f. coil for the band in use and should have no pathway to ground. I eventually traced the short to the antenna coil of Band "D," the highest frequency band. Reluctantly I theorized that the primary and secondary of the coil might have been shorted together by a lightning strike. I did have a replacement coil in my parts set, but changing it out would be an exacting and lengthy task

I was never happier to discover that I was wrong about something! This particular coil has a small 10 pf capacitor wired across the secondary. Its connecting leads are wrapped around the body of the cap for a couple of turns at each end. I noticed that the cap was pushed down flat on top of the coil so its ends were in contact with the primary terminals. I lifted the cap off the terminals and the short thankfully disappeared!

If you saved a copy of my August column, you can get a look at this problem cap. Study either of the underchassis views shown and direct your attention to the first detector trimmer capacitor for band "D." It is the single trimmer sitting between the group of four and the group of three. You'll see the little cap at the upper end of the trimmer pushed down against the coil.

Refinished back from junker set fits nicely and matches well. Line cord runs through opening formerly occupied by interlock plug (see text). Earphone pin jacks are just to the right of the opening. Antenna and ground connections are at far right.

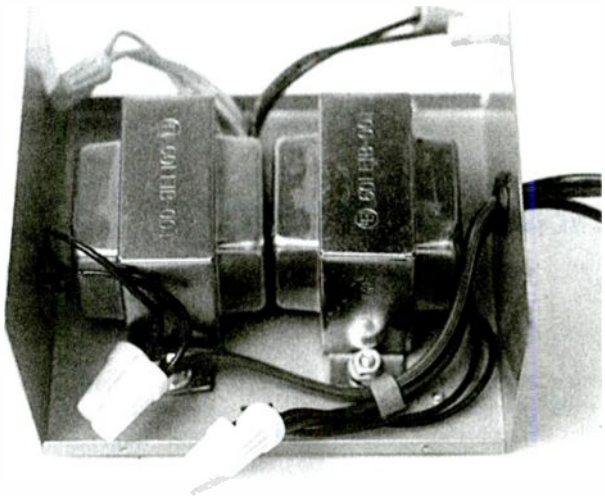
❖ Taking Care of Loose Ends

After correcting the ground problem, I thought it would be prudent to realign the oscillator and first detector circuits. For one thing, I felt that the removal of the spurious ground might make a difference in the adjustments. For another, I'd been uneasy about the original alignment method used ever since I completed the work.

The manufacturer's specifications, as reprinted in my Rider's manual, seemed to call for the signal from the r.f. generator to be injected into the signal grid of the 12BE6 converter for the i.f. adjustment and left there for the oscillator and first detector adjustments. Yet the usual strategy for the latter adjustments is to inject the signal into the "front end" of the set – either by coupling to the loop antenna, as with the Philco *Transitone* alignment done in an earlier column, or by direct connection to the antenna input.

Studying the wording in Rider's again, I found some oddities that suggested the omission of a paragraph or two. And since I had been somewhat concerned about the mushy action of a few of the first detector trimmers, especially the broadcast band trimmer, I decided to ignore the apparent dicta of The National Company and strike off on my own using a conventional hookup. I redid all oscillator and first detector adjustments with the signal generator connected across the antenna terminals in series with the 300-ohm dummy antenna resistor recommended by National. I was gratified to find that all first detector trimmers now tuned quite sharply, even the "problem" broadcast band trimmer.

Now all I needed to do to complete the restoration was to recondition the metal back I had salvaged from my junk set and to replace the brittle and dangerous line cord. The back was badly rusted and scuffed and – much as I would have preferred to keep the original finish – no amount of polishing and rubbing was going to



Interior of isolation transformer cabinet. Tied-together 12-volt secondaries are at upper left; their unused center taps are at upper right. Line voltage input and output connections are below.

make it look decent. Another small problem was that this back, which had come from an older Model SW-54, was set up to use a line cord with an old-fashioned TV interlock plug. (The power cord was automatically unplugged when you removed the back).

After removing the interlock plug by drilling out its rivets, I steel-wooled and sanded all of the rust and other glop caked onto the back. Visiting the touch-up paint section of a local auto parts store, I selected a gun metal gray shade intended for GM cars: "plasti-kote" brand GM7221 to be exact. After building up a finish by spraying on several thin coats, I obtained a very nice surface which dried completely in less than an hour and was a very credible match.

The new line cord was passed through the old interlock opening in the back, and then through the hole provided on the rear chassis apron. The original cord had an integral grommet and strain relief, but I was able to find a separate grommet that fit the entrance hole and fed the cord through that – providing strain relief by the simple expedient of tying a knot in the zip cord leads.

A second listening test now satisfied me that the SW-54 was working very well and that its dial calibration was proper. All local broadcast stations were in their rightful places and I was able to pick up the WWV transmissions at 2.5, 5, 10 and 15 MHz at exactly those spots on the dial. Hence I now declare the SW-54 restoration project to be officially completed. If any of you out there in readerland decide to restore an SW-54 of your own, I'd like to chronicle your adventures on these pages. So be sure to contact me!

◆ A Quick and Dirty Isolation Transformer

I promise not to harp too much longer on your need to use an isolation transformer while working on ac-dc sets. Nor do I intend to repeat any of the fervent caveats I expressed in past columns. However, knowing that formal isolation transformers are not easy to find (except in the catalogues of a few national parts dealers, where minimum orders or high shipping/handling charges may turn you off on purchasing even a modestly priced unit), I'd like to show you how you can build one using Radio Shack parts in less than two hours.

You'll need two heavy duty power transformers. I had two #273-1511 (12.6 Vct @ 3.0 A) units on hand, so I used them for my model. These fit comfortably in a #270-253 "Vented All-Metal Cabinet," which by great good luck I also happened to have on hand. The total cost of these items, bought new, would be about $27.00 plus tax. The only other items you will need are some screws and nuts, a rubber grommet, a cable clamp, and a sturdy 6-foot extension cord.

Tape up the center-tap connection on the secondary of each transformer, or put a small electrician's wire nut on it; you won't be using this wire. Install a rubber grommet in the center of one end of the cabinet. Mount the transformers in the cabinet with the secondary sides facing each other. Place a cable clamp sized to fit two pieces of zip cord under one of the mounting screws and leave that screw loose for now. Now connect the 12-volt secondary of one transformer to its counterpart on the other one. Solder both connections and insulate with tape or a wire nut.

Cut the extension cord about six inches from its "socket" side and strip the insulation from the severed ends. Slip both ends through the grommet, then solder the plug wires to one of the transformer primaries and the socket wires to the other. Insulate the connections with tape or wire nuts. Secure the two pieces of zip cord under the clamp and tighten the screw. Install the cover on the cabinet and your isolation transformer is completed.

Theory of operation is simple. The transformer with the plug wired to it converts the 115-volt line voltage at its primary to 12 volts at its secondary. The 12-volt secondary is connected to the 12-volt secondary of the second transformer, which – being hooked up backward – is used as a primary in this application. Since transformers work just as well backward as forward, the second transformer obediently converts its 12-volt input to 115 volts, which is available at the socket end of the extension cord.

With a volt-ampere rating of 36 (3 amps X 12 volts), this transformer is pushed to its limit (but not over its limit) when running a typical small a.c.-d.c. radio. As a test, I powered the SW-54 from this hookup for about two hours. The transformers got hot enough so you knew they were working, but not dangerously hot. A word to the wise: at first I depended on wire nuts only to fasten the connections, and found that the output of the second transformer dropped to from 115 to 100 volts under the load of the radio. After soldering each connection and reinstalling the wire nuts, I measured a satisfactory 110 volts.

The completed isolation transformer as set up to power the completed SW-54 for a final "smoke test" of both units.

ANTENNA TOPICS

BUYING, BUILDING AND UNDERSTANDING ANTENNAS

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Some Basic Antenna Concepts

Last month we talked about the idea that a 6-foot long wire could be a satisfactory HF receiving antenna for some applications. This month let's talk about some of the things that can make an antenna perform differently – and sometimes more satisfactorily – than a 6-foot piece of wire.

❖ Gain and Directivity:

Gain and directivity are usually heavily interdependent so let's cover them both together. Consider an antenna so tiny that it is a point in space. Let this antenna also be nondirectional. This imaginary antenna is called an "isotropic" antenna. Engineers often compare the theoretical performance of this antenna to real-world antenna performance.

Because this antenna radiates equally in all directions its radiation-reception pattern (R-R pattern) is a sphere centered on the antenna (fig. 1A).. An antenna's gain patterns are the same for transmission and reception. If we think of the isotropic antenna's R-R pattern as a balloon, and we squeeze the balloon around its circumference then the pattern would extend farther from its center in some places, and less than before in others (fig. 1B). Such a pattern would indicate greater gain for the places where the balloon protruded farther out, and less gain where the balloon extended less than before.

In a sense this is how antenna gain is derived – by taking the existing amount of signal the antenna has to deal with, and shaping the R-R pattern of the antenna to concentrate more signal in directions where higher gain is desired, and reducing it in directions where less gain is desired.

As you can see an increase in antenna gain in one direction means that some other direction must have less gain. There are antenna designs for a wide variety of situations where directivity and gain in specific directions are important, where reducing gain to signals or noise from one or more directions is important, or some combination of increasing and decreasing gain in various directions (fig. 3).

❖ Horizontal and Vertical Directivity:

When we speak of antenna "directivity" we typically are thinking of an antenna which can emphasize its radiation or reception to different directions of the compass. If we want to work stations to the west of our location, and also reduce interference from stations or electrical noise from other directions then we want an antenna with horizontal directivity. We call this a "beam antenna."

The vertical directivity, or patterning of waves, is also important in determining our signal's path between transmitter and receiver. For MF and HF work utilizing ionospheric propagation, an antenna which concentrates its patterning upwards supports short-haul communication best. In contrast, MF and HF antennas which direct their radiation lower, support longer ionospheric communication paths better. These are sometimes called "DX antennas." At VHF and higher frequencies, line-of-sight propagation predominates. Here, low-vertical angle patterns allow the signal's line-of-sight access to the horizon, whereas high-angle radiation is often undesirable unless it is directed to hill-top stations, aircraft, satellites or spacecraft.

❖ One Piece of Wire Has Two Different Lengths!

Antennas deal with radio waves, and waves

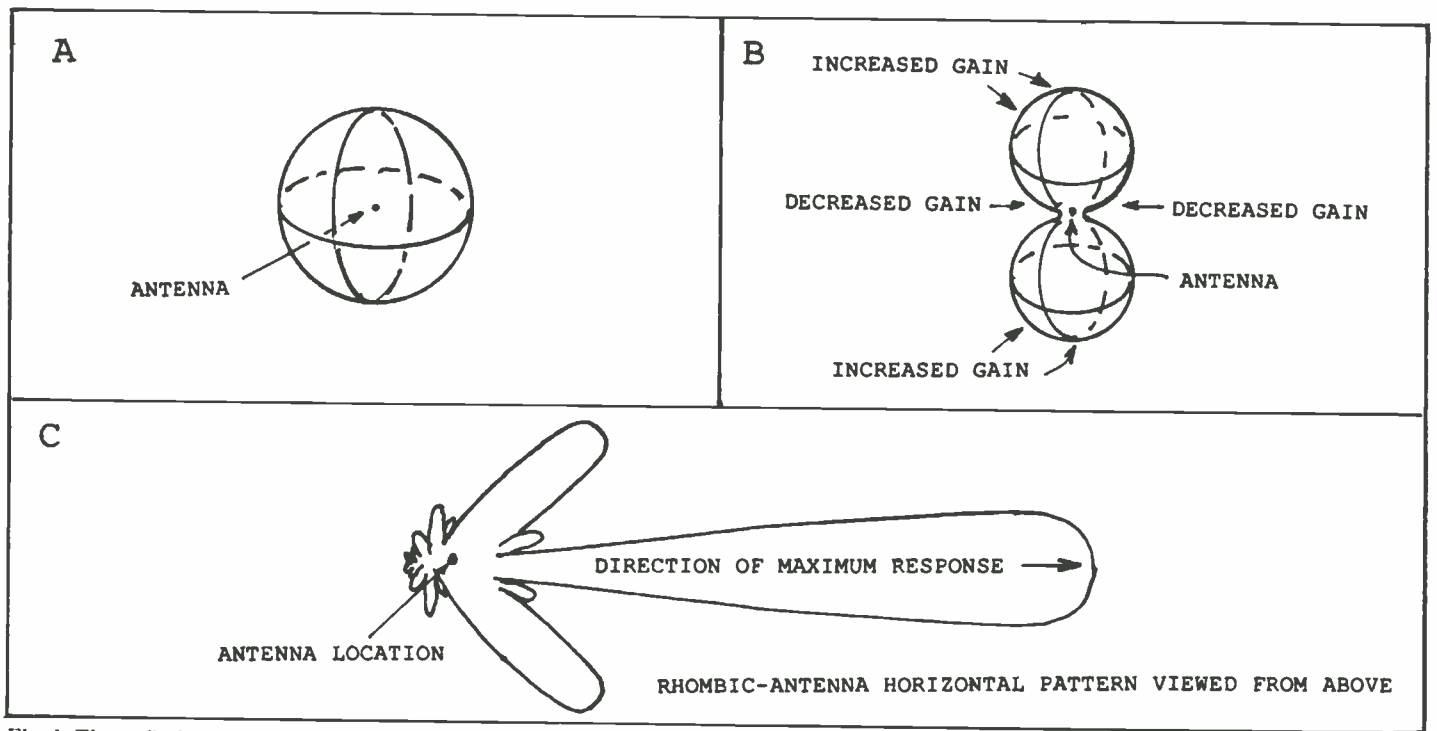

Fig. 1. The radiation-reception pattern of an isotropic antenna: (A) Squeezing the isotropic antenna pattern to give it some directionality, (B) One of many radiation-reception patterns which can be produced by appropriate antenna design.

This Month's Interesting Antenna-Related Web site:

This site has study material about antennas as a part of a really fine course for the study of radio and electronics in general. It is interactive, including tests, and feedback is given on test performance. "The only cost is your willingness to learn, and do some work." I salute the wonderful spirit of the person or people who prepared this course, and who so generously offer it free to internet users:
http://members.nbci.com/ronber/about.html

have what we call "wavelengths." In fact the term "shortwave" refers to the relative shortness of waves on the shortwave (3-30 MHz) band as compared to the longer waves on bands lower in frequency.

The wavelengths of signals with different frequencies are different. For example a wire measuring 10 foot in length would seem short as compared to a wavelength of 270 feet, but long to a wavelength of one foot. Antennas are designed for specific wavelengths (which also means a specific frequency), and this determines the physical size of their elements, and the spacing between those elements. For this reason we should develop the habit of thinking of our antenna's length in relation to the wavelength it is to work with. In fact many antennas are named or described with this in mind as when we speak of a "halfwave dipole," a quarterwave groundplane," or "a beam with 1/10 wavelength spacing between elements." A 10 MHz halfwave dipole is around 47 feet long. This length will not be a halfwave at any other frequency. It may perform well, but differently, at various other frequencies. And it will also perform poorly at various other frequencies.

We sometimes hear the term "capture area" or "aperture" used in relation to an antenna's length, size or gain. There is the temptation to believe that larger antennas necessarily have more gain, and thus send more signal to the receiver. Although larger antennas do have a larger area exposed to the received wave, they do not always have more gain than smaller antennas. Differences in factors such as antenna resonance and efficiency can cause a larger antenna to have less gain than a smaller one.

◆ Matching and SWR:

The feedline from a transmitter is a source of power connected to an antenna which we want to accept that power. Hopefully the antenna will then radiate that power as a transmitted signal. As with other electrical circuits the maximum transfer of power is accomplished when the impedance of the source and load are identical. Thus a 50-ohm feedline will transfer all its energy to a 50-ohm antenna feedpoint. But if the impedance of the feedpoint is other than 50-ohms less power is accepted by the load. Simultaneously more of the power is reflected from the load back down the feedline toward the transmitter. The reflected power combines with the power coming up the line toward the antenna, and this combination sets up high and low voltage (and current) points along the line. The distribution of these high and low points are known as "standing waves." The ratio of these high and low points is referred to as the line's "standing wave ratio," or "SWR."

When all the power is accepted by the load (antenna), there is no power reflected back down the line, there are no standing waves, and the SWR is 1:1. Whether an SWR above 1:1 indicates a sizeable power loss in transmitting applications depends primarily on the amount of loss in the transmission line. In some situations with very low-loss lines, even a 10:1 or higher SWR can be tolerated.

For reception, matching between antenna and feedline, and between feedline and receiver, can also be important. On VHF and higher frequencies, decent matching between antenna, feedline, and receiver antenna-input is definitely important. On HF and lower frequencies, good matching is usually not as important unless the reception location is electrically very quiet (little received electrical interference).

Feedpoints on antennas are usually designed to match the impedance of the feedline used, and an antenna-matching unit (ATU) is often used to provide a match between a transmitter and the feedline. With modern equipment ATUs are seldom of value between a feedline and receiver.

RADIO RIDDLES

Last Month:

We said: "So now that we've said that even a 6-foot wire can often do as well as a sophisticated antenna design for receiving HF, let's think of some antennas that can outperform such a simple wire antenna at times, and why they are able to do that." This month's column offers some answers to this question.

This Month:

What was the simplest radio receiver ever built? You might think until your brain Hertz, and still not know this one.

You'll find an answer for this month's riddle, another interesting, antenna-related web site, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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Mobile Scanning in Style

Dave Downing, N9DAV, gave me a tour of his impressive mobile installation (fig. 1 and 2). His 1998 Ford Explorer XLT "communications vehicle" contains multiple VHF and UHF radios. Dave said, "The planning started a year prior to the actual installation. As with any big project, proper planning is the first order of business. This project took me approximately 4 weeks to complete."

There are eight antennas, not counting the AM/FM radio antenna. Six of the antennas employ Maxrad NMO mounts on the roof fed with 800 MHz low loss Teflon coax. Dave standardized on the same mount and coax throughout so he can fit them with any matching antenna, regardless of radio/band. He enlisted the help of an experienced installer to drill the holes, install the mounts, and dress the feedlines, a 5 hour job. Dave observed that the low profile NMO mounts provide a very "clean" look.

All the radios are switched on and off simultaneously by a heavy-duty toggle switch. A key switch enables Dave to lock the power off when the car needs service or when parked by a valet.

There are six speakers: one amplified and two non-amplified Motorola, two amplified and one non-amplified Radio Shack models.

On the inside, starting from the top right is:

- Motorola UHF Systems Saber (HT)
- Optoelectronics Scout frequency counter/recorder
- Uniden BC-780XLT trunktracking scanner
- Radio Shack Pro-2066 trunktracking scanner
- Uniden BC-9000XLT conventional scanner
- Icom 2710 dual band transceiver (50W)
- Motorola UHF Syntor X9000 transceiver (110W)
- Motorola VHF Syntor X9000 transceiver (110W)
- Uniden Pro-538W CB

Except for installing the antennas, Dave performed all the other installation work. He removed the Explorer's stock center console and installed bracketing made by Lund Industries of Wheeling, IL (**http://www.lund-industries.com**). Lund is a major installer/supplier to the public safety sector. He avoided drilling new holes by using existing holes intended for the stock console and seats. The wiring was purchased from both Lund and The Cable Experts (**http://www.cablexperts.com**) also located in Wheeling, IL.

Though Dave uses the Syntors for ham radio, he spends about 70% of his time monitoring vs. 30% hamming. He scans over 40 fire departments, local law enforcement agencies, and the Illinois State Police. Dave also listens to four different ham repeaters simultaneously.

Some of the transmitters interact with the scanners. Dave reduces the BC9000XLT's volume when transmitting to avoid feedback. He reports the trunk tracking scanners aren't afflicted, but the ICOM dual-bander squeals sometimes, depending on what frequency it's tuned to.

*Figure 1. **Dave Downing's mobile monitoring post.***

*Figure 2. **Arm rest is visible at the bottom of this photo.***

Dave is understandably satisfied with his mobile monitoring station: "In the end, I feel the installation turned out exactly as I planned."

If you have any questions, contact Dave via email at *studioded@aol.com*.

Channel Labeling Hint

Maury Midio uses an interesting technique to keep track of the channels programmed in his Icom IC-R7100A. The IC-R7100A has 900 memory channels but does not support alpha-numeric channel labeling, so "Mid" stores the channel numbers and licensee names in a Sharp Electronics YO-520 electronic organizer.

When a channel is active, Mid enters the channel number on the organizer's keypad and sees the agency name displayed on the organizer's screen.

Mid writes that the YO-520 organizer has 1 MB of memory and sells for about $50 at Radio Shack.

Uniden/Bearcat BC200XLT Loss of Audio and Dial Lamp

We are reprinting this tip by request. If you can program frequencies into your

BC200XLT portable scanner, but there is no audio and the green backlight no longer functions, a tiny transistor may have failed.

Check for a defective PNP surface mount transistor, Q201 (2SB815B6-YDY). Q201 is used as a switch to furnish 8 VDC to several stages of the BC200XLT. Its main purpose is to switch off power hungry stages of the BC200XLT when the CPU thinks the NiCd voltage has fallen below a threshold. That's an attempt to limit the current drain on weak NiCds to avoid permanent damage.

Q201 is located on the foil side of the "Micom" board, adjacent to the black multi-pin connector that mates the Micom and main boards together (fig. 3).

Q201 can be destroyed by a few different causes, primarily, by something in the scanner drawing too much current through it. In one case, capacitor C36 shorted. It's a 220 uF 10v electrolytic, located on the component side of the main board, connected from pin 8 of the audio IC (IC2 NJM386SL) to ground.

Capacitor C55 shorted in another BC200XLT. Gary Bean reports he substituted a 2SA1298 for Q201 and it worked fine. In a pinch you can bypass Q201 by soldering a short piece of bare wire between the collector and emitter (as shown in fig. 3), but you must first fix the component that caused Q201 to fail. Adding a jumper wire is only a temporary fix and it would be better to replace the transistor instead.

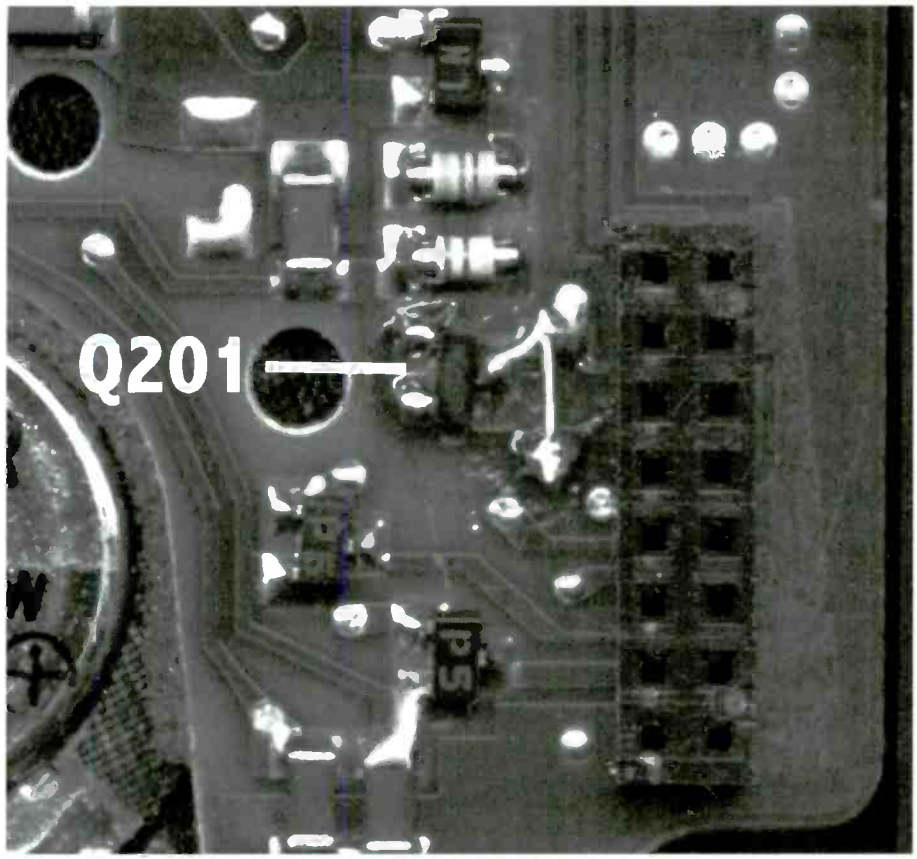

Figure 3. ***Transistor Q201 location on BC200XLT Micom board.***

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Software for the Do-Everything BC 780XLT

Not too long ago, to find a receiver with all the features of the Uniden BC780XLT selling (from Grove) at $349.95 would have been an impossibility. Heading the impressive list of 780XLT capabilities are computer control, 500 channels, a large display showing (among other useful data) frequency and user-inputted station details, and multiple system trunk tracking capabilities and tone decoding. Of course, it was the computer control capability that caught the eye of yours truly.

A Quick 780XLT Overview

Although small in size at approximately 7 x 6.5 x 2.25 inches (176 x 167 x 61 mm), this diminutive receiver covers 25 to 512, 806 to 956 (excluding cellular) and 1240 to 1300 MHz. It only weighs in at 42 oz. (1.33 kg). On its own, without computer control, it scans at 100 channels per second and moves out at 300 steps per second in the turbo search mode.

The 780XLT has an internal speaker that does a reasonable job, and it is powered by a large "wall wart" 110 volt AC supply. This is pretty standard with receivers that are designed to operate from automotive battery voltage, as is the 780XLT.

The 780XLT's primary control is via a scrolling menu, displayed on its back-illuminated liquid crystal display. Instructions are inputted using scroll arrow keys and a numeric keypad. The size of the 70 + page instruction manual is testimony to not only its capabilities, but also the operating complexity of the 780XLT. To be fair, a large part of the manual is taken up with using the 780XLT in the trunk tracking mode. However, still the question has to be asked (especially in this column!), "Is this a job for computer control?

780XLT's Computer Control

Uniden has made computer interfacing a snap by including a standard 9 pin serial interface on the back panel. All that is needed to connect it to a computer is a simple serial cable; no other interface/level shifting hardware is required. Perhaps it is due to this simple serial port configuration that a number of companies have produced software packages for the 780XLT. These include: Scanner Master's WinScan780 (made by Pozilla Software), Signal Intelligence's TrunkStar780, Computer Aided Technologies' ScanCat V8.0 and ScanPro Scanner Software's BC780XLT. This time we will take a look at the first two, and keep the others till next time.

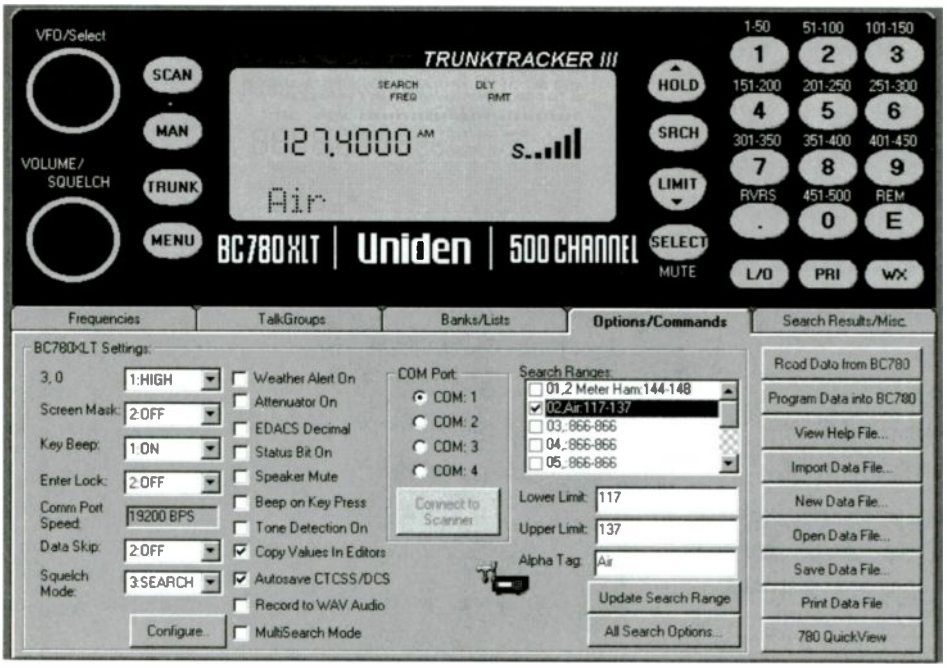


Figure 1 – WinScan780 Radio look-a-like showing Options/Command Screen

Sure Looks Like It!!

Scanner Master/Pozilla Software's **WinScan780** version 1.00 comes on a CD and has modest system needs: Pentium 75 MHz with Windows 95/98/NT 4.0, 15 MB of Ram, 10 MB hard drive space for program, a free com port and a CD ROM drive.

Loading was simple, fast and without problems. The 780XLT must be placed into the Remote computer control mode by pressing and holding the "E" key on the radio for 2 seconds. The radio will display "RMT" on the LCD indicating it is now ready for computer control.

When WinScan780 version 1.00 is run the result is displayed in Figure 1. The top part of the display is a very accurate representation of the front panel of the radio. Even the off segments of the liquid crystal display's indium tin oxide electrodes (they look like very lightly lit labels and small rectangles) have been programmed into the computer display. Very impressive! All buttons are functional using the mouse.

Just below the black "front panel" sit the five functional screen keys: Frequencies, TalkGroups (for trunk tracking), Banks/Lists, Options/Commands and Search Results/Misc. Once the user selects one of these keys the area below the keys displays the scanning variables which can be controlled.

A Closer Look

For example, in Figure 1 the Options/Commands key has been selected, and the bottom display region now allows the user to perform a number of commands. In the center of the bottom screen, search range frequencies and names can be added or modified and the computer's serial port (COM) can be changed.

On the left side, parameters dealing with the 780XLT's settings such as activation of key beep, port speed, attenuator control, record WAV file and many others can be set.

Looking at the buttons on the bottom right side, data can be read into the 780XLT, or data can be programmed into the radio. Most important, file handling commands can be accessed from this screen. Finally, the "Quick View" button shrinks the display down to a size that can be conveniently tucked into a corner of your computer screen while you do other work (like writing this column).

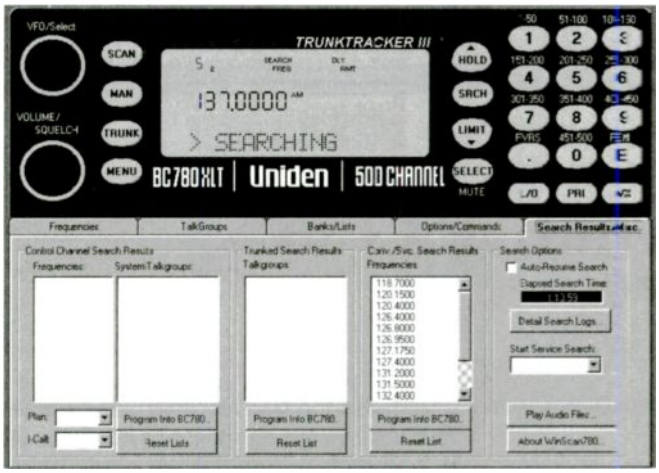


Figure 2 – WinScan780 Search Results Screen

Your Search Shall Be Fulfilled

As you can see from the "Search Ranges" box in the lower center of Figure 1, we have defined two searches: 2 Meter Ham 144-148 MHz and Aircraft 117-136 MHz. A check mark in the box next to "Air" in the Search Range menu, and "Air" displayed on the screen below the frequency 127.400 indicates that we are searching the Aircraft band and that a station has been detected. As the program searches, the frequency numbers on computer display change. However, they do not change as fast as the radio is actually searching, nor as fast as the radio's display.

Figure 2 is the screen which appears when the "Search Results/Misc" functional screen key is selected. In the "Search Results" box we can see all the active frequencies detected during our previous search. The other parts of this screen, to the left, control the trunk tracking function. Searches of services, such as news media, railroad, marine, public safety and alike can be performed from the "Start Service Search" box on the bottom right of Figure 2. WinScan780 does a lot, and requires very little user effort. However, if a user needs to refer to the users guide, all they need do is click on the "Options/Commands" (See Figure 1) and then on "View Help File" button on the bottom right. This Help file is very useful.

Frequency and label data from word processing files, HTML and other sources can easily be incorporated into WinScan via their "Paste" button. All that is required is to copy the data from whatever source using the Windows copy command. Using WinScan's "Paste" command it will be easily transferred into the program. I tried it with MS Word and HTML files and it worked great.

Another "Star" – TrunkStar

Signal Intelligence is a company that should be familiar to most computer scanner people. They are the makers of the much-used ScanStar products: Scan*Star Deluxe and Scan*Star Industrial Radio Analysis Suite. Users of these fine programs will see similarities in **TrunkStar780**.

The system requirements for TrunkStar780 are a bit more than WinScan. However, they are still quite modest for today's PC. A Pentium CPU running Windows 95/98/ME/NT/2000/XP, with 64 MB of RAM, a free COM port and a CD ROM drive are required.

A Little Different Look

The main screen of TrunkStar780 in the Air Band search mode is displayed in Figure 3. It bears little resemblance to the actual 780XLT front panel except for the layout of the keyboard (on the right). It is divided into two main sections, the top section being for control of the radio and the bottom for all logging data display and inputting.

Starting at the top, let's take a quick tour of the upper section. The serial communication is established with the radio by clicking on the radio icon (fourth from the right). The first slider on the right side of the huge signal strength meter sets the operation mode of the 780XLT: service search, frequency search, memory scan, frequency input via keypad or dialed-in frequencies.

The middle slider selects trunk scanning modes and the right one selects reception mode. The slider below the small tuning meter at the lower left selects squelch mode. The knobs on the lower left of the upper section are a bit unique. One is for changing megahertz, and one for kilohertz. I have not seen this arrangement for many years. The icons along the top are for various file handling functions. The ten toggle switches under the word "AIR" enable ten different service searches.

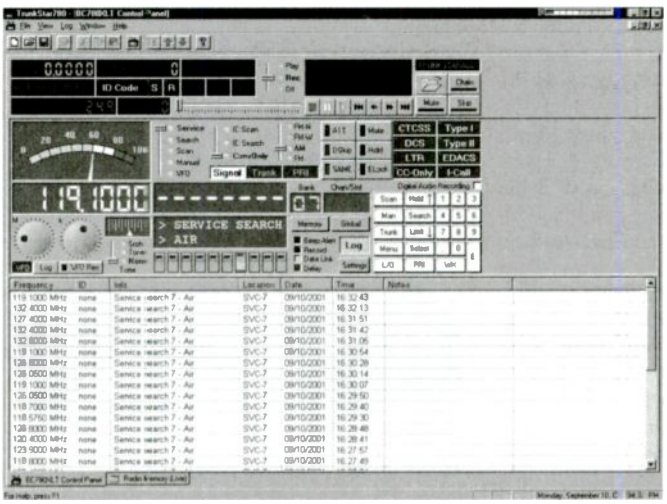


Figure 3 – TrunkStar780's Main Screen in Service Search –Air Mode

How Does It Work?

TrunkStar780 was simple to install, easy to use and operated without a problem. The help "bubble" which appear when the cursor hovers over a control, together with its simple layout, makes the very limited Help file almost unnecessary. All in all, TrunkStar780 lives up to its name when it comes to trunk tracking.

With the 780XLT's audio output connected to the input of the computer's sound card via a separate cable, both WinScan780 and TrunkStar780 have easy-to-use digital audio recorders.

In my humble opinion, WinScan780 is better suited to the general scanner enthusiast, while TrunkStar780 is aimed squarely at trunking enthusiasts. However, I was very impressed with both programs and you cannot go wrong with either if you own a 780XLT.

Where & How Much?

WinScan780 is available from ScanMaster/Pozilla Software at **http://www.mghusa.com/pozilla** for $ 69.95, plus $3.95 for USA shipping and handling. A demo version is available at their site. They can also be contacted via ScanMaster Corp., 40 Freeman Place, Needham, MA 02492. Alternatively, it is currently available in the Grove catalog at **http://www.grove-ent.com/software.html**.

TrunkStar780 is available from Signal Intelligence at **http://www.scanstar.com** or at (408) 926-5630. The price is $ 64.97, plus shipping. A trial version can be downloaded at **ftp://ftp.scanstar.com/ts780dv.exe**.

What's Next?

Next time we will continue with programs made for the BC780XLT scanner. We'll look at an offering from one of the oldest radio software manufacturers – Computer Aided Technologies, and from one of the newest – ScanPro Scanner Software. The new guy, and the old pro: It should be an interesting comparison. See you then.

Mobile SWL Alternatives - III

By Ken Reitz KS4ZR

In October's installment on mobile shortwave listening, we looked at using an in-dash shortwave receiver from Sony or Becker, and I tried using my home rig in the car with a variety of antennas. Noise suppression is also critical to the success of any installation and we explored some resources for learning more about this complicated subject.

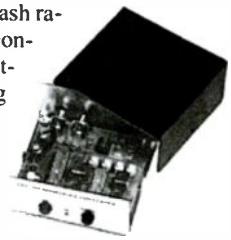
This month the topic turns to converters – tricking your car radio into tuning the shortwave bands. Converters are available in both preassembled and in kit form.

The LFB 4 Band Converter

Shortwave converters have been on the market for decades but have earned a reputation for poor performance. While this is no doubt due to engine-related radio frequency interference (RFI), converters can provide excellent listening once the problem is tackled. Their common shortcomings, compared with communications receivers, are smaller frequency coverage and lack of sensitivity.

Of the converters on the market, the LFB 4-band digital shortwave converter is likely the best. Its heavy metal case and shielded wire connections certainly help keep noise down to a minimum before active noise suppression. Setting up to use the LFB, as with all converters, is fairly simple if you can get into your dashboard. The unit uses your existing AM/FM antenna and your own in-dash radio to tune the 19, 25, 31 and 49 meter bands. It is designed to work with modern digital readout AM/FM car radios, but I found it worked nicely on my analog car radio.

The unit is made in Brazil and was shipped with instructions in Portugese. However, nearly all of the instructions are available in English on the LFB web site which I simply printed out. The main converter is meant to be installed discreetly under the dash while a wired control pad is mounted on the dash. To tune shortwave, simply pull the car's antenna plug out of the back of your in-dash radio and plug it into the converter. Take the wire fitted with a Motorola plug from the converter and put that where the antenna goes in the back of your radio. Now, with the car radio turned on and set to AM, simply press the right hand button on the remote to select a band. A red LED lights up to indicate which band you're tuning.



LFB 4 Band Short Wave Converter gets top marks among four similar units.

With the engine off, I found the LFB 4-Band Converter worked well. It shows that if you can cure the electrical noise problem, tuning into SW on your car radio using your existing antenna and in-dash radio is a very real and reasonably priced possibility.

With the engine on I found only the high powered international broadcasters made it through. Still, many of us are content to listen to the news from RCI, DW and the dozens of interesting music and talk programs available with just a twist of the tuning knob. Incidentally, the LFB features a strong AM/FM antenna booster which made a real difference on AM and FM band reception when SW was not being tuned.

The Ramsey Converter

Ramsey Electronics makes a converter kit (see sources) which is the cheapest alternative of all. But, be prepared to get out your soldering iron. Ramsey estimates that total assembly time for advanced hobbyists is 1.3 hours and for beginners is 3 hours. The unit is limited to 1 MHz on two bands, which are switchable from the front panel and labeled "Day" and "Night." In the assembly process you can set your converter to tune a combination of frequencies between 60 and 16 meters. As with all converters, the audio is heard through your car radio speakers.

Ramsey SC-1 Short Wave Converter Kit. Build it yourself and enjoy SWL in your car.

The unit comes with a fully detailed 20-page manual with step-by-step instructions, including a schematic diagram and a large "parts finder"sheet which shows where all the parts go. There are even tips for other circuit additions and applications. Measuring just 5"x 5"x1-1/2" and weighing just ounces, the Ramsey converter takes the least amount of room and is the easiest to set up. You'll need to add a cigarette lighter power cord with an output of 9 volts and cable adaptors, as it has RCA jacks in the back.

I found the Ramsey converter worked exactly as described in their catalog, providing a range of international broadcasters which came through loud and clear. But, just as with every other method, you'll have to suppress the engine's RFI or you'll be disappointed with your reception.

There are at least two other converters on the market. Vectronics makes a kit nearly identical to the Ramsey model, but with a metal cover. It uses a built-in 9 volt battery for a power supply. As with the Ramsey, it covers only two bands which are switchable from the front panel and set by the builder. Price for the Vectronics kit is $28 plus $15 for the cover.

MFJ also offers a converter, but it is not a kit. The MFJ-306 World Band Explorer comes completely built and covers the 19, 25, 31, and 49 meter bands. Measuring 5"x 3-1/2"x 1-1/2" the MFJ-306 requires a connection to your car's battery and uses Motorola plugs on the back. Audio is through your car's radio. The MFJ-306 is $90 plus $7 UPS shipping. If you have any doubt as to your kit building ability, I recommend the MFJ-306.

Quick Comparisons

No matter which SWL option you choose, if you don't address the noise problem you'll be dissatisfied. That said, folks with deep pockets and interested in *serious* shortwave DXing will have to opt for any of the high ticket, general coverage communications receivers. With total HF reception and AM, SSB, and CW capability, built-in noise blankers, and dozens of memory presets, why go any other route?

High rollers who want the best audio, ease of operation, and less worry about theft, will opt for the Becker Mexico 2340. With coverage between 5.9-15.7 MHz and 10 memory presets, this model has received good reviews. Expect to pay about $500 for the Becker; extra for professional installation.

Low rollers who want good audio and a cheaper price tag will opt for Sony's XR-CA620X or XR-4950X, both of which offer 12 shortwave memory presets and coverage between 2.9-7.7 MHz and 9.5-18.1 MHz. While they're advertised at $127 and $110, respectively, expect to pay extra for courier delivery, insurance and import duty. That could end up doubling the price. Pay extra for professional installation.

World Band Explorer from MFJ Enterprises tunes 19, 25, 31 and 49 Meters through your car radio.

Listeners opting for the converter can choose between the LFB 4-band converter at the high end and the Ramsey and Vectronics kits at the low end, with the MFJ-306 in the middle. The LFB is the most expensive but is the best built, most convenient to use, and has the most features. The kits are the cheapest and take up the least amount of room, but offer the least coverage.

One Final Note

On the subject of being able to hear the audio from portables, mobile SW receivers etc., there are a couple of critical issues. Many newer vehicles' cassette decks have an automatic reverse mode which wants to continuously kick in when an audio adaptor cassette is inserted, causing it to keep searching for the end of the tape (which, of course, it never finds). An excellent alternative is to use a mini-FM transmitter, which takes the audio from your portable or mobile unit and plays it at an open frequency on your car's FM radio.

However, these transmitters present two more problems: (1) they're battery eaters and really need to be powered from the cigarette lighter adaptor (which may already be in use for the radio) and (2) it's more gadgets floating around in the console of your car or sitting on the passenger seat and more hook-up time when you get ready to get on the road.

These complaints give an added edge to the converters which automatically play through the AM radio (and finally give you a chance to use the AM presets on the radio!) as well as in-dash AM/FM/SW radios which give you all the advantages and keep the interior free from extra boxes, cables, adaptors etc.

Experimenting with audio in your own car, you'll soon find out which method works best for you.

SOURCES:

Find out more about products and articles mentioned here:

LFB Short Wave Converter
http://angelfire.com/ia/lfb
($140 + 20 shipping)
Contact: Luis Loeff *angel@tsp.com.br* ; LFB Ind. & Com. Ltda; Phonefax 55 11 3115 0397

MFJ World Band Explorer
http://mfjenterprises.com
($90 + $7 UPS)
Contact: MFJ Enterprises, Inc. P.O. Box 494 Mississippi State, MS 39762; 800-647-1800

Ramsey Short Wave Converter
http://ramseyelectronics.com
($28 + $15 +$7 shipping)
Contact: Ramsey Electronics, Inc. 793 Canning Parkway Victor, NY 14564; 800-446-2295 or 716-924-4560

Vectronics Short Wave Converter
http:www.vectronics.com
($28 + $15/case + $ Shipping)
Contact: Vectronics 300 Industrial Park, Starkville, MS 39759; 800-363-2922

Satellite Radio In Your Car

Poised to take advantage of motorist's disaffection with terrestrial radio and weariness with stale tape and CD collections are the two licensees for the DARS (Digital Audio Radio Service) XM Radio and Sirius Satellite. With each offering 100 channels of digital audio, commuters will find more than enough distraction tuning through their programming line-ups. But, it won't be cheap. Aside from the initial system purchase price and installation cost (XM Radio units will be available in-dash in only the Cadillac Seville and DeVille for the 2002 model year), listeners will have to pay $10/month for XM Radio and $13/month for Sirius. At between $120 and $156 per year many subscribers will probably wonder why they're still listening to commercials on many of the program channels.

While music programming on these services hopes to be bright and entertaining, the non-music DARS experience promises to be audio simulcasts of cable fare you thought you left at home. On XM Radio you'll hear CNN headline News, the Weather Channel, C-SPAN Radio, CNN/SI, etc. Sirius plans to offer similar fare as well as programming from ABC Radio Networks which are already simulcast on 4,600 affiliate radio stations across the country. Both services hope to eventually drive the other under in a radio version of DISH vs DirecTV and become the final sky radio monopoly.

The only exciting news for shortwave listeners is that XM Radio will carry the BBC World Service on their channel 131. This is one of the reasons the 3BC recently cited for dropping its shortwave service to North America. But, the excitement could be dampened by the expense of tuning in as well as the possibility that the service could just as easily be bounced in favor of a new music fad or popular sports channel. Sirius has no plans to carry shortwave programming.

Jock Elliott
lightkpr@nycap.rr.com

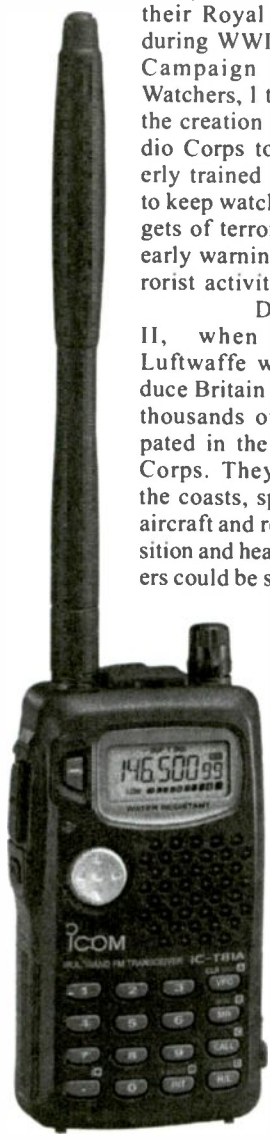
Citizens Radio Corps

Radio is a weapon that can help win the war on terrorism.

Many Americans, I suspect, felt sadness, frustration and rage as a result of the terrorist attack of September 11. I know I did.

But we needn't feel helpless, not by a long shot. We can learn a lesson or two from history.

Radio is a weapon that can help win the war on terrorism, strike a blow for security on the Home Front and give people a positive means of contributing to everyone's safety. Just as the British had their Royal Observer Corps during WWII and the Pacific Campaign had its Coast Watchers, I think it's time for the creation of a Citizens Radio Corps to empower properly trained ordinary citizens to keep watch on potential targets of terrorism and provide early warning of possible terrorist activity.



During World War II, when the German Luftwaffe was trying to reduce Britain to rubble, tens of thousands of people participated in the Royal Observer Corps. They kept watch on the coasts, spotting incoming aircraft and reporting their position and heading so that fighters could be scrambled to fight back. It was an enormous success.

And in Pacific island chains, the Coast Watchers kept a careful eye on Japanese ships and troop movements, radioing their observations to those who could take action where it would do the most good.

In the same way, the purpose of the Citizen Radio Corps (CRC) would be to observe, detect, and notify authorities – what I call "watch, point and scream." There is plenty of reason to keep such a watch on the Home Front. There are literally millions of potential targets for terrorists in the United States: power stations, water supplies, natural gas pipelines, tunnels, bridges, hospitals and factories to name just a few. Civil authorities simply do not have the manpower to keep watch over all of these.

But you and I can. We can extend the eyes and ears of the authorities to the benefit of all. A widespread force of civilians keeping watch would greatly expand low-level intelligence gathering throughout the nation and provide early warning of suspicious activity.

It emphatically would not be the job of the CRC to respond to a potential threat, any more than it was the job of the Royal Observer Corps to shoot down German aircraft. Dealing with actual or potential terrorists is the duty of properly trained authorities.

A number of national experts have already observed that it is time that we start thinking the way terrorists do. I agree. Perhaps the CRC should maintain a low profile, operating with stealth and cunning . . . becoming, in effect, a guerrilla observer corps. As a result, potential terrorists could never be sure if someone is watching their activities or not. A friend says this notion is "positively Orwellian." Maybe so, but as I recall, 225 years ago, some dissatisfied colonists defeated a world power by wearing buckskin and shooting from behind rocks and trees, while the enemy marched in straight lines wearing red coats. The Bad Guys are "thinking sneaky," so should we.

The place to start building the CRC is with the existing base of amateur radio operators. Ham radio already has a considerable communications infrastructure in place that can provide both local and coast-to-coast communications. Many hams have emergency capabilities that would permit them to operate even when parts of the civil infrastructure – cell phone towers, phone lines, and the like – are down. Radio hams have been licensed by the federal government and have unique callsigns. That lowers the possibility of people hiding behind anonymity to make false or misleading reports.

In addition, many ham radio operators have computer and Internet capability. That makes it easier to coordinate across the country. So, for example, if someone in California detects a possible threat to dams, that information could be quickly spread to other locales where dams might be a target.

CRC observers would have to be trained and procedures put in place for coordination and reporting to proper authorities. A model for the CRC already exists. For the past five years, I have spent thousands of hours running a Ham Radio Commuter Assistance Network in the Albany area of New York State. The Network detects problems on the roadways and reports them to the authorities. More than 130 hams have reported thousands of incidents, ranging from disabled vehicles to life-threatening accidents, with me funneling them to the proper jurisdiction for action. This operation is unique in the country and has been very successful.

There still are problems to be solved in creating the CRC. Security, for example, is an issue. If CRC spotters are operating "in the clear" on readily intercepted frequencies, it would probably be better to say, "there's activity in Sector 12," rather than "there's suspicious activity at the dam."

Here, though, is the bottom line: it isn't just up to "the other guy" – the police or the military – to protect us. We are all in it together. The CRC is a way to rally our resources and help protect each other. I've sent a memo on this concept to the President and Secretary of Homeland Security, and I welcome your feedback by mail via *Monitoring Times*, or to *CRC@monitoringtimes.com*.

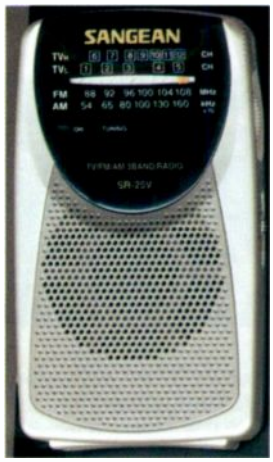
MT REVIEW

By Bob Grove

AM/FM/TV-Audio Pocket Portable

For those on the move who can't stand to miss their latest radio or TV program, Sangean has released a pocket portable with AM, FM and VHF-TV (channels 2-13) audio. Operated by two AA cells (not included), the new SR-25V uses simple analog tuning with a thumbwheel, making fine tuning a bit touchy, but pretty standard for pocket portables.

A small LED tuning indicator flashes when stations are properly tuned in, and an "oversized" speaker produces more bass than on comparable radios we've experienced. Even so, loud audio produces considerable speaker distortion, so an earphone (not provided) should be used when modest sound levels are not adequate.



An internal loopstick antenna is engaged for AM reception, while a telescoping whip brings in the FM and TV signals. In strong signal conditions the receiver is easily overloaded, producing multiple signals across the band, but we found that compressing the length of the whip, thus reducing signal levels, helped considerably.

The SR-25V should be available over the counter and at a very attractive price wherever Sangean products are sold.

PAR AM Broadcast Filter

In a previous issue we reviewed a PAR filter intended to prevent strong, local medium-wave broadcasters from interfering with shortwave reception. Now PAR has addressed another part of the spectrum: VLF. This low portion of the RF spectrum is often besieged by intermodulation and other spurious signal mixes from the medium wave broadcasters, and even higher frequency sources, resulting in interference to weak VLF signals like non-directional beacons (NDBs), maritime data transmissions,

and amateur beacons.

The new BCST-LPF is a well designed, ruggedly encased, low-pass filter capable of delivering 0-540 kHz signals from an antenna, while steeply attenuating local AM broadcasters (and shortwave-through-VHF signals as well) as much as 70 dB (average attenuation 45 dB). A toggle switch allows the filter to be instantly disabled, bypassing the five-pole elliptical filter and permitting the full spectrum to be heard.

The new BCST-LPF is available for $49 plus shipping from PAR Electronics, PO Box 645, Glenville, NC 28736; phone (828) 743-1338, or email par@parelectronics.com.

Avcom Ramsey SDM42B Spectrum Display Unit

Avcom of Virginia, a leading American manufacturer of affordable test equipment, has recently joined corporate forces with Ramsey Electronics, a prominent producer of kits for the radio hobbyist. The fusion, now called Avcom Ramsey Technologies, Inc., is expected to evolve a series of new releases of interest to both the hobbyist and the professional.

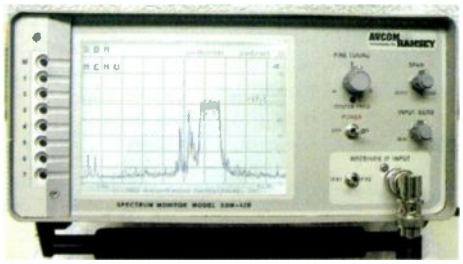
Most recent is the SDM42B spectrum display unit (SDU), a highly-useful accessory for the serious searcher of the radio spectrum. The SDU connects to the IF output of any compatible receiver, and displays the active signals as vertical spikes across the baseline of the screen.

The signals are spaced in frequency order, proportionately spaced by their relative frequency separation. The higher the spike, the stronger the signal. A swath of spectrum at least 10 MHz wide may be visually monitored at any one time, limited by the bandwidth of the receiver filters.

High input sensitivity at 10 dB per division displays weak signals, while 80 dB dynamic range handles the strong ones, too.

The microprocessor-controlled SDM42B is a compact, LCD version of the long-standing SDM42A CRT model. The new one is smaller, lighter in weight, and features a crisp, bright, drift-free, 3-1/2" x 4-1/2" LCD screen. A 10 kHz RBW filter and rapid sweep provide crisp, real-time signal spikes.

A host of control functions is readily accessible from an on-screen menu, allowing adjustments for contrast, video flip, sweep reversal, baseline adjustment, grid configuration, and peak amplitude dB. Manual controls are provided for sensitivity adjustment, span, centering, and selection of either of two IF input frequencies (second frequency optional).



The SDM42B comes with a standard 10.7 MHz IF input, making it an ideal companion for off-the-shelf receivers like the Icom R8500 (and earlier R7000, R7100, and R9000) and AOR AR5000, but is available with 21.4, 45, or 70 MHz input for high-end receivers on special order.

Measuring 9-1/2"W x 4-1/2"H x 9-1/2"D, and weighing a mere 8 lbs, the compact SDM-42B SDU contains a universal power supply, operable from 85-264 VAC @ 47-440 Hz, or 9-15 VDC. It is also available in a rack mount (SDM-42BRM).

Both the new and the old versions are currently in production, with no immediate plans to discontinue the less expensive CRT model.

The SDM42B LCD spectrum display unit and the SM42BRM are available for $1595 and $1849 respectively from Grove Enterprises (800-438-8155 or **http://www.grove-ent.com**).

What's NEW

Tell them you saw it in Monitoring Times

Cool Stuff for the Radio Buff

Timewave ANC-4

You may remember the ANC-4 RF Noise Canceller which was regrettably discontinued a couple of years ago when JPS closed their amateur radio division. Well, it's back! If you have problems with noise from power lines, electric motors, TVs, or other home electronics interfering with your radio reception, you'll be glad to know Timewave has put the product back on the market. This digital noise canceller connects right to the antenna connector of the receiver or transceiver to cancel locally generated noise before it gets into the receiver and affects the receiver AGC circuits.

To cancel locally generated interference such as power line or computer noise up to 40 dB, a short wire antenna or collapsible whip picks up the local noise. The ANC-4 detects the interfering signal and adjusts its phase and magnitude so that it matches the offending interference at the receiver input, but is 180 degrees out of phase, effectively canceling the interference. The front panel controls allow adjustment of both the phase and magnitude of the local interference. For noises generated outside the home, it's better to use an external antenna as the noise pick-up.

The ANC-4 operates as an active antenna by using the noise antenna and the noise gain control to amplify the antenna output. The unit can also be used as a diversity combiner to peak weak signals or null interfering signals. Its effective frequency range is 500 kHz to 80 MHz, though it's usable down to 100 kHz.

The Timewave ANC-4 Noise Canceller is available from Grove Enterprises and other Timewave dealers for $199.95. For shipping and further information call Grove Enterprises 1-800-438-8155, write 7540 Hwy 64 West, Brasstown, NC 28902, or visit **http://www.grove-ent.com**.

Grove Universal Telescoping Whip

For ham and commercial handie-talkies as well as hand-held scanners, the Grove ANT-6 features a swivel BNC base, allowing the whip to be used straight or turned to a right angle for those special applications. Adjustable length from 6" to 16" allows frequency optimization. The whip shows quarter-wave resonance at VHF hi band, and 3 dB gain or more over rubber duckies at UHF. (Collapsed to 6" and straight, or extended to 16" and swiveled 90 degrees)

This inexpensive but universally-appreciated accessory is only $19.95 from Grove (contact info above).

Fun Kits from Ramsey Electronics Van DeGraff Generator

For education or just plain fun, here's the ideal gift for a budding scientist or the hobbyist who already has everything. Although the VanDeGraff generator produces up to 250,000 volts, it's perfectly safe. Create your own lightning and have fun demonstrating all the effects of high voltage.

The informative manual gives plenty of insight on high voltage theory and lots of interesting experiments to try out for yourself. Perform the classic "hair raising" demonstration where your hair will literally stand out on end! Turn out the lights and amaze everyone by safely drawing up to one foot sparks right to your hand!

Cleverly constructed from precut PVC pipe, this kit is perfect for the classroom or science fair, easily dissassembled and reassembled to show the components of its operation. The DC operated motor runs quietly and efficiently from the included12 VDC plug-in wall adapter. Size: 13" x 24" x 10 1/2". The Van DeGraff Generator kit is $99.95 from Ramsey.

Fun with Lights

Christmas is the season of lights, and Ramsey Electronics has a little kit to make them even livelier. Their Music Lights Kit contains three channels which respond individually to the lows, mids, and highs from music audio. Each channel controls up to 300 watts, so you can run Christmas lights or even spotlights from your control box. Music Lights is available for only $19.95.

To order these or any of the delightful kits from Ramsey Electronics, contact them at **793 Canning Parkway, Victor, NY14564;** 800-446-2295 or visit **http://www.ramseyelectronics.com.**

MFJ Morse Code Reader

Need that CW identification, but you don't know Morse Code? Or just rusty and want to follow a CW ragchew? Just place this tiny pocket sized MFJ Morse Code Reader near your receiver's speaker and watch Morse code signals turn into solid text messages as they scroll across an easy-to-read LCD display – No cables to hook-up, no computer, no interface, no other equipment needed!

The reader automatically tracks the correct speed. Its phase locked loop (PLL) augments weak signals and even tracks slightly drifting signals. The two-line LCD display has 32 large 1/4 inch high-contrast characters. You can display decoded CW as text and speed or switch to all text on both lines. The reader can instantly replay the most recent 140 characters – a great feature if you're using the reader to practice your own copy skills.

Better yet, if you need to store the decoded text, a serial port lets you display CW text on a monitor using a computer and terminal program. The MFJ-4612 can also be connected to your receiver with a cable, in case it's too noisy for microphone pickup or you don't want to listen to the signal. The pocket-sized reader operates on a 9-volt battery and defaults to sleep mode during periods of inactivity.

The MFJ-4612 is $79.95 from MFJ Enterprises (P.O. Box 494, Mississippi State, MS 39762; 800-647-1800; **http://www.mfjenterprises.com**)

Alinco DJ-X3 Scanning Receiver

Alinco has announced the FCC Type-acceptance and imminent release and of its new DJ-X3 scan-

What's NEW

Tell them you saw it in Monitoring Times

ning receiver, a pocket-sized unit that can receive from 100 kHz to 1.3 GHz in AM and wide or narrow FM modes.

The DJ-X3 places the speaker *behind the display*, so that audio is heard from ports on either side of the display window. The DJ-X3 can reproduce FM stereo when optional stereo headphones are connected to the unit. The DJ-X3 features 700 memory channels (10 banks of 70 channels), is powered by a rechargeable Ni-MH battery and also comes with a dry cell (three AAs) battery pack. The triple conversion IF stage provides excellent reception.

The operator also has four selectable antenna choices: an internal AM bar antenna, a shortwave bar antenna, the earphone cable may be used as an antenna or the SMA whip antenna terminal can be activated. The unit is supplied with a removable whip antenna but an external antenna can also be connected to the SMA port. An attenuator function is available to reduce very strong signals. The receiver also has a "bug" detector, useful in searching for hidden transmitters.

The DJ-X3 has three operating profiles: VFO, Preset AM, FM and TV frequencies, and the Memory mode. The operator can make manual selections or scan in any of those modes. In the memory scan mode, the operator can choose one specified bank, certain banks can be linked for scanning, or one can choose to scan all banks. There are 20 program and memory scan options.

The DJ-X3 is capable of tuning in eleven user-defined steps or an auto-step mode that selects the appropriate step for the band currently in use.

The illuminated display is large and easy to read. In addition to frequency information, it will also show the operating mode, memory channel, battery strength, signal strength, and a number of other user-selected operating parameters. A charger, belt clip and strap are also included. The DJ-X3 can also "clone" to other DJ-X3 units, sharing its programmed parameters through a wire connection.

The DJ-X3 is expected to be available in stores soon. It will be available from Grove Enterprises for under $300; call for price and availability at 1-800-438-8155.

Grundig Millennium 800

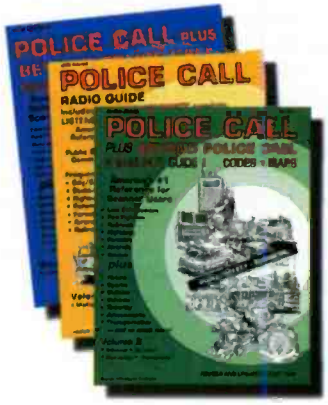
Grove Enterprises notes that the Millennium 800 shortwave receiver has received some upgrades over the past year. "Although there have been gradual improvements in shielding to reduce the 'birdies' and 'spurs' in the receiver, the biggest change was a complete redesign of the tuning mechanism. The old wobbly shaft and hollow knob have been replaced by a solid brass shaft with ball-bearing stability and a solid knob as well, giving the tuning dial a heft that is quite reassuring."

For more information, or to request a copy of Grove Enterprises' new 2002 catalog, visit **http://www.grove-ent.com** or call 800-438-8155.

Police Call 2002

Gene Hughes' *Police Call Frequency Guide* is the de facto standard for scanner listeners. Painstakingly updated each year, and containing frequencies, locations, call signs, and base/mobile/portable counts for land mobile users across the country, *Police Call* is a "must" for every scanner enthusiast's bookshelf.

Licensees listed include police, fire, rescue, ambulance, aircraft, hospitals, military bases, schools, hotels, railroads, highway departments, forestry, security agencies, amusement parks, racing and sports, and more.



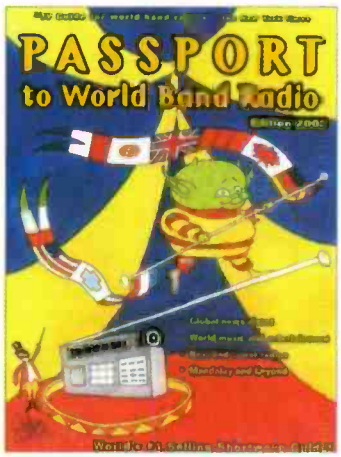
An excellent trunking guide for major cities reveals talk groups and system providers. Introductory chapters explain repeater systems, analog and digital transmissions, antennas, automated tracking systems, and much more.

And this year for the first time, the *Police Call CD-ROM* is included with every book! Quite a listening package. Choose your state and order the appropriate volume.

$19.95 plus $3 book rate shipping from Grove Enterprises; also available from other *MT* advertisers.

Passport 2002

Just released is the 2002 edition of *Passport to World Band Radio*. Edited by former *MT* reviewer Lawrence Magne, *Passport* continues to be a "must-have" reference for the shortwave broadcast listener. When we get our hands on the 2002 edition, we'll give it a review, but if you're looking for a Christmas gift, you can't go wrong with this one. The perfect package is a *Passport* in the hand for a worldwide, all-language overview of SW broadcasting, plus a one-year subscription to *Monitoring Times* to keep the English language schedules up to date!



Of course, *Passport* has more than just its famous "Blue Pages" which visually display world broadcasters by frequency, time, language, and station power. It also carries receiver reviews and ratings, program profiles, listening post tips, Internet Web radio, clandestine listings, and more. *Passport* is $19.95 plus $3 shipping in U.S. from Grove Enterprises and other *MT* advertisers. (Grove Enterprises 1-800-438-8155, write 7540 Hwy 64 West, Brasstown, NC 28902, or visit **http://www.grove-ent.com**)

Free Computer Guide

In an effort to help promote computer literacy, Gold Standard Press of Reno, Nevada is offering their latest publication, *The User Friendly Guide to Internet & Computer Terms* by Charles Steed for FREE. Simply log onto their Website, **http://www.userfriendlybooks.com/** and download the book. The book is also available at Amazon.com and other bookstores.

The 340 page reference defines more than 1250 contemporary computer and Internet terms in easy to understand language. The book contains articles on shopping for a computer, online shopping and travel, investing online, how to avoid frauds and scams on the Web, the history of the Internet, how to get the most from search engines, and much more.

Books and equipment for announcement or review should be sent to " What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mteditor@grove-ent.com.

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- Charles (Chuck) Boehnke
Keaau, Hawaii

"You and the MT staff that put this project together have done a FANTASTIC job. You would seem to be the leaders in the field presenting material in this manner so it can be archived so easily. This is the way to receive a magazine."

- Don Nauer

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Ad copy must be typed for legibility.

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Monitoring Times assumes no responsibility for misrepresented merchandise.

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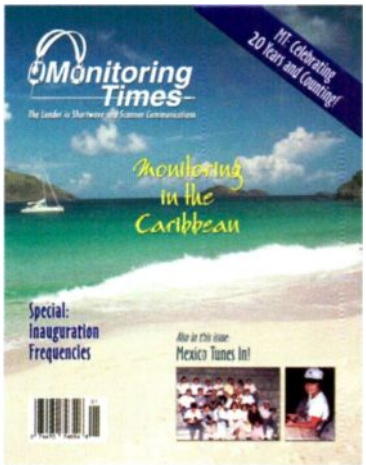

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Closing Comments

America: Land of the Free

By the MT Editorial staff

In the wake of America's catastrophic attack by terrorists, a distressed Middle-East resident questioned the US media's use of "Islam" and "terror" used together. "Terror is a satanic act apart from religions, and must be damned by all people," he said.

Many Americans are indeed learning that the Islamic faith is not inherently evil; throughout time, and throughout the world, there have been many extremists who misuse religion to effect their own means. We know that our own Judeo-Christian heritage has not been immune from committing atrocities in the name of God.

We are sympathetic to those populations throughout the globe who have been subjected to armed conflict for generations; they are born, live and die in terror. This time it is we Americans who reel in horror to see the unthinkable happen here on our soil.

It is hard for most of us to believe the evil incarnate that we witnessed on that black Tuesday. How could anyone harbor so much hate against us that he would spend years orchestrating a devastating blow, not just against Americans, but against world citizens – Christians, Jews, Muslims and more – who were peacefully attending their business, or simply touring one of the greatest cities of the face of the earth on that fateful morning?

It is prudent that we exercised discretion by not reacting with blind force against another country without exhaustive investigation and deliberation. Our retaliation must not resemble the original attack. The wrong of this terrorist act has been decried by world leaders – allies and adversaries alike. America's resolve, tempered by caution, has earned global respect. If you don't believe it, visit this extraordinary web site: **http://thankyou.fast-networks.net/**

Assessing our Right to Know

We are the land of the free and the home of the brave but, sadly, with this new awareness of the danger in our midst and our resolve to root it out, one wonders how many of our own freedoms will we lose? How much freedom will Americans rush to give away in the interest of security? Or will we even be asked as our freedoms are *taken* away?

Following the collapse of the World Trade towers, radio hobbyists on the Internet soon found themselves at each others' throats, accusing each other of compromising national security by reporting frequencies and call signs overheard on scanners and shortwave receivers.

But is this concern legitimate? As the leading publication of such information, *Monitoring Times* has a lot at stake in the answer. The fact is, any agency utilizing communications in this technological era is well aware of our citizens' ability to listen in. When the military and other federal agencies don't want us to hear something, we can't. They scramble it, move transmissions to satellite, you name it. It's that simple.

We believe in an open society, and we would mourn the loss of more freedoms than are absolutely necessary. Regrettably, the freedom to listen to the airwaves is sometimes misused for illegitimate ends. Our country would not bear such a burden of cumbersome legislation if it weren't for those who exploit their freedoms as far as the law will allow.

Freedom is best maintained by self-discipline. In our two decades of publication, *Monitoring Times* has never resorted to sensationalism to sell magazines nor, to our knowledge, divulged classified information. We consistently try to balance the public's right to know and the hobbyist's enjoyment in solving the mysteries of communications without compromising an on-going investigation or endangering law enforcement personnel.

What Does the Future Hold?

Although we see no present movement by the government to restrict our listening, we do see various agencies pressuring Congress to increase their ability to listen to us. The Justice and other departments have been asking for greater leeway in "wiretapping" (both wired and wireless), access to privacy codes, and Internet surveillance. Only time will tell if this increasing loss of privacy will target the criminals rather than our democracy.

Many of us fear that increased powers will be abused by administrative and law enforcement agencies. This concern is a major argument in the fight to retain the ability of the public and the media to monitor public safety communications. The more open our society remains, the less likely such potential abuse can go undetected and unchecked.

The sentiment has been repeated many times in the media that America lost its innocence through these terrorist attacks, and that the world will never again be the same. As agonizing and heart-rending as this event was, the truth is the world was already a different place. Wireless technology has freed us from the phone line; it's made it possible to call for help from underneath the rubble of a destroyed building, and to watch a disaster unfold in real time.

Technology has shrunk the world through computers and the Internet; it's made world economies interactive; it's made us more vulnerable and more dependent upon the rest of the world (as they are dependent upon us). And it has helped lead us toward a more global family; "Today, we are all Americans," said one French official.

This *is* a different world we live in, and we can't turn back the clock to a Cold War mentality of fear and paranoia. We pray and trust that America, this immigrant nation which has so often offered refuge to the victims of terror, will continue to stand for liberty and freedom now that we have become victims ourselves.

Monitoring Times wishes to acknowledge the outpouring of sympathy from well-wishers around the world. We join in our sorrow for the families who have been torn apart, in our admiration for those who participated in rescue efforts, and in our support for troops around the world who find themselves in a new kind of war.

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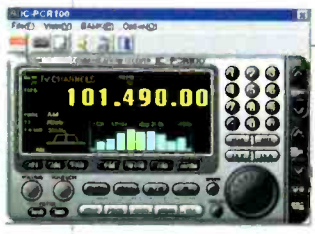

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