Volume 19, No. 11 November 2000

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Monitoring Times

Do You Hear What I Hear?

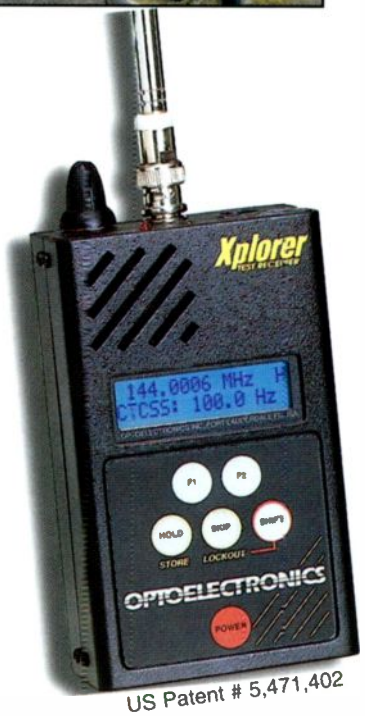
A guide to learning how to listen.

Discover the Unknown

The Xplorer Test Receiver is a handheld nearfield receiver that locks onto the strongest signal in the nearfield in one second.

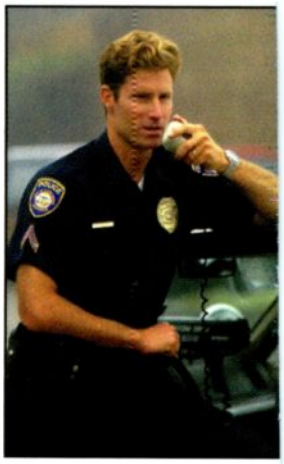
With its sensitive front end, the Xplorer is capable of locking onto a 5 watt UHF signal from as far away as 800 feet.

Once locked to a signal the Xplorer demodulates the FM audio and decodes any CTCSS, DCS, LTR or DTMF tones present.



US Patent # 5,471,402

Xplorer comes supplied with TA100S antenna, rapid charger, PC interface cable and software for memory download.



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- ARQ6-70
- ARQ6-90
- ARQ6-98
- ARQ-E
- ARQ-E3
- ARQ-N
- Baudot
- IRA (ASCII)
- NAVTEX
- Packet Radio
- POL-ARQ
- Raw Bits
- SI-ARQ
- SITOR-A
- SITOR-B
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Universal FSK Decoder main control panel

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Monitoring Times

Vol. 19, No. 11 November 2000

Cover Story

An Ear for Radio

By ML Shannon

Certain skills in radio listening come only with familiarity, but you'll get there faster if you know what you're looking for and why. Monitoring radiocommunications is quite different from broadcast listening; the process of identifying what agency is using the frequency and understanding the radio traffic can be a challenging exercise.

However, with practice anyone can develop an "Ear" for recognizing dispatchers, discerning when something out of the ordinary is taking place, and even monitoring two or three simultaneous transmissions without missing important information. These skills can be applied universally, of course, but they are most necessary when applied to scanning. Story starts on page 10.

Cover photo: LA County Fire Air Support, photo by Ed Justice, Jr.

CONTENTS

MONITORING TIMES
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Reviews:

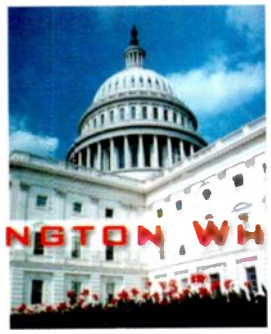
Chances are good that you are not very familiar with AOR's AR-3000A, even though it is not a new receiver. The lack of familiarity is largely due to its cost. The 3000a does have a loyal following, however, so Parnass checks it out to discover why (p.100).

Frequencies are the lifeblood of the radio hobby and the hobbyist spends a great deal of his time trying to find active ones. Catalano checks out some good resources for information and frequencies on the Internet. (p. 96).

In our series on "What do those specs mean anyway?" we look this month at dynamic range and how it's measured (p.98).

Did you know AOR also manufactures a line of antennas? In comparison tests, Bob Grove finds them to be very competitive (p.102).

Table Of Contents



WASHINGTON WHISPERS

Fred Maia, W5YI

FCC Creates New VHF-CB Service
MURS Service Virtually Unknown

The "Multi-Use Radio Service" (MURS) is the latest Citizens Band Radio Service. With a respectable 2 Watts maximum effective radiated power (ERP) and very few regulations, we expect MURS to be used for general CB, phone patch, packet, paging, image, repeater, telemetry and remote control operation. Continuous transmission is permitted on four of the five channels when MURS is used for remote control purposes. No MURS license is issued and no station identification is necessary.

MURS has received virtually no publicity from the FCC or from hobby or commercial trade publications. FCC Commissioners usually issue celebratory statements when they create new services, but they have been silent on MURS.

As an unlicensed service, we expect little or no FCC enforcement in MURS. We draw this conclusion from the peculiar history of this service.

The FCC created MURS on July 12, 2000 (Wireless Telecommunications Docket 98-182). Final MURS rules have not yet been published in the Federal Register, but that could happen by the end of September. Rumors are that this service could become available in October.

MURS began as an FCC reaction to rampant unlicensed operation on certain Industrial/Business Pool radio frequencies. These frequencies are informally known as "color dots," named after colored stickers identifying the channel. (By way of explanation, the former Business Radio Service, and many other industrial services, are now "pooled" together in the "Industrial/Business Pool" of frequencies in Part 90 of the Rules.)

Color dot radios are pretuned, off-the-shelf, business radios sold by two-way radio outlets and in national consumer electronics chain stores and hardware stores such as Home Depot. Some color dots are on VHF, others UHF.

"Many advertisements imply that these radios can be used by anybody for any purpose, whether commercial or recreational, and make no mention of the licensing requirement," the FCC has stated. "Manufacturers have informally indicated to us that it is their belief that only a small percentage of persons buying these radios actually apply for a license."

The FCC proposed to move VHF color dot frequencies to CB by creating a new class of Citizens Band Service.

Radio Shack – popularizer of another CB service, the Family Radio Service (FRS) in the UHF spectrum – strongly supported the idea. Such a new service could "offer the general public the utility of features and accessories not currently available in the Family Radio Service," the company said.

Radio Shack and Motorola asked the FCC to add frequencies in the UHF band to the new service. But trade associations for the wireless industry asked that "other frequencies in the Industrial/Business Pool not become a haven in which manufacturers are allowed to promote unlicensed consumer radios." The "further erosion of critical Private Land Mobile Radio spectrum must be avoided in the future," they said.

"Against this backdrop," the FCC said, "we are not persuaded that there is sufficient support in the record to justify reallocation of additional Part 90 frequencies at this time. We may, however, revisit this issue at a later date should additional support develop. We will therefore include in the new Multi-Use Radio Service only the five frequencies listed in our original proposal."

MURS Channels	Authorized Bandwidth
151.820 MHz	11.25 kHz
151.880 MHz	11.25 kHz
151.940 MHz	11.25 kHz
154.570 MHz	12.5 kHz
154.600 MHz	12.5 kHz

There are key differences between FRS and MURS. Data transmission, except for certain signals to establish voice QSO, is prohibited in FRS but permitted in MURS.

FRS is UHF (462/467 MHz) while MURS is VHF, with attendant benefits to MURS signal propagation. Unlike FRS, external, detachable antennas are allowed in MURS.

What rules don't say

"The significance of the rules governing the Multi-Use Radio Service is not in what they say, but in what they don't say," according to Corwin D. Moore Jr., WB8UPM, coordinator of the Personal Radio Steering Group (See **http://www.provide.net/~prsg.**)

He observed that MURS does not restrain content of communications or station operator eligibility (other than the usual exclusions related to foreign governments). The rules will now permit what the FCC used to prohibit: unlimited personal communications on frequencies that used to be for business use only.

"MURS has no restriction on connecting to external antennas, nor on antenna height, so long as the 2 W ERP restriction is observed. Two watts at an even modest height could produce great coverage," he said.

"There is no constraint on communications with other radio services, or with retransmitting signals from other MURS (or other) radio stations. How soon will we see repeaters? There is no restriction on interconnection with the Public Switched Telephone Network." Moore said that the FCC may have created a "completely unmanageable monster."

Other New CB Services

MURS is not the only new CB service. Here is the complete list of current Personal Radio Services:

SUBPART	PART 95 RULE SUBPART
Subpart A	General Mobile Radio Service (GMRS)
Subpart B	Family Radio Service (FRS)
Subpart C	Radio Control Radio Service
Subpart D	Citizens Band Radio Service
Subpart G	Low Power Radio Service (LPRS)
Subpart H	Wireless Medical Telemetry Service
Subpart I	Medical Implants Communication Service
Subpart J	MultiUse Radio Service (MURS)

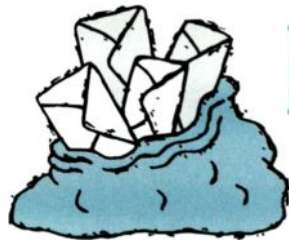
You may be unfamiliar with some of the newer services. The Low Power Radio Service is intended for various non-voice purposes, including headset devices used in schools for the hearing impaired.

LPRS also is used to control certain types of maritime stations, and may be used for health care applications. LPRS is perhaps best known for its intended use in "beacon bucks," theft tracking transmitters hidden inside stacks of money.

The Wireless Medical Telemetry Service is used to transmit signals to patient monitoring devices. The Medical Implants Communication Service conveys signals between devices such as pacemakers and their programming devices, replacing the bulky inductive pickups formerly used.

Although these unlicensed services have nothing to do with the 27 MHz Citizens Band, the FCC finds it convenient to place them within the CB scope. The Communications Act normally requires licenses for all stations, but it exempts anything that the FCC wishes to call CB.

The General Mobile Radio Service is an exception. While GMRS rules are listed under Part 95, it is a licensed service. You must have an FCC-authorized GMRS license (or be an eligible station operator under someone else's existing GMRS license), or be authorized to operate under a "temporary callsign," before you may legally transmit with a GMRS radio.



LETTERS TO THE EDITOR

MiniDisc Recorder

"The article, 'DX Lifesaver: The MiniDisc Recorder,' by Bob Tarte in the September 2000 edition of *Monitoring Times* was great. I don't have a MiniDisc recorder but I do similar things with a stereophonic High-Fidelity VHS Video Cassette Recorder. A stereo HiFi VCR does not only record television programs for up to nine hours (with an extra-long tape using EP/SLP speed), it will do the same for audio material with near-Compact Disc quality from any line-level audio source. Simply plug in a stereo patch cable into the VCR's audio input and into an audio line-level output of any audio device (AM/FM tuner, cassette or reel-to-reel tape, CD player, etc.), select the audio/video source on the VCR and start recording. Play back the VCR's tape, preferably from the VCR's audio output to a line-level input to a home stereo system. However, a television will do nicely if one doesn't mind a black screen.

"My usual application for VCR audio recording is the recording of favorite radio programs while I'm away at work. I leave the FM stereo receiver on, tuned to the intended station. The VCR is connected to the receiver as if it were another audio cassette deck. The VCR is programmed with the start and stop times of the radio programming, but instead of a TV channel number, the A/V input is selected. The VCR records the radio program, and when I come home, I can listen to *Burns and Allen, Jack Benny, Riders in the Sky*, or whatever else was on.

"I usually dub ('transcribe') the programs onto audio cassettes so I can play them during long vacation drives in my car.

"When I go pirate-hunting, my (Realistic/Radio Shack models) DX-440 or DX-390 gets plugged into my home stereo receiver's auxiliary input and the VCR gets loaded with a fresh tape. The resulting recordings are of immense help when writing reception reports for QSLs. They too, are dubbed onto audio cassettes for further listening pleasure. The more conventional programs from more conventional SW broadcasters and Morse code practice transmissions from W1AW sometimes get the same treatment also.

"Please take note that a stereo HiFi VCR is the only type of VHS VCR that is usable for audio recording because non-HiFi monaural VCRs need a video signal's presence to record audio signals onto the tape.

"Even in the presence of a video signal, a mono VCR's audio is hissy and poor. 'Normal,' (i.e., using the fixed audio head, audio mode to a stereo HiFi VCR) stereo HiFi VCRs have the HiFi audio heads incorporated with the (rotating) video heads. During audio-only recording, in the absence of an external video signal, a stereo HiFi VCR will generate an internal video signal (a black screen) for proper playback and tracking of the HiFi audio and video signals. (It also assures that the tape will play properly on a non-HiFi mono VCR.)

"I hope this is of help to the *MT* readership."

– *Bradley C. Lucken*

From time to time readers will ask us about an article they remembered reading in MT regarding the use of a VCR as an eight-hour scanner logger/recorder, but we've never been able to locate it in our indexes. If you are one of those readers, Bradley may accidentally have discovered it in a passing reference he found in an old MT he purchased at a hamfest. The Jan 1993 Federal File column by Steve Douglass demonstrates how to use a stereo VCR for recording or to listen to two separate receivers. All reprints are $3 plus SASE.

MiniDisc and More

"Thanks to Bob Tarte, I am a couple of hundred dollars poorer today. I ordered a minidisc recorder from Amazon.com. His article sold me on the medium. Being an old fart, I lost track of what formats were which since 8mm and VHS-C video first became popular. I bought 20 discs, so I need not worry if the format bombs.

"Bob, you are right on the mark with your Internet comments (in the September's 'Closing Comments'). It is the perfect place for critical thinkers, while it is as potentially dangerous as television and movie fare to some. I love it.

"On Bill Cheek's passing: I am sorry for your loss, and I have sympathy for his family. I owned his books and modified my scanners. I think the respect he gained from guys like you and people he did not know personally, like me, is a fine legacy. I hope his loved ones gain enough legal clout to recover some money and give his detractors a dose of humility."

- 73, *Robert A. "Rick" Barrow, K3IW*, longtime subscriber, thanks to a tip from Ike Kerschner

Bill Cheek no Pariah

"I was touched by your eulogy to Bill Cheek on page 9 of the September issue of *Monitoring Times*. I never knew Mr. Cheek, nor was ever (thankfully!) involved in any Usenet discussions pertaining to him. However, I've read a few of the horrible and disrespectful things said about this man in **rec.radio.scanner**, and it's just unbelievable. Clearly this man was no 'Adolph Hitler,' yet is being treated like it so soon after his death. It saddens and sickens me, even though I never knew the man nor anything about him, that a fellow human being could be treated in such a way.

"Most people focus so strongly on personalities (or what they perceive of them, which is always just a small portion of the total), and give so little credence to the genuine contributions made by an individual. I am impressed that you see through all that outrageous nonsense, and got right to the heart of Mr. Cheek's generous and copious contributions to the radio hobby, and his contribution to the world simply by being in it and not being afraid to actually exercise the rights to free speech that so many of us (dangerously) take for granted as a given here in the U.S. I want to express my condolences for your loss, and the loss of the entire radio community.

"At times, I can be a bit like Mr. Cheek was perceived – opinionated and impulsive, speaking in a shoot-from-the-hip style. This has caused me a great deal of trouble on the Usenet newsgroups (which I have essentially decided to abandon at this point other than lurking).

"Anyway, I wanted to say 'Thanks' for remembering the good as well as the bad and to express my sadness at this loss to the radio hobby."

– *Tim Gerchmez, Radio Site:* **http://swlinks.webalias.com** ; Shareware: **http://tshareware.webjump.com**

Internet

"Bob Grove's September *Closing Comments* regarding the internet was very good and I enjoyed reading it. Various writers in your fine magazine have predicted for years the impact of computers and the internet on our monitoring hobby, and those predictions have pretty much come true.

"I particularly agreed with Mr. Grove's last paragraph in which he urged us to learn about the internet, use it and *'defend it from becoming a politically manipulated tool.'*

"Earlier in the article he seems to accept eventual government regulation as inevitable, and I see some sort of conflict in those statements and sentiments. On the one hand he urges us to fend off government attempts, yet on the other he accepts it as inevitable.

"I think government regulation of the internet would be tantamount to government regulation of the newspaper or magazine industry – it would be a blatant violation of the First Amendment. The internet provides a means of communication amongst citizens never experienced before by mankind, and the political rami-

fications of that are profound. There are issues being discussed on the internet that would never have surfaced if not for the internet, and many of these discussions are spilling over into the conventional media. In that sense the internet might be perceived as a threat to certain segments of the establishment and the traditional political structure, for knowledge is power to a certain extent. In my opinion, the internet should be defended vigorously from any government regulation.

"I think that the excellent letter of Mr. Frederick Turnage of Rocky Mount in the August issue sums up the way we should view the issue of many things, including this issue: *'Remember, we are the law. We merely delegate it to the police and courts on condition of good stewardship.'*

"Well put, Mr. Turnage, and very relevant to our relationship with the internet."

– Richard Sinnott, Fort Pierce, FL

QSL Collection on the Web

About two years ago Howard and Helen Wilkerson offered *MT* a collection of QSLs which we in turn offered to the reader or club which came up with a deserving proposal to use them. Below is an email from the recipient of the QSLs to the Wilkersons:

"Hello, my name is Brett Saylor. I am a ham radio operator and shortwave listener, and have been active in the hobby for over 25 years. About two years ago Bob Grove sent me your QSL collection after you had forwarded it to *Monitoring Times* magazine. I understand that you were unable to keep it due to your move to a smaller apartment.

"At the time I told Bob Grove that I intended to scan them and put them on the Internet. Happily, over the past 6 months I have been able to start doing just that. Some of your items are now on my shortwave web site at: **http://www.personal.psu.edu/bds2/qsl.html**. Most of the items I have scanned have been stickers, decals and pennants, since they are the ones that are least often seen anywhere (on the web or in publications), and because I think they are very nice representations of the station's image.

"I intend to continue to scan them and put them on line as I am able to. I am starting to run out of web space on this site, and will likely start to put new ones up on a different server. Please accept my thanks for donating the collection and allowing me the opportunity to put them somewhere where people all over the world can see and appreciate them. "

– Brett Saylor N3EVB

Howard Wilkerson says, "It seems so long ago that Helen and I sent *MT* her collection of QSLs, etc. I am very happy you would accept them and, as you said, 'find them a home.' In June of last year, I lost my wife of 51 years. Brett's Web site is a wonderful memorial. Thank you very, very much for selecting him to be the one to receive her collection."

We chose Brett to receive the collection in part because we thought the largest number of folks would ultimately benefit. However, there were other worthy clubs, groups, and classes who might still be interested in obtaining a piece of radio history. If you find yourself with a collection in need of a good home, we invite you to advertise it through Monitoring Times.

Shortwave broadcast QSLs may also be donated to the Committee to Preserve Radio Verifications (a committee of the Association of North American Radio Clubs), but they do not accept amateur radio QSLs. For more information write to Jerry Berg, 38 Eastern Ave., Lexington, MA 02173 USA; visit ***http://www.ontheshortwaves.com/*** *or email jberg@tiac.net*

Your letters, opinions, comments and information are welcome at Letters to the Editor, PO Box 98, Brasstown, NC 28902.

RADIO HONOR ROLL

Scanner Report Aids Police

"We had a great citizen who helped us out," Novato, California, police Capt. Reggie Lyles told the *Marin News* following the arrest of a man and woman charged with stealing nearly $700 worth of clothing from an Old Navy store. "This guy was in his car listening to his (police) scanner and he observed the car. He got on his cell phone and told us our suspects were headed southbound on Highway 101."

"We were really blessed that he did that. It just speaks to why our community is so safe, because we have such solid people like him out there."

DXers Help Out Stations

Brazilian Radio Voz do Coração Imaculado, 4885 kHz, recently reported that they were off the air due to transmitter problems. While the station was trying to obtain some parts locally, DXers helped as well. Thanks to Ben Hester, Ralph Famularo, Marcelo Toniolo, and Cumbre DX, tubes that this station needs to get back on the air were sent to Brazil in early September.

This will be the third station that DXers have helped out. Previously, stations in both Bolivia and Somalia were able to stay on the air thanks to help from DXers (see p. 26). If you want to help a station or know a station that needs help, drop me a line at *hansdjohnson1@juno.com* If you like to hear the station's identification, you can find it at http://www.cumbredx.org

❖ Space Icon to become Orbiting Billboard

Russia's *Mir* space station has been opened for sponsorship and advertising opportunities through an agreement signed by Holland-based MirCorp, which has a lifetime commercial lease arrangement.

The company has already funded the first privately backed manned flight to a space station earlier this year, and will begin a series of "Citizen Explorer" missions with private astronauts/cosmonauts in 2001. The first announced Citizen Explorer is American businessman Dennis Tito. NBC announced that the grand prize in a new contest by the creators of the *Survivor* series will be a stay *Mir*.

Examples of sponsorship and advertising packages available with *Mir* are: Corporate naming of a *Mir* habitation module, *Mir* official supplier status, "Citizen Explorer" mission sponsorship, Advertising and Promotion rights (see the Internet Website and portal **http://www.mirstation.com**)

The *Mir* space station entered service in 1986 and has been visited by more than 100 cosmonauts and astronauts.

❖ Getting Sirius

With the successful launch of a Russian Proton rocket half a world away Americans are a step closer to receiving digital radio programming via satellite.

The second Sirius Satellite Radio spacecraft was blasted into orbit by the three-stage Proton core vehicle and Block DM upper stage. Sirius 1 was launched in June, and Sirius 3 is due for its ride aboard another Proton rocket this fall. By year's end the Sirius satellites could be ready to begin relaying 100 channels of digital audio programming.

Reception will require a special receiver initially installed into high-end cars in the US. For about $10 per month, subscribers will get music, news, sports and entertainment programming directly from the orbiting satellites to their automobiles. Customers will be able to listen to the programming in seamless, coast-to-coast coverage, allowing someone to drive across the country and never lose a channel's signal.

Sirius is currently building a team of disc jockeys and behind-the-scenes staff to run the system from its broadcasting facility in New York City's Rockefeller Center.

For owners wanting to retrofit their existing cars, there will be two options costing under $199. One will be replacing the existing car radio with a Sirius system; the other would be buying an adapter that will bring the satellite signal into your current radio via the FM input.

Rival company XM Satellite Radio, with a new broadcast facility in Northeast Washington DC, is expected to launch the first of its two satellites in November. Both companies hope to be in operation early next year.

❖ Globalstar Headed for the Rocks?

While Motorola does the paperwork to allow its Iridium satellites to reenter and burn up in the atmosphere, rival Globalstar is looking as though it may be the next to crash and burn. Perhaps due to jitters following Iridium's failure, customers are failing to sign up with Globalstar and, as of August, only 13,000 phones had been sold as opposed to the 500,000 needed to break even. In September, Globalstar filed for bankruptcy for "reorganization."

Some report the Globalstar narrowband signal is not capable of providing the quality signal nor the variety of services needed to attract customers in today's market.

By the way, the reader who spotted the report on Iridium said, "their engineers feel certain pieces of the birds may actually reach the Earth and not burn up completely. Most notably a 2 foot by 3 foot titanium fuel tank may make it through the atmosphere."

If it does, he added, you can expect to see it for sale on eBay!

❖ Cluster II to Monitor Sun

Four years after Cluster I was lost in a launch failure, a new Cluster quartet was launched in two pairs from the Baikonur cosmodrome in Kazakhstan. These four identical spacecraft (named Rumba, Salsa, Samba and Tango for the way they will "dance in formation") will be able to make the most detailed three-dimensional study yet of how the Sun and Earth interact.

The four satellites will join an armada of spacecraft from many countries (including ESA's SOHO satellite) which are already studying the Sun and the high-speed wind of charged particles which it continually blasts into space. This information has practical applications in protecting vulnerable equipment such as satellite components, the power grid, radio communications, and even oil pipelines and airline passengers.

For regular updates on the Cluster mission visit the Cluster homepage at:
http://sci.esa.int/cluster

❖ Phase 3D Launch Promising

AMSAT News Service reports preparations for the next-generation Amateur Radio Phase 3D satellite has begun at the European Spaceport in Kourou, French Guiana. Following another successful Ariane 5 launch and satellite deployment this week, Phase 3D now is tentatively set to go into space aboard the next Ariane 5 flight on Halloween (October 31).

AMSAT-DL Executive Vice President Peter Guelzow, DB2OS, is heading the launch team in Kourou. Guelzow said the advance members of the P3D launch team reported that Phase 3D

BULLETIN BOARD

Nov 4: Lawrenceville, NJ
Delaware Valley Radio Assoc hamfest at Lawrence High School, 2525 Princeton Pike, 0800-1300 LT, gen adm $5. Talk-in 146.670 (PL131.8). For more information, visit http://www.slac.com/w2zq or contact *w2zq@arrl.net*, 609-882-2240

Nov 4-5: Odessa, TX
2000 Odessa Hamfest, Ector County Coliseum, Bldg D (42nd and Andrews Hwy), 8a.m.-5p.m. Talk-in 145.470/444.425/ HF 3.922; admission $3. VE testing Sat 1p.m. For more info visit http://radioranch@qth.com

Nov 4-5: Lawrenceville, GA
Hamfest 2000 and Computer Expo, Gwinnett County Fairgrounds; Talk-in 145.45- (PL107.2)/ 444.25+ (PL131.8) / 146.76- (PL107.2). Huge fleamarket, forums. For more info email *KR4NQ@bigfoot.com*; visit http://www.totr.radio.org; call 770-410-3989; or write Alford Memorial Radio Club, PO Box 1282 Stone Mountain, GA 30086-1282.

RMRA Ham Radio and Scanner Group, Salt Lake City, has a new website - **http://www.rmra.org/index.html**

appears to be in excellent condition. Tests of Phase 3D's systems are now under way, including charging of the satellite's batteries.

AMSAT and Phase 3D officials had been keeping a close eye on this week's launch of an Arianespace Ariane 5 vehicle as a possible bellwether for the Phase 3D launch that's next in line. The Ariane 5 successfully delivered a pair of communications satellites into Earth orbit following its launch September 14. A launch contract accepting Phase 3D as a payload for the first suitable Ariane 5 launch vehicle was signed last fall. For more information about Phase 3D, visit the AMSAT-NA Web site, **http://www.amsat.org/**

❖ Not Your Father's AFN

Some folks have raised their eyebrows at the programming to be found on the Armed Forces Television and Radio Network (see this month's "Global Forum"). Choosing television programming is the work of Lawrence Marotta and team from their headquarters at March Air Reserve Base in California.

Marotta has the luxury of waiting to see how a television series is received by the audience before choosing to pick it up, but it's not always easy to boil all the available programming down into three 24-hour channels. Gearing program selections to troops in their late 20s may mean including controversial shows such as *Survivor* or *Will & Grace* and even *X-Files*.

Says Marotta, "We're here to represent American television uncensored for the U.S. military, who is defending our rights for free speech."

❖ Swords into Plowshares

Once a NASA tracking station and a top secret U.S. Department of Defense installation, the former Rosman Research Station in Transylvania County, NC, is now in the hands of the Pisgah Astronomical Research Institute. Director Jim Powers easily ticks off what the Institute plans to do with the former Rosman Research Station – educational tours that spark school children to investigate the sciences; partnerships with area colleges and universities to aid the study of astronomy; scientifically valuable celestial research projects; and hard-to-get, hands-on experience for radio astronomers.

NASA operated the facility in the 1960s and '70s as a tracking station that supported a number of space projects, including the Apollo and Apollo-Soyuz missions. In 1981, the U.S. Department of Defense converted the Rosman Research Center into a communications research station, and the National Security Agency immediately began a top secret operation to use equipment there as part of its global network of ground stations used to intercept civil and military satellite communications.

The government decided to dump the site in 1995. It was about to be dismantled and plowed under when J. Donald Cline, a retired computer-company executive, and his institute stepped in and arranged a land swap.

Now, the Institute is in the midst of renovating radiotelescopes and other equipment at the former Rosman station. The four antennae are the most spectacular. The two biggest have dishes that span 85 feet in diameter and weigh about 400 tons.

Impressive as they may look, Tony Beasley, the assistant director of the National Radio Astronomy Observatory, says "He has what would be considered OK telescopes and software systems. To build it into a strong research-capable system, it's a bucketload of cash," The ability to perform real research will be critical to raising the money.

❖ Bogus Controllers Spark Criminal Investigation

Bogus instructions to pilots by persons posing as air traffic controllers is causing concern in the United Kingdom; so much so that the Civil Aviation Authority (CAA) has issued a safety alert. "There has been a significant increase in the number of reported occurrences of unauthorised and malicious transmissions being made on UK air traffic frequencies," warns the CAA safety circular. They include fake distress calls and false instructions.

"This is a criminal act which could ultimately result in a serious accident," said Richard Dawson, president of the Guild of Air Traffic Controllers. "The problem is that the people making these spurious calls are mobile and can be very difficult to trace."

In 1998, there were just three malicious transmissions; last year there were 18. The CAA has reported 20 so far this year. There have been no prosecutions.

❖ Off the Air

Ray Scherer, 81, July 1 - White House correspondent for *NBC News* from Harry S. Truman to Gerald Ford.

William Roscoe (Rosko) Mercer, Aug 1 at 73 - Pioneer of free-form FM radio as a jazz and rock disc jockey, but left commercial radio in 1985 in disgust. He told the *Daily News* that "only 5 percent of hosts today understand their potential. And stations wouldn't let them fulfill it." Most recently heard doing voice-overs with *CBS Sports*.

Lucille Fletcher, Aug 31 at 88 - Author of "Sorry, Wrong Number" and innumerable radio dramas and thrillers.

Pero Simundza - 9A4SP/3W4SP - Sept 6 - One of the three UN staff who were killed during a militia assault on the UNHCR office in Attambua, West-Timor. The young man worked for UNHCR as an international radio operator.

Media Network - Oct 26 - The last edition of the respected *Media Network* show aired the end of October. Jonathan Marks, Radio Netherland's Director of Programmes as well as producer and host of the show, said, "We've decided that the radio show should end its almost 20 year run while at its listening peak ... I think we all worked hard to show that good international broadcasting comes from the heart." For *Media Network* the Webzine, try **http://www.rnw.nl/realradio/html/radioshow.html**

"Communications" is compiled by editor Rachel Baughn from newsclippings and emails forwarded by our readers. Thanks to this month's reporters: Anonymous, Albany, NY; Harry Baughn, NC; Ed Cichorek, Somerset.NJ; Joe Glath, Tarentum, PA; Norman Hill, Arlington, VA; Dave Hughes, Kansas City, MO; Sterling Marcher, La Mirada, CA; D Parsons, Tucson, AZ; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI; Richard Sklar, Seattle, WA; Robert Thomas, Bridgeport, CT. *Via email:* Chet Copeland, e cummings, Glenn Hauser, Hans Johnson, Tony Shelton, Bill Siedsma, Doug Smith, Tom Sundstrom, John Van Allen, Larry Van Horn, Dan Veeneman, Peter Vieth.

POLICE
AMBULANCE
FIRE
PIRATE RADIO
TAXIS
TELEPHONE
BUSINESS
GOVERNMENT

Developing "The Ear"

Learning to Identify Transmissions

By M.L. Shannon

I first became interested in radio communications many years ago when a TV repairman gave me a military surplus BC-342-M receiver. This was a real treasure for a kid, and I was soon addicted to shortwave. In the wee small hours, headphones clamped to my ears, I was oblivious to all but the exotic sounds from around the world.

Along with a few tricks for pulling in weak signals, I soon learned how to identify what I was hearing. The sounds, the voices, the terms. Radio Moscow always announced the news with "And now the news." Accents helped, and it wasn't long before I could recognize voices on the BBC. Some broadcasts by the AFRS, the Armed Forces Radio Service, signed on with the first six notes of *'My Country, 'tis of Thee,'* and I looked forward to the call of the kookaburra bird when Radio New Zealand came on the air .

At that time, VHF was still *terra incognito* to most hobbyists. The receivers available on the surplus market were expensive, and they were mostly crystal controlled. There were no scanners, but with instructions from an article in *Popular Electronics*, it was possible to modify a tube-type FM radio (I used an old Magnavox) to pick up police calls in the 150 megacycle band. Tuning was critical because of the difference in bandwidth, reception was poor and the audio was faint, but it worked. My basement workshop was often visited by kids in the neighborhood who wanted to see if I could "really pick up police calls."

A few years later, there were battery powered portable radios that tuned VHF and it became possible to monitor the local police as well as some of the federal agencies. And then, in the seventies, programmable scanners appeared on the market. How well I remember my first one, a Regency 'Touch Series' model. This was followed by the Bearcat 250, a quantum leap in programmables and the first to incorporate Search *and* Store.

Soon, the use of VHF was growing and the bands were becoming crowded, so many services were moving to UHF. There were countless stations to monitor – so many that it was difficult to keep track of all of them. The few frequency guides available were limited to local government such as police and fire departments, public works and so forth.

The Ear

Just as with shortwave, I developed the ability to quickly identify the different transmissions that I tuned in. This is second nature to experienced "scannists," but you who are new to scanning may find these techniques useful. Developing The Ear means *hearing* what you are tuned to, not just *monitoring*. With some practice, you will soon be able to recognize the type of service you are tuned to.

The good news is, without realizing it you have to some extent already acquired this skill ... from television. Think about it. You are watching a sitcom. Suddenly the background music and the canned laughter stops and the voice emanating from the speaker is different, a preview of the Ten O'clock news. And you instantly recognize the change.

Sometimes it is more subtle. You are watching a movie in which there is a chase scene. You hear the screeching of tires, the roar of engines, and suddenly you are watching a commercial. You are still hearing speeding vehicles, but then you see a well known NASCAR driver pulling over to the side of the road, getting out, and telling you about how he loves his Ford Taurus. So it is with scanning. Things can change quickly as your radio hops from one station to another.

Frequency Allocations

It is important to become familiar with frequency allocations so that you have an idea what to expect to hear in a particular area of the RF spectrum. An excellent aid is the poster available from the Government Printing Office (see resources list). This is a large (30" x 40") chart that graphically lists all allocations in the RF spectrum and the types of service assigned to them.

As you will see on the chart, sometimes the same frequencies are assigned to different services, shared by both government and nongovernment agencies, so you might hear the local police or a three letter Federal agency.

And, what service is on a particular frequency in one area may or may not be in another. In the 400 MHz band, 460.025 is nationwide: it is NALEMARS, the National Law Enforcement Mutual Aid Radio System. But, where 461.1375 in San Francisco is Hyatt Hotel security, it will no doubt be used by another service in Dallas or Baltimore.

Fortunately, unlike those good old days, there are many frequency guides available to you via books, CDs and Internet sites. Using them to research a frequency you are monitoring may well solve the mystery of an unknown station. Some of them are listed at the end of this article.

What The Ear May Hear

Here are some of the signals between which The Ear may learn to distinguish:

Law enforcement, local and Federal agencies
Security guards: patrols and fixed locations
Businesses, small and large
Fire departments and networks, local and federal
Local government agencies: public works, utilities...
Taxicabs
Media and remote relay
Wireless telephones, cordless and analog cellular
Telephone company maintenance
Emergency Services: Emergency Broadcast System, Red Cross
Amateur Radio
Cable TV leakage
Pirate 'Micro-Broadcasting' stations
Surveillance transmitters

That's a lot of coverage, a lot of services, and a lot to learn about. So, in order to learn to recognize the signals to which you are tuned, here are some things to listen for.

Signal Strength and Clarity

Commercial and government radio systems are designed so that the transmissions are clearly understood. Business decisions may depend upon clarity of communications, but with law enforcement and other emergency services, lives often depend upon successful radio traffic.

Unfortunately clarity is not always achieved. I have heard many complaints, for example, on San Francisco Police Channel Six of poor reception in certain areas. But, for the most part, the systems work as they are supposed to.

So, if you tune in something where the sound is muffled, like the voices are " inside a barrel," this should start to narrow down the source. You may be intercepting a baby monitor or, if you are lucky, even a surveillance transmitter. Think about the frequency. Most baby monitors use cordless telephone channels in the low VHF range; 46 and 49 MHz. Surveillance "bugs" can operate on virtually any frequency but are most likely to be heard just above and below FM broadcasting.

Length of Transmission

Cordless telephone and amateur radio conversations may go on for hours. Analog cellular calls are invariably shorter because of the cost, but probably longer than commercial two-way radio comms which tend to be brief. Local police departments sometimes need to make long transmissions when describing several suspects at a crime scene, but will usually break them up into a series, to temporarily clear the air for an incoming emergency call. Fire department transmissions are usually short and somewhat terse.

Photo by Gary Watts

Gender

Once, the world of radio communications was male dominated. Today, fortunately, this is no longer true. And, while you can not necessarily identify a service by the sex of the person speaking, you may be able to narrow it down.

Police dispatchers are, more often than not, women, particularly in large cities. Here in San Francisco, I sometimes hear one male but the rest are female. Fire Departments are more likely to use male dispatchers for some reason. Taxicab company dispatchers may be either sex but are more often males, as are the drivers. Most of the voices you hear on Federal law enforcement agencies will be male, but there are exceptions.

Age

Sometimes you can make a good guess as to the approximate age of a person; sometimes not. Elderly people may sound their age, as might the very young. It is unlikely that, at either extreme, they will be dispatchers for a police or fire department but they might work for a cab company.

Neither are likely to be dispatching for a federal agency, or to be an agent on the other end of the communication, but people of all ages may use the General Mobile Radio Service (GMRS) as well as amateur radio frequencies and of course, wireless telephone.

Voice Quality

Professional broadcasters such as newscasters, disk jockeys, and people who make those abominable commercials are easy to recognize ("Well, don't answer because you also get..."). So, when you hear these "professional" voices on your scanner, you may wonder why. There are several possibilities – a remote broadcast channel; an on-location reporter relaying to a radio or TV station. Or, in the UHF bands, the audio from a TV station. Hint: if you hear a lot of "buzzing" sounds that lock up your radio and you have to keep hitting the SCAN button, then this is probably what you are tuned to. Cable TV leakage is another likely source. You may hear this in the area of 150 to 180 MHz.

Terminology

When you hear things like "Dry Standpipe," "Phantom Box," or "Engine Company" then you are tuned to a fire department.

Should you be tuned to a taxicab company, you may hear "No-Go" (the passenger wasn't at the pickup location), "Bingo" (after dropping a passenger, there was another one waiting), "Stand" (A taxi stand, a place where cabs wait) and you may also hear the drivers talking back and forth. I drove a cab for a while after graduation, and I can tell you it can get really interesting. Especially late nights at a small company.

Physical descriptions of a person, height, clothing, etc. usually means police, but could also be a private security guard company.

If you hear the word "signal" you may be tuned to the FBI as this is a word they sometimes use for agent. Another FBI term is "91 New" which means a bank robbery that has just occurred.

Secret Service agents usually use their name and city. "McTavish, San Francisco" is agent McTavish calling the San Francisco dispatcher, and on Customs Service channels you will frequently hear the word "sector."

Emotion

If you hear someone getting emotional, raising their voice, screaming, then you are likely tuned to a commercial broadcasting station, cable TV leakage, or wireless telephone. Or maybe (you knew I was going to say this, didn't

Has your scanner stopped on ambulance, fire and rescue, or law enforcement communications? When you've got The Ear you may not need to it look it up. -photo by Garry Watts

you?) taxi companies. But you won't likely hear this on law enforcement radio.

A few years ago, I was at my desk when I heard gunfire. A few seconds later came sirens, many sirens. I spun the knob on my R7000 to the Police Instant Communication channel 4 (460.075) and heard "code 33." In San Francisco, 33 means restricted traffic; an emergency situation.

A sniper fired dozens of shots, hitting several people including two police officers. Even though two cops had been shot, the officers and dispatchers maintained the same calm professionalism as always. True, as an experienced scannist, I could sense the stress in their voices, but they were very professional through the entire incident until the Code 4, "Suspect in custody."

Laughter

How often will you hear people laughing? Well, on wireless telephones of course, commercial radio and TV stations, and remote broadcast locations, and on amateur radio. On Federal law enforcement and fire department channels, this is most unlikely. But don't overlook police departments. It is not unusual to hear people chatting and laughing in the background at the San Francisco Police Department.

Profanity

Profanity is a no-no on amateur and commercial radio, but you still hear it sometimes. Wireless telephones, amateur radio frequencies (since anyone with the cash can buy two way radios at certain stores) and the unlicensed FRS, the Family Radio Service. And, cab drivers sometimes get a little hot and become rather expressive. Like when a competing cab company "spears" (steals) their passenger.

Putting It All Together

Your radio stops on a signal and you want to know what it is. You stop the scanning and listen for the next transmission. Think about what you have learned so far: What frequency is in the display and what does that tell you? How long do the transmissions last? Is the sound quality good, easily understood, or is it muffled? Can you hear both sides of the conversation? Are the voices excited?

After a while, all these things will become second nature and you will quickly know what you are hearing. You will have developed The Ear.

What The Ear Does *Not* Hear

Even as a novice to scanning, you know that signals on the airwaves may take forms other than ordinary speech. They may be encrypted analog, digital, or encrypted digital. (Right – digital is not necessarily encrypted.)

Let's look at these types of transmissions, starting with encrypted analog transmissions which use **Frequency Inversion**. This is a method of processing speech by taking the frequencies above a certain point called the baseline and converting them to low frequencies and vice versa. The frequencies are switched or "inverted." Low becomes high and high becomes low. This is one of the signals you may hear on cordless telephone frequencies.

What does it sounds like? A bit like Donald Duck with a sort of metallic twang or whine. You can tell that this is human speech and sometimes you think you can make out a word here and there. It may be possible to reconstruct this type of signal back into clear speech using another frequency inversion scrambler if it is the same kind, using the same baseline frequency. There once was a program available on the Internet that had an adjustable baseline. [However, since 1986 ECPA it is illegal to decode encrypted or scrambled communications, or to market decoding devices and software.]

Frequency Inversion, Variable Baseline: Also called "Rolling-Code Analog" this is a form of frequency inversion scrambling in which the baseline frequency is changed many times per second, according to a pre-arranged scheme. Converting it back to plain speech requires sophisticated software and a fast workstation or a super-computer. You will recognize it, as it sounds much the same as ordinary frequency inversion but with a loud "knock" sound about two times per second. I haven't found a wave sample of this on the Internet but the term "knock" is an accurate description. If you happen to hear this type of transmission, you will recognize it.

Digital Transmissions: There are many types of digital signals – regular speech that has been digitized, but not necessarily encrypted, such as used by the Personal Communications Service (PCS) and apparently also NexTel.

The method of converting speech to digital is not unlike what is used in the digital CDs you play on your stereo. The sound feeds into the front end of a circuit where it is "sampled" at a particular rate, depending on the bandwidth. The higher the bandwidth, the higher the sampling rate. Since two-way radio transmissions have a narrower bandwidth, they use a "splatter filter" that reduces or "clips" the audio, and so the sampling rate is lower. That is an oversimplification but basically that's how it works.

What does it sound like? Digital speech sounds much like the background noise on your scanner, as if you had the squelch open while tuned to an unused frequency.

It should be possible to build a device that will convert digital back to analog sound so that it can be received on a scanner. However, there are a number of things to be considered and not just the sampling rate. The details are beyond the scope of this article. I am not aware of anyone who has done this and there aren't any digital scanners just yet. But I fully expect there will be.

The Law

Federal and local laws prohibit monitoring some types of transmissions. Cellular radio, cordless telephone are *verboten*, and others including paging, even if you can't decode it. It is possible that mere possession of devices that can be used to decode transmissions such as pagers may be unlawful, even though they have legitimate uses in amateur radio. There have been raids by federal agents of companies that sell devices that can decode data transmissions and the owners have been arrested and prosecuted. If you want to know just what is and is not legal to tune in, please consult an attorney.

Digital Encrypted: There are several digital encryption methods used, some more complex than others, but none of which can be converted back to normal clear speech by us hobbyists with our Pentiums. The difference in how secure they are is based upon the "keyspace" or length of the "password."

One of the first methods used was the Data Encryption Standard, the DES Developed by IBM many years ago as Project Lucifer. It used a keyspace of 56. The DES can be successfully attacked with a specially designed computer, such as the one developed by the Electronic Frontier Foundation. It cost them something like half a million dollars to build.

With the DES compromised, new and more secure systems were developed that use much longer keyspaces. The most often used is Motorola's Digital Voice Protection which is built into their Saber brand radios. Probably the most secure system is Fascinator, which I believe was developed by and for the military and allegedly is used by the Secret Service. To try all of the possible Fascinator keys would take thousands of years.

Data Transmisions

So far this article has been about voice transmissions, but much of what is being broadcast over the airwaves is data. Transmitting data by radio has been used since the days of World War II when there was radioteletype (RTTY), and weather maps and documents were sent by "wirephoto."

In the VHF and UHF bands you will hear many data signals. Pagers, Mobitex data terminals, police Mobile Data Terminals, Ardis, and others. Many of these signals are not encrypted or "scrambled." They may use a proprietary system, but some of them can be decoded if you have the right equipment. At the end of this article are listed a few web sites that have captured these sounds as wave files. By listening to them, you will be able to identify many of the data signals you will hear.

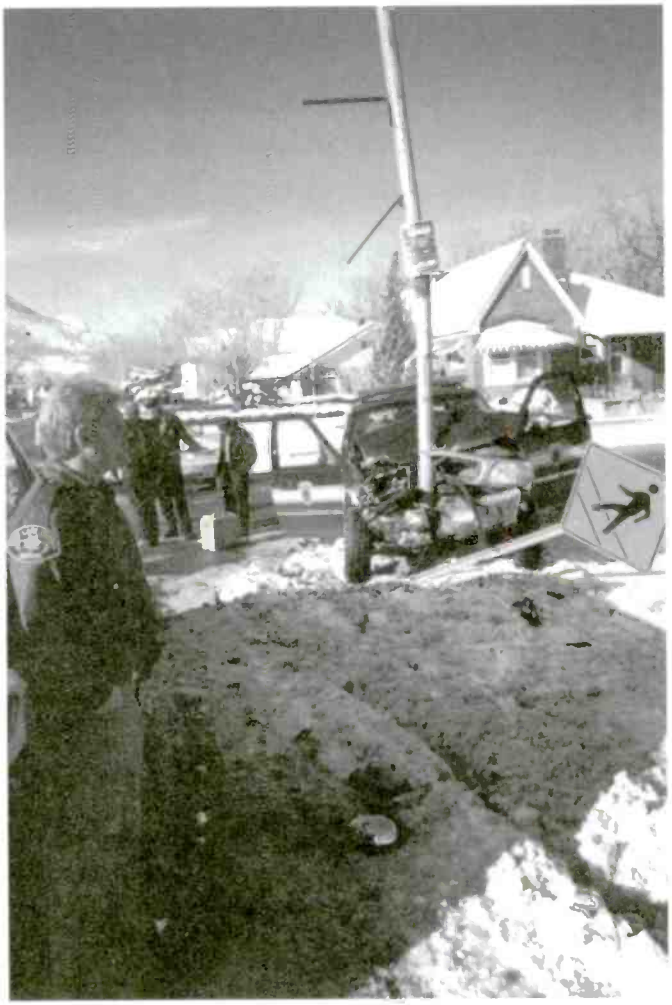


Photo by Deputy Mark Peterson, Salt Lake City Sheriffs Office

A long-time listener can often pick up an undercurrent of adrenalin in the dispatcher's voice in a significant crisis. -photo by Garry Watts

The Last Word: The Future of Scanning

Federal law enforcement agencies have digital encrypted radio systems as described above and there is no way that we hobbyists are going to defeat them. But keep in mind that they don't always use "10-10." They often transmit "in the clear."

Local governments are switching to trunked radio because it is a better system, offering greater flexibility. But trunked systems are not necessarily encrypted and there are radios which monitor them very successfully. I believe the technology to monitor unencrypted digital transmissions will also be available to hobbyists eventually. And, of course, there will be many services that do not convert to these systems but will continue to use plain old analog speech. So, for years to come, there will be a great many signals to monitor by those who have The Ears to hear!

Deputy Marc Peterson, Salt Lake City Sheriffs Office

About the author

M L Shannon is a San Francisco writer and author of several books on electronic surveillance. Graduate of a Community College in electronics, he has worked for manufacturers of electronic spy equipment and as a countermeasures technician. Shannon has been a guest speaker before law enforcement agencies and interviewed on radio and television. Mail: PO Box 192171 San Francisco CA 94119-2171; Email theear@fusionsites.com. The author wishes to thank Steve Uhrig of SWS Security, for advice and proofreading this article.

Resource List

FREQUENCY GUIDES

Grove Enterprises
http://www.grove-ent.com/SCANNERBOOKS.html
800-485-8155
A nice selection of frequency listings, both printed and CDs, and books on all areas of scanning including technical stuff and radio modifications.

Robert Kelty, Mobile Radio Resources
Mr. Kelty has compiled the most comprehensive frequency listings available. Local, State, Federal agencies and the military, his works include not just frequencies, but also repeater inputs, PL tones, codes and other useful information. Some are in book form, others on disk.
Mobile Radio Resources
1224 Madrona Avenue, San
Jose, CA, 95125-3547.
408-269-5814 voice
408-269-5811 Fax

Percon Corporation
Lots of CDs for both professional use and hobbyists. Like you!
http://www.perconcorp.com/products/products.htm

Frequency Allocation Chart

https://orders.access.gpo.gov/cgi-bin/prfgate.cgi
Title: United States Frequency Allocations:
The Radio Spectrum, March 1996
Stock Number: 003-000-00652-2
Price: $6.00
Description: Shows through color codes the parts of the radio spectrum that are allocated to each type of radio service.
Year/pages: 1996: Poster, 30x40 in.; folded.

Order by mail from:
Superintendent of Documents
P.O. Box 371954
Pittsburgh, PA 15250-7954
The chart may be available at, or can be ordered through GPO Stores. A list is at:
http://bookstore.gpo.gov/locations/index.html

DATA AND DIGITAL SIGNALS

Samples of many different data transmissions.
Southeastern Wisconsin Monitoring Page
http://www.execpc.com/~ghahn/digital/index.htm
Updated June 2000

Monitoring Digital Signals With Your Scanner
http://www.lcblanton.com/dfw/download.htm
updated August 2000

Technical info on digital signals

http://www.wunclub.com/digfaq/signals.html
For those interested in the technical aspects, this site has a great deal of information including bit-streams and timing for many services. Published in 1997, much of the data here still applies to current technology.

Frequency Inversion Scrambling

This site has technical information:
http://www.transcryptsecure.com/techcorner/scrames.html

Information about surveillance transmitters

The Bug Book
ISBN 1-58160-065-8
8 1/2x 11 paperback 156 pages, illustrated
$34.00 postpaid. Available from the author.
www.fusionsites.com

M.L. Shannon

An avid listener's post contains receivers, computers, recording equipment and reference books.

Canada's Regional Stations

By Hans Johnson

Canada has many voices on the shortwave dial. The best known and most listened to of these is Radio Canada International (RCI), Canada's official voice to the world. But there are also a number of regional stations across this nation. Originally established to serve isolated communities, these stations continue to supplement coverage of AM (mediumwave) stations that serve a particular region or province. They make for interesting listening, offering insights and a local flavor that RCI simply cannot match.

Canada's regional stations are also great DX catches. Their transmitter powers are quite modest, maxing out at a mere 1,000 watts. They also include the only shortwave station in the radio "country" of Newfoundland.

Adrian Peterson's excellent two-part article in the April and May 1995 issues of *Monitoring Times* covered the history of these stations. The focus of this article is to examine the present and future of the Canadian regionals. So let's have a look at these domestic voices.

Nova Scotia's Only Shortwave Station

CHNX is Nova Scotia's only shortwave station. As Chief Engineer Mark Olson explains, CHNX has been on shortwave since 1937 and it is important to keep it on the air. CHNX has been off for much of 2000 due to a transmitter problem, but Mark hopes to have it back on by the time you read this.

CHNX is using a military transmitter, a Harris RF-230M that has a maximum power of 100 watts, but that has often operated at around 50 watts when the station was last on the air. A Harris amplifier that boosted the station's power failed a long time ago. The same fate happened to CHNX's Marconi transmitter, which was disassembled some time ago.

The RF-230M failed in the middle of 2000 as it was never designed to operate 24 hours a day. Olson describes the failure as akin to leaving a CB keyed 24 hours a day. After a lot of difficulties in locating a manual and then a source for parts, Engineer Olson has finally located both. If all went well, replacement cards for the ones that failed were to have been installed in mid-September.

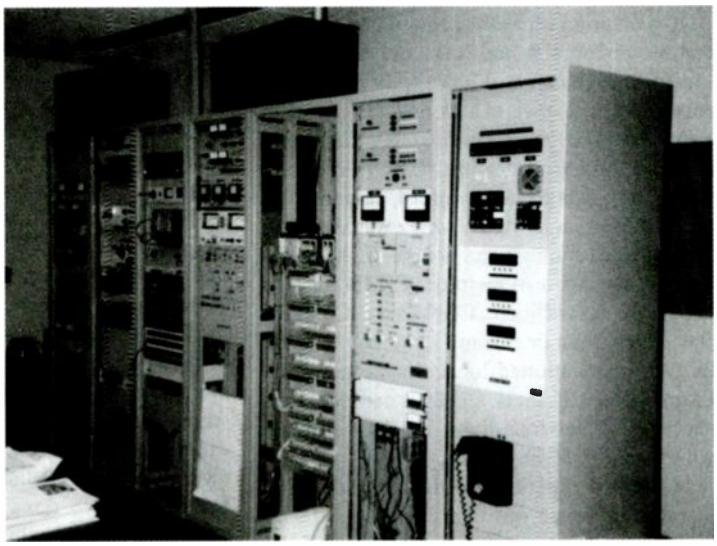
If the Harris proves to be unfixable, then Olson plans to purchase another very small transmitter. Although there have been concerns voiced in the past about CHNX remaining on shortwave, Olson has used listener letters to convince management to remain on shortwave.

Once they are back, look for them on 6130 kilohertz (kHz) with oldies music. The station relays AM CHNS 24 hours a day.

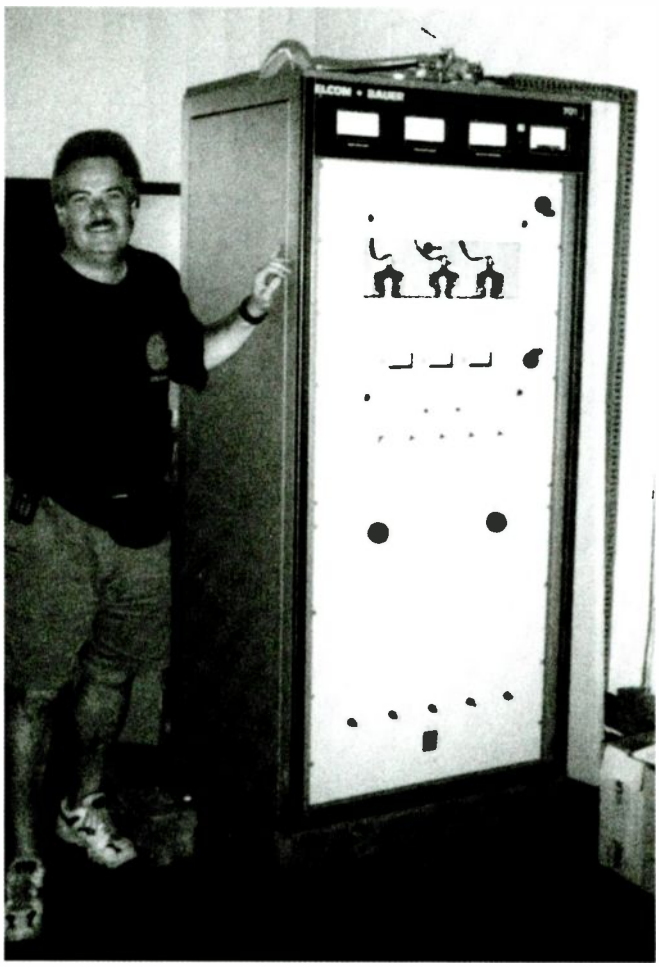
Voice of the Prairies

CFVP is Canada's shortwave voice on 6030 kHz from her western prairies. For years, it operated under the "Voice of the Prairies" moniker. As with other Canadian regionals, it is a relay of an AM service, rather than carrying its own programming. Over the years, CFVP has relayed a variety of formats. Currently they carry 1060 CKMX, whose format consists of easy listening music billed as "Great music, great memories." The station was airing some Mandarin programming called Apple Radio in the evenings, but that has now ended according to Ken Pasolli, the station's technical director. So now the programming is all in English. If you love Frank Sinatra and Anne Murray, then this station is for you.

My favorite part is their slogans. From the



CFRB Control Panel



CFRB/CFRX QSL Manager Steve Canney standing beside the 1,000 watt CFRX transmitter.

abovementioned to "Our music doesn't stop a lot, because that's the way you told us you like it," they have some great ones. The most frequently heard ID is simply a canned "1060 CKMX."

Serving Cabins and Fishermen in Labrador

CKZN from St. John's, Newfoundland, operates on 6160 kHz and is the only one of the Canadian regionals that has a truly local audience. "We still have cabins and fishermen in Labrador who can only hear the Canadian Broadcasting Corporation (CBC) on shortwave," explains Keith Durnford, station engineer. Durnford adds that CKZN expanded their schedule last summer and is now on the air 24 hours a day. Most of the time, CKZN relays a local CBC AM affiliate, CBN. But CKZN also carries programming from Goose Bay to serve those aforementioned locals in the morning. From 6 AM-9:30 local, CFGB is carried on the shortwave [Newfoundland is UTC –3:30 in winter and –2:30 in summer].

Durnford explains that their transmitter is in excellent shape and that there is solid support for the shortwave service due to the local audience.

A Faithful, but Distant Audience

CFRX is located in Toronto, Ontario, Canada's most populous province. Operating on 6070 kHz, CFRX relays CFRB, a news talk station at 1010 kHz on the AM band. Engineer Ian Sharp explains that the station operates at more than its rated power of 1,000 watts. "It would run away from us if it could, but we hold it at 1,200 watts," Sharp relates.

CFRX's largest audience is not in Canada, but in the northeast United States. "If we go off, we get calls asking what has happened," Sharp explains. "We have folks that wake up to us," he adds. Originally, CFRX shortwave was set up to cover northern Ontario, but feels quite comfortable with its American audience. So does its management. "We gain a lot of prestige as the only Toronto station able to announce it is in shortwave," relates Sharp.

Sadly, the range that CFRX can reach has been reduced, due to co-channel interference from Voz Christiana in Chile. Sharp explains that the station tried to deal with the problem, but got nowhere with international regulatory bodies. Sharp does welcome listeners contacting Voz Christiana and asking them to find another channel. CFRX has used 6070 kHz for years and does not have any alternative frequencies.

Voz Christiana is a relatively newcomer to the channel and can easily find another frequency in the 49 meter band. "We sure would like to be able to cover Florida again," Sharp said. Surely Voz Christiana can find another frequency so that CFRX can serve the estimated one million Canadians that go to Florida each winter.

CFRX had a transmitter problem earlier this year, but new audio processing equipment resolved it. Sharp explains that they are sometimes busy with other situations and cannot always get out to the shortwave transmitter site to immediately correct transmitter failures. Sharp does appreciate telephone calls or emails alerting him of any transmitter difficulties.

The Western Wing

CKZU in Vancouver on Canada's west coast relays a local CBC affiliate on 6160 kHz. There isn't a local audience for this station, although CKZU was originally established to serve isolated communities on the British Columbian coast. The transmitter is in fine shape, but the station would most certainly welcome letters of support.

Hearing the Canadian Regionals

Perhaps the greatest irony in hearing these stations is that the one with the lowest power is the easiest to hear. CHNX [which I fully expect to be on by the time you read this] with its little Harris transmitter is regularly reported in Europe, throughout North America, and in Australia and New Zealand. Listeners simply cannot believe that the station is operating at such low power, but it is. The transmitter is not particularly close to the water, but certainly seems to propagate well. A combination of location, mode, and frequency probably explains its worldwide reception.

The best time to hear this one in North America is around 2300 on the East Coast and 0500 in the West. In Europe, insomniacs and automatic timers are logging CHNX around 0100. In Oz and New Zealand, a good time is 0800. Listen for "Oldies" (particularly a lot of Canadian artists such as Gordon Lightfoot) 24 hours a day on 6130 kilohertz. Please note that the station operates in upper side band (USB) plus carrier. While you can hear the station in AM, you will receive a stronger signal if you tune in the station in USB or use your BFO and zero-beat it.

From the easiest to the hardest: CFVP is the hardest of the lot, due to its low power of 100 watts and frequency of 6030 kHz. This frequency is often blocked by much larger stations in an already crowded 49 meter band. Mornings are the best time throughout North America, especially before sunrise at the station. Loggings from abroad are quite rare, although Anker Petersen of Denmark did tentatively hear the station last summer just prior to 0400. I know of no loggings of this one from the South Pacific; apparently the frequency is blocked at the times it would propagate.

CKZN on 6160 kHz is in the middle. It puts out a decent enough signal, but unfortunately it is co-channel CKZU (see below) and it can be hard to tell the two apart, as they both carry CBC programming. It is particularly confusing when CBC relays World Radio Network overnight, whose programming consists of relays of various other shortwave stations. So listen carefully for a local ID or weather report to make sure that you are re-

ally hearing St. John's. East Coast listeners should try at 0800 or about 2300. 2300 is also a good time for listeners in Europe, while the 0800 time seems to work in the South Pacific.

CFRX on 6070 kHz is a bit tougher these days, with co-channel Chilean station Voz Christiana blocking the station during much of the local morning opening. Evenings now seem to be the best time for this one unless you live relatively close to the transmitter. Europeans might still want to listen around 2300, but North American and South Pacific listeners would want to try at 0500 and 0700 respectively.

Even with its excellent technical standards, CKZU is a tough catch on the East Coast. This is especially true now that CKZN is on 24 hours. Best reception will probably be in the mornings after it is daylight at CKZN, but still darkness at the listener's location as well as CKZU. Things are much easier on the West Coast with both morning and evening openings. I am not aware of any European logs of CKZU, but 0800 is a good time in the South Pacific.

The Future

How long will these stations survive? After all, only CKZN has a true, local audience for its programs. DXers and SWLers are the only audience for the remaining stations. We have lost regional stations in both Montreal and Vancouver in the last few years. They didn't have the local audience and didn't receive enough support from the shortwave listening community to remain on the air. How long the others continue on the air is entirely up to the hobbyist community. We need to make a concerted effort to support these stations. The minimal level of support would be letters telling the stations that you enjoy their programs.

I dare say that we also need to support these stations *financially*! That's quite a concept. The Ontario DX Association (ODXA) took a bold step a decade ago in taking over the QSL responsibilities for CFRX. The station engineers have also been generous, often spending their own money to keep their stations on shortwave. Now it is time for the SWL community to take the initiative, with clubs, organizations, and radio dealers "adopting a station" and sending parts and money to these stations if needed.

The money is there: the question is where are we going to spend it? We'll drop $50 US on QSLing a single station, or plunk down $500 for that second, third, or even fourth receiver. We need to realize that the world has changed and that we are now the only true audience for many small shortwave stations. Why not start channeling some of that money to the stations? Just a bit of help will often keep a station on the air. For if we don't start supporting them, there isn't going to be anything left to hear or verify.

Hans Johnson is founder of Cumbre DX, an organization that has helped keep shortwave stations on the air in Bolivia, Somalia, and Brazil. You can reach him at ***hansdjohnson@juno.com*** *or view Cumbre's webpage at:*
http://www.cumbredx.org

Your Letters of Support

CHNX
PO Box 400
Halifax, Nova Scotia, B3J 2R2
Telephone (902) 422-1651
Fax (902) 422-5330
Email *chns@ns.sympatico.ca*
No website
Contact Mark Olson, Chief Engineer

CFVP
PO Box 2750 Station M
Calgary, Alberta, T2P 4P8
Telephone (403) 240-5800
Fax (403) 240-5801
No Email
No website
Contact Ken Pasolli, Technical Director

CFRX
2 St. Clair Avenue West
Toronto, Ontario, M4V 1L6
Telephone (416) 924-5711
Fax (416) 323-6830
Email *CFRBcomments@cfrb.com*
Website **http://crfb.com**
Contact Ian Sharp, Technical Director
Please note that the Ontario DX Association (ODXA) handles reception reports for this station. You can reach them as follows:
CFRB/CFRX reception reports c/o ODXA
Steve Canney
P.O. Box 161 Station A
Willowdale, Ontarion M2N 5S8
Email *odxa@compuserve.com*

CKZN
PO Box 12010 Station A
St. Johns, Newfoundland, A1B 3T8
Telephone (888) 353-7006
Fax (709) 576-5099
Email *keith_durnford@cbc.ca*
No website
Contact Keith Durnford, Station Engineer

CKZU
PO Box 4600
Vancouver, British Columbia, V6B 4A2
Telephone (604) 662-6000
Fax (604) 662-6350
No Email
Website **http://www.vancouver.cbc.ca**
No particular point of contact

CFVP control room in Calgary

A Visit to Radio Exterior de España

By Roger Chambers

Visiting a favorite radio station may not be high on the agenda of most tourists, but the idea of meeting "face to face" familiar voices is rather intriguing to those of us who listen to international broadcasters via shortwave radio. That's one reason why my wife Joyce and I visited the studios of Radio Exterior de España (REE), or Spanish National Radio, on a trip to Spain in March 2000.

Such an experience can be interesting and beneficial to both listener and broadcaster. Our excursion to the English section of REE was a highlight of our week in Spain.

Contact the Station First

In preparation, an e-mail was sent in late February proposing our stopping by in March with tentative dates. A friendly reply was received in a few days from Victoria Laporta, in charge of audience relations of the English service. She indicated that a midweek visit would be preferable to the weekend, when coverage of the Spanish national elections on March 12 would find all the staff quite busy. Victoria indicated an evening visit would be better. We replied by e-mail, including the phone number of our Madrid hotel.

When we reached our hotel, we found a message from Victoria awaiting our arrival. Over the phone we agreed that she would meet our taxi at the Spanish National Radio House on Paseo del Rey about 5:30 pm the next day. For reasons explained later, the English section works primarily from 5 to 10 pm. Working those hours in Spain would be a pleasure, as the dinner hour does not really begin until after 9pm, and the restaurants are full from then until midnight, when the bars (most open until 3 am and some until dawn) take over. The streets of Madrid are quite full of pedestrians from 9 pm to 2 am or later. Conversely, the city is slow to wake up, with streets often nearly deserted past 7:30 am.

A recording studio of REE.

Wednesday was a fine sunny day, much warmer than we are used to in New York in March. The morning was spent at the Prado art museum, with its wonderful Spanish and Italian Renaissance paintings, and then a tour of the Museo de Americas, the largest museum in Spain with pre-Columbian artifacts from the New World. After a relaxing meal at an outdoor cafe, with Arroz (Paella) Valenciana (rice with chicken and sea food) washed down with Spanish Sangria, we took a taxi to the REE Studios.

Our tour of the Station/Studios

We were warmly greeted by Victoria who showed us through the now ubiquitous security checks, and we were given a little sticker to wear while present at their facilities. The large foyer on the first floor was a museum with radios displayed and acrylic markers with the long history of the Spanish National Radio from 1937 to the present. Unfortunately, our time there was far too brief, as we were soon ushered upstairs to meet the English section staff.

Many of the voices of the announcers of the English service would be familiar to any long term radio listener of the station. Deanelle Backer, Justin Coe, Camilla Jessel, Gil Carbajal, and Christopher Birch were all quite pleasant and eager to take a brief time out to

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by Larry Van Horn

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Inside the Spanish National Radio Casa de Radio with staff of the English section. From left to right: Deanelle Baker, Roger Chambers, Joyce Chambers, and Justin Coe.

chat. These five were the announcers on staff at the time. These dedicated staff persons were busy typing on computer screens, working off and on throughout our visit. With four hours a day in English (repeated broadcasts of one hour), the staff is very busy with writing, editing, researching, announcing the news, and producing their various feature programs. Two announcers who had left a few months before had not been replaced.

A logo of Radio Exterior de España, often sent as a sticker with replies to listeners' letters.

Since our visit, Christopher Birch has retired, leaving four announcers for the English service, and cutbacks in programming. This has included the omission of news from their weekend broadcasts and fewer features, many of which are repeated on the weekend.

Reception of REE in northeastern North America is usually quite reliable, even with just one frequency. The English news goes out live at 2000 UTC on the first English broadcast of the day. This news is repeated at 0000, 0100, and 0500 UTC, but today there is seldom staff available to update this for the later newscasts. The usual frequency is 6055 kHz, though in the summer they may use 15385 kHz or other frequencies.

After a brief visit with the staff, they had to go back to work on news and feature programs. So, Victoria again took over, leading us on a more extensive tour of the complex. There are several studios, with a room for the announcer and guests. Many of these studios are shared by various services of the Spanish National Radio in Russian, German, Arabic, Sefardi (Ladino), French, English, and Spanish, including domestic services.

There are Radio One, Two and Three, similar to that system used in England with one network emphasizing news, talk, and sports, and the others classical and popular music.

Music From 300,000 Vinyl LPs

A tour of the very extensive record archives (of tapes, CDs, vinyl discs, and such) was quite impressive. They have some 100,000 CDs and 300,000 LPs available for use. Most of these are cataloged by computer and cross indexed for ease in finding a specific record or tape. This library also includes reel-to-reel tapes of virtually all broadcasts from the early days. This was done "during the time of Franco" to keep tight control over just what was broadcast.

We then had a very brief visit with a busy man, José Manuel Amorena, equivalent to director general or the "big boss" of all the services. One of his major jobs is preparing the news from a wide variety of press agencies and feeds; the bulk of the news that is broadcast is written and often translated by him. He was very gracious and apologized for his limited English, which was certainly quite adequate.

Since our visit, he has been appointed a member of the Federal Government cabinet. This has led to some uncertainty on the part of the staff. With a new boss in the near future, there may be major changes in emphasis. Some may want to stress and expand English or Arabic services, for example, while others may prefer to put more emphasis on European Union issues. However, I have no doubt that the traditional cultural, historical, and linguistic ties with Latin America will remain an important part of any external services in English or Spanish.

We then managed to step outside briefly for a photo of the facility. This group of buildings is the main headquarters for all Spanish radio and television, domestic networks, and the international service of Spanish National Radio. REE utilizes only a small portion of the entire complex, and most of these studios are shared with domestic radio services.

Victoria guided us back upstairs for a cold cola. Then we met again with Deanelle Baker and Justin Coe for interviews.

A statue of a matador near the entrance to the Plaza de Toros, Madrid.

A statue of Velázquez, the 17th century Spanish painter, outside an entrance to the Prado art museum, Madrid.

Consider Being Interviewed

Many shortwave stations have mail bag and radio hobby ("DX") programs. REE is no exception. Some of these shows are interested in interviewing listeners who happen to stop by their facilities

"Radio Waves" is a radio hobby program presented by Justin Coe. It is broadcast on Mondays and Saturdays. Justin was interested in what we thought of current REE programs, as well as the future of shortwave broadcasting.

The latter is a complex issue with many differences of opinion. Despite the rapid changes in the technology of broadcasting in the past 10 or 15 years, I feel that shortwave radio will be around for quite a while. This is especially true in the developing countries such as Mexico, where listening to shortwave on even small portable radios is a major source of information and entertainment that will not be rapidly replaced by the Internet or satellite dishes.

Deanelle Baker's interview for **"Radio Club"** (broadcast on Fridays and repeated on Sundays) was a bit less radio focused. Although a couple from Minnesota had visited the day before and were also interviewed by her, REE seldom receives visits from their international listeners. Deanelle has been with REE from the early 1960s and is a well-known voice to any long time listener. Both Justin and Deanelle were pleasant and made us feel very much at ease. We heard both programs late in March upon our return home.

By the time we completed the interviews and had a quick tour of a large studio used by several services for recording larger musical groups, it was time to say our goodbyes. Just outside the studios, we caught a cab back into the central city of Madrid, thus bringing to a close a very friendly and interesting chapter from our visit to Spain.

Such a visit is highly recommended to anyone who happens to be in a location of a station that they listen to on a regular basis. As you see, it can prove to be a very rewarding experience for both the listener and the broadcaster. However, if possible, make your arrangements prior to an actual visit. This makes it easier to find the location of the studios and also allows busy staff to be better prepared to take time out to meet the listener. One of the most enjoyable aspects of making such a visit is carrying back home the visual image of announcers we have listened to for years.

The author and his wife Joyce on Zocodover Square (main plaza) of Toledo. The painted bench tiles depict scenes from Don Quijote.

For further information:

Broadcasts in English to Europe
2000-2100 UTC 15265 kHz or 9840 kHz

Broadcasts to English to North America
0000--2000 UTC 6055 kHz or 15385 kHz
0100--2000 UTC 6055 kHz or 15385 kHz
0500--0600 UTC 6055 kHz or 15385 kHz

Address:

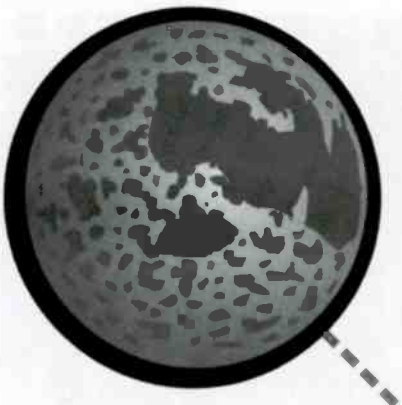
Radio Exterior de España
Apartado de Correos, 156.202
8080 MADRID Spain
Web site: **http://www.rtve.es/rne/ree/**
E-mail: *audiencia_ree.rne@rtve.es*

About the Author:

Roger Chambers has been listening to shortwave since 1966 from his home in Utica, New York; he has been active in the Ontario DX Association, winning the 1996 annual ODXA DX Challenge, and has organized or participated in numerous DX camps. He helped found the Mohawk Valley Short Wave Listeners Club and is webmaster at **http://www.angelfire.com/mo/mvswlc/index.html**

An outside view of the Casa de Radio, home to various radio services in Spain, including Radio Exterior de España.

MOONBOUNCE



Communicating Via Nature's Satellite

By Dale Parfitt W4OP

It's 5:30 a.m.: I awaken to the piercing sound of my alarm clock. Unlike some mornings, I arise eagerly and head for the ham shack. Months of preparation are about to culminate in what I hope will be my first detection of amateur radio signals being reflected from the moon's surface.

My reception is to be from a 12-ft TVRO dish (whose horizon to horizon drive has been modified to allow for the moon's varying declination). The traditional C band feedhorn has been replaced by a unique scalar feedhorn that generates the circular polarity used by amateurs on 1296 MHz EME (Earth-Moon-Earth). Like TVRO, a Low Noise Amplifier connects directly to the feed in order to avoid any loss of the precious, weak signal before amplification.

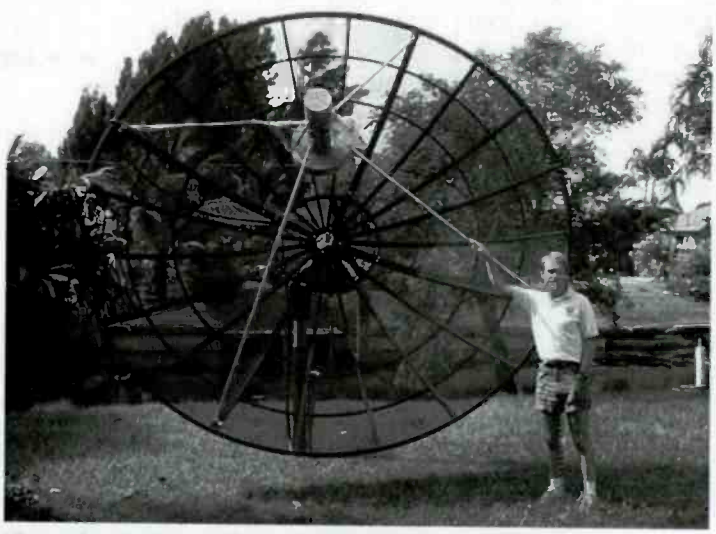
Because I have not had time to run hardline coaxial cable into the shack, I carry my Yaesu FT736R transceiver out and set it up at the base of the dish. A sheet of paper filled with calculations from the prior evening tells me where to point the dish. I am new at this and am happy to see the sky is cloud free and I will be able to confirm the math with a visual pointing.

Finally, all the connections are made, the dish is pointed and the transceiver powered up. I have been told that most activity takes place between 1296.000 and 1296.025 MHz. Starting at the low end I begin tuning. Almost immediately there is a CW (Morse) signal – incredibly weak, but there. After 5 minutes of copying every character I hear, a call begins to emerge – VE1ALQ. The thrill can only be compared to making my first amateur radio contact some 37 years ago. It is still dark out as I stand up and stare at the moon, still unbelieving that I have recovered a microwave signal after its half million mile journey from the earth to the moon and back.

Eventually, I completed a 4-tube water-cooled amplifier to became active on 23cm myself. Out of 37 years of hamming, I rank hearing my own echoes off the moon (the round trip takes approximately 2.5 seconds) as the most memorable event!

Some Background

EME activity is not all that new, having first been accomplished by the US Army Signal Corps following WW II. In the 1950s the US Navy established a lunar radio teletype link between Washington DC and Hawaii using 400 megawatts. Amateurs first received moon reflected signals in 1953, but two-way communications were not established until 1960.



The author in front of his 3.7M 1296 MHz dish

1296 MHz is not the only band having activity. Contacts are routinely made from 50 MHz up through 24 GHz, with the highest activity occurring on 144 MHz followed closely by 432 MHz. On these bands, arrays of Yagis are employed instead of parabolic dishes. Nor is Morse code the only mode used. It is not unusual to hear the better equipped stations holding casual voice contacts using single sideband (SSB), just as they might on the shortwave bands.

So what does it take to hear these signals? Of primary importance is the antenna – put very simply, the bigger the better. The loss in signal strength as the signal traverses its half million mile path is as astronomical as the space it crosses. At 144 MHz the loss is 251 dB. This is roughly equivalent to multiplying the radiated power from the earth-based transmitter by a fraction whose denominator has a 1 followed by 25 zeroes. At 1296 MHz this number has risen to 271dB, another 100 times weaker.

The casual enthusiast may confuse moonbounce communications with communicating through the amateur radio satellites. Other than the fact that both the moon and satellites are in space, the two communication mechanisms are totally different. First, amateur satellites are much closer to earth – typically a few hundred miles up for amateur satellites. Secondly, satellites are active – that is, they contain sensitive receivers and antennas that receive the signal from earth, transfer it to a transmitter that then sends the signal back to earth. Even handheld radios are capable of communicating through some of the amateur birds.

Before leaving the subject of satellites, it is interesting to note that the first communications satellites, the Echo series, were passive satellites – large metallized balloons relatively close to earth. I can recall looking up into the night sky as a kid and actually seeing the Echo satel-

lites pass overhead. These first attempts were quickly abandoned in favour of the active satellites in use today.

Now, compare the above with sending a signal to the moon. As the radio wave travels through space it spreads out in an ever-widening area. This is somewhat analogous to the way light spreads from a spotlight. As the light spreads further, the area it illuminates gets dimmer and dimmer, just as the radio signal gets weaker and weaker as it spreads. Finally, after a quarter million mile trip, a tiny amount of the original radio signal actually intercepts the moon, with the great majority continuing on into deep space. If the moon were a flat metal surface, 100 percent of the arriving signal would be reflected back – still suffering the signal spreading and resulting path loss. Of course, the moon is far from an ideal reflector and only a very small fraction (approximately 7 percent) of the incident wave is reflected back in the direction of earth.

Other characteristics of the earth, moon, and their relationship to one another further complicate the problem. Because the moon is a rough, irregular surface, radio waves reflect differently from different areas on the moon. Secondly, the earth and moon move relative to one another. This rocking motion, called libration, further distorts the signal amplitude. At any given moment, reflected signals may combine to result in a short burst of increased signal, while in the next moment, signals may partially cancel out, resulting in deep fades.

An analogy on earth is the multipath enhancement that sometimes results when a radio or television signal is reflected from an airplane. The signal reflected from the airplane alternately adds and subtracts from the direct signal arriving from the transmitter. The effect is a fluttering signal. Libration fading on moon-reflected signals is similar, but much faster and more random. The result on weak signals can be frustrating, as a single Morse dash is chopped into what sounds like dots.

Next, the distance between the earth and moon varies because the moon is in a slightly elliptical orbit. This variation amounts to about 10 percent of the total distance. The effect on radio signals is that when the moon is closest to earth (perigee) signals making the trip are 2 dB louder than when the moon is furthest away (apogee). 2 dB may not seem like much, but when signals are just above the noise, 2dB makes the difference between "solid copy" and very rough copy.

Hitting the Moon

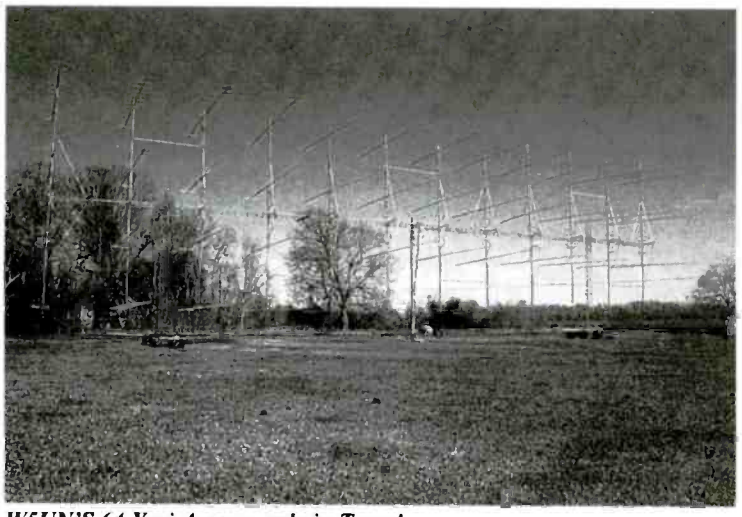
The television satellites that we are most familiar with are parked in geostationary orbits, i.e., they appear to be stationary in space to an earth-based observer. Obviously, the moon does not fall into this category. Not only does it traverse the sky as does the sun, its motion is more complex. The moon orbits the earth on a 28 day period. As the moon orbits the earth, the earth is spinning once per 24 hours on its own axis. The moon's rotation is in such a direction to make the moon appear to move more slowly through the sky than say the sun.

Look at it this way. The earth rotates once every 24 hours. One rotation is 360 degrees. Divide this by 24 hours and we have an apparent sun motion of 15 degrees per hour. The moon's apparent motion is more like 14.5 degrees per hour. The result is that the moon rises almost an hour later each day.

The second effect is the moon's varying declination. Anyone who has put up a C band satellite dish is aware of a setting on the polar mount called declination. This angular offset is a fixed number for a given latitude. The moon's declination varies over its 28 day cycle from -20 degrees to +20 degrees. Stations in the northern hemisphere will have a longer common "window" (both stations being able to see the moon) when the moon is at its highest declination.

Because of this complex motion, few stations use polar mounts, but rather employ two motor drives in an azimuth-elevation configuration similar to a gun on a ship.

Because only a very small segment of the amateur community participates in EME communication, activity peaks on an assigned weekend once per month known as schedule weekend. As you might suspect, the selected weekend is ideally a period when the moon is at a high declination and also at or close to perigee. Unfortunately, these two characteristics rarely coincide, so a compromise is almost always the



W5UN'S 64 Yagi Array – only in Texas!

result. The very best time to listen is during the two fall weekends of the ARRL EME contest when activity is at an all-time high.

What Does It Take to Hear an EME Signal?

The 2 meter amateur band is the best place to begin EME DXing. This is not only because the equipment is inexpensive and readily available, but also there is the most activity on this band.

Although serious EMErs use multiple Yagis (up to 64 Yagis – see the photo of W5UN's monster array), a single, relatively high gain Yagi and a good preamp mounted at the antenna is enough to get started. Commercial Yagis from Cushcraft, M Square or Directive Systems with a boom length of 18 feet or so is a good candidate. Select an antenna whose design is optimized for the low end of the band (144 MHz), not one that is set up for the FM portion. Although an elevation and azimuth rotator allow long term tracking of the moon, it is not necessary to get started. The antenna needs to be only high enough to get a clear shot of the rising moon and able to be manually aimed. A horizontally polarized Yagi has quite a wide vertical beamwidth so will "see" the moon for perhaps up to one half hour without being reaimed.

There is another advantage to using the rising moon. At this position it is possible to pick up 3dB of extra gain. This is analogous to viewing the rising sun from across a lake – you get not only the direct illumination from the sun, but also its reflection off the water. On the down side, this angle is also most likely to pick up more man-made noise. Computer "birdies" and power line noise can be particularly troublesome on this band.

Mirage, ARR, SSB Electronics, and Down East Microwave all make suitable low noise preamplifiers. To be most effective, the preamp needs to be mounted right at the feed of the Yagi.

Finally, any good receiver capable of tuning the 144 MHz band in CW or SSB mode will suffice. Narrow filters and a slow tuning rate can help pull out the weak ones – and they will ALL be weak. The majority of the activity will be between 144.000 and 144.030 MHz.

What Will I Hear?

The vast majority of stations will be using slow Morse code (CW). Because signals are weak, calls are repeated many times. This will aid you in identifying the stations. You don't need to be able to copy Morse. As already mentioned, keying speeds are slow and you can either tape the signals or make computer WAV files for later analysis. Local amateurs will also be willing to help you decode the Morse files. Although stronger stations may send the common RST report (readability, signal quality, tone quality), many times the letter O is sent to indicate a full set of call signs (receiving and transmitting calls) have been copied. The letter R indicates a completed contact (QSO). These letters are repeated a number of times.

Undoubtedly, the strongest station on 2M is Dave W5UN. Dave runs maximum legal limit power into an incredible 64 yagi array. Look for Dave on 144.028 MHz. You may also wish to visit his WEB site at: **http://web.wt.net/~w5un**

QSLing

Moonbounce operators are very proud of their stations and QSLing runs close to 100 percent. Many times the operator includes a photo of his antenna array. This is particularly true on 1296 MHz where some very large dishes (48-ft and larger) are in use. Just as in HF QSLing, include the time in UTC the station was heard, the frequency and the station he was working if possible. An SASE can't hurt.

Moonbounce and the Internet

The Internet provides a wonderful resource for learning more about moonbounce. More pictures of W5UN's array may be seen at **http://df6na.mayn.de/~df6na/w5un.htm**. In addition, the September 2000 issue of *QST* contains an in depth article on W5UN's array.

The EME homepage of HB9BBD contains a large collection of .WAV audio files of stations he has contacted with his 33-ft dish on 1296 MHz. The author's file, W4OP, is there along with many files of stations contacted using SSB. The KB2AH file is a good example. Here we have two 1500W stations using dishes over 30 feet in diameter! For stations of this size, the exotic mode of EME becomes mundane.

Dom's homepage is located at **http://www.hb9bbd.ch/front.htm**

Conclusion

Although EME is perhaps the most exotic method that amateurs use to communicate, hearing some of the big stations is not all that difficult or expensive. But be warned, it can be addictive, and like the size of your boat, the antennas are never big enough!

Moonbounce on a Handheld?

Well, sort of. The Navy maintains a system known as NAVSPASUR (Naval Space Surveillance Radar). There are three transmitter sites with the primary site located at Kickapoo Lake, Texas. This site comprises an array of 2556 dipoles arranged north-south with an effective radiated power of 6.3 *billion* watts on 216.980 MHz, making this the most powerful CW transmitter on earth! It runs 24 hours a day 365 days a year.

The array is arranged such that it transmits a "fan" or ribbon of energy east-west across the United States. Any object passing through the fan creates a reflection, which is picked up by three monitoring sites. This information allows technicians to compute the location where the object crossed the fan and its velocity vector. Thus the Navy is able to keep track of space objects as small as 10cM and up to 15,000 nautical miles away. You can learn more about NAVSPASUR at **http://www.zilker.net/~crossley/NAVSPASUR/index.html** and **http://www.gate.net/~tomk/navspasur/index/html**.

An EME friend, K9BCT, had told me of receiving the echo from the moon as it crossed the fan. I had to try! I used an older Yaesu FRG9600 receiver in SSB mode (but any of the new, all mode handhelds or base receivers will work) and a Cushcraft 4-element 222-MHz amateur Yagi. To calculate when the moon would cross the fan, I used my EME tracking program, entering Kickapoo as my location. Because the fan runs east-west, I scrolled through the program looking for the time when the moon's azimuth (as viewed from Kickapoo) was 270 degrees, i.e. due west. I then aimed the Yagi at the moon and went inside to listen.

Just past 270 degrees Azimuth, the background noise began to drop as the sounds of a carrier emerged. The lunar echo was copyable for just over a minute. The next day I built a low noise preamp and modified the Yagi so that it was optimum for 217 MHz. That night, the echo was heard for over 10 minutes – an eerie wavering tone coming out of nowhere and eventually disappearing. While I waited for the moon to cross the fan, I heard a number of short pings or whistles – most likely satellites or meteors. My next session will be when the shuttle is up – the return should be outstanding!

About the Author:

Dale Parfitt was first licensed as WA2YPY in 1963. He has a BSEE/MSEE from Syracus University. His interests are SWLing, CW, building equipment, and most recently, microwave frequencies.

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Getting on the Air in Somalia

Photographs courtesy of Sam Voron, VK2BVS

This van housed Somaliland's original Radio Hargeisa that was on in the early 1990s.

Radio Hargeisa's antenna looms above the local post office. The station's 1 kW transmitter is a tough catch, but can be heard around 0400 and 1600 UTC on 7530 kHz.

Setting up Radio Galkayco's log periodic antenna in 1994 and how it looked when it was completed

Part of the staff of Radio Galkayco ("Radio Free Somalia")

Sam Voron with the entire staff of the Radio Galkayco. The station can be heard on 6985 kHz from 1000-1215 and 1600-1715 UTC. English programs are at 1200 and 1700.

Sam has also trained local Somalis in amateur license training.

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GLOSSARY

A Glossary of radio related terms used in *Monitoring Times*. (See www.grove-ent.com/mtglossary.html for a much more comprehensive list.)

THE RADIO SPECTRUM

ULF - Ultra Low Frequency (3-30 Hz)
ELF - Extremely Low Frequency (30-300 Hz)
VF - Voice Frequencies (300 Hz-3 kHz)
VLF - Very Low Frequency (3-30 kHz)
LF - Low Frequency (30-300 kHz)
MF - Medium Frequency (300 kHz-3 MHz)
HF - High Frequency (3-30 MHz)
VHF - Very High Frequency (30-300 MHz)
UHF - Ultra High Frequency (300 MHz-3 GHz)
SHF - Super High Frequency (3-30 GHz)
EHF - Extremely High Frequency (30 GHz and above)

// - Indicates a Parallel Frequency
μF - Microfarad
μH - MicroHenry
AC/ac - Alternating Current
AGC - Automatic Gain Control
AM - Amplitude Modulation
ARRL - American Radio Relay League
BCB - Broadcast Band (530-1705 kHz AM)
Bd - Baud
BFO - Beat Frequency Oscillator
BNC - Coax connector commonly used with VHF/UHF equipment
CB - Citizen Band
C-band - 3.7-4.2 GHz
Comm - Communications
CQ - General call to all stations
CTCSS - Continuous Tone Controlled Squelch System
CW - Continuous Wave (Morse code)
DAB - Digital Audio Broadcast
dB - Decibel; dBi- decibels over isotropic
DBS - Direct Broadcast Satellite
DC/dc - Direct Current
de - Morse code prosign meaning "from"
DSP - Digital Signal Processing
DTMF - Dual Tone Multi Frequency
DTRS - Digital Trunk Radio System
DX - Distant Station Reception
DXer - A person who engages in the hobby of distant radio/television reception
DXing - The hobby of listening to distant radio or television signals
DXpeditions - DX Expeditions (trips to the boonies by radio listeners)
ECPA - Electronic Communications Privacy Act
ECSS - Exalted Carrier Selectable Sideband
E-skip - Sporadic E-layer ionospheric propagation
FCC - Federal Communications Commission
FD - Fire Department
FM - Frequency Modulation
Freq - Frequency
FRS - Family Radio Service
GHFS - Global High Frequency System
GHz - Gigahertz
GMDSS - Global Maritime Distress and Safety System
GMRS - General Mobile Radio Service
GMT - Greenwich Mean Time (replaced in most applications by UTC)
GPS - Global Positioning Satellites
GSM - Global System for Mobiles (900 MHz)
HT - Handi Talkie/Handheld Transceiver
Hz - Hertz
ID - Identification
IF - Intermediate Frequency
IRC - International Reply Coupon
ISB - Independent Sideband
kHz - Kilohertz
km - Kilometer
Ku-band - 11.7-12.2 GHz (plus 12.2-12.7 GHz in North America)
kW - Kilowatt
LCD - Liquid Crystal Display
LED - Light Emitting Diode
LNA - Low Noise Amplifier
LNB - Low Noise Block Downconverter
LNBF - Low Noise Block Downconverter Feedhorns
LSB - Lower Sideband
LT - Local time
LW - Longwave (150-300 kHz)
mb/MB - meter band/Megabyte
MDT - Mobile Data Terminal
MF - Medium Frequency
MHz - Megahertz
ms - milliseconds
MT - Monitoring Times
MUF - Maximum Usable Frequency
mW - Milliwatt
MW - Medium Wave (typically 530-1710 kHz)
MW - Megawatts
NCS - National Communications System/Net Control Station
NDB - Non-Directional Beacon
NFM - Narrowband Frequency Modulation
NiCd - Nickel Cadmium Battery
NiMH - Nickel Metal Hydride battery
No Joy - Station did not answer call
NWR-SAME - National Weather Radio Specific Area Message Encoding
Ops - Operations
Packet - Amateur radio error correcting mode
PC - Personal Computer/Printed Circuit
PCS - Personal Communication System/Satellite
PD - Police Department/Primary Data
PFC - Prepared Form Card
PL - Private Line
Q - Performance rating regarding selectivity or bandwidth
QRM - Interference from another station
QRN - Interference from natural or man-made sources
QRP - Low power operation
QSL - A card or letter confirming reception of a radio station
QSO - Communications between two or more stations
QTH - Location
RDF - Radio Direction Finding
RF - Radio Frequency
Rptr - Repeater

RTTY - Radioteletype
SASE - Self Addressed Stamped Envelope
S-band - Microwave frequencies above UHF
SCA - Subsidiary Carrier Authorization (now known as SCS)
SCPC - Single Channel Per Carrier
SCS - Subsidiary Carrier Service
SELCAL - Selective Calling
Sesqui - A "Hauserism" meaning one and one-half
SINAD - Signal to noise and distortion ratio
SINPO - A code system used by radio hobbyists to indicate how well a station was received: S=Strength, I=Interference, N=Noise, P=Propagation, O=Overall (sometimes shortened to SIO)
SITOR-A(B) - Simplex teleprinting over radio system, mode A (B)
S-Meter - Signal Strength Meter
SMR - Specialized Mobile Radio
S/N Ratio - Signal-to-Noise Ratio
SSB - Single Sideband
SSN - Sunspot Number
SW - Shortwave (high frequency - HF)
SWBC - Shortwave Broadcast
SWL - Shortwave Listener
SWR - Standing Wave Ratio
Tac - Tactical
Tent - Tentative
TIS - Traveler Information Service
TVRO - TV Receive Only
Tx - Transmit
UHF - Ultra High Frequency
UKoGBaNI - United Kingdom of Great Britain and Northern Ireland
ULS - Universal License System
Unid - Unidentified
USB - Upper Sideband
UT - Universal Time
UTC - Universal Time Coordinated
Vac/VAC - Volts Alternating Current
Vdc/VDC - Volts Direct Current
VFO - Variable Frequency Oscillator
VOLMET - Aviation Weather Broadcasts (on HF)
VOX - Voice Operated Relay
VSWR - Voltage Standing Wave Ratio
WAM - Wideband Amplitude Modulation
WEFAX - Weather Facsimile
WFM - Wideband Frequency Modulation
wpm - Words Per Minute
WWV - National Bureau of Standards Time Station, Ft. Collins, CO
WWVH - National Bureau of Standards Time Station in Hawaii
Wx - Weather
WXSAT - Weather Satellite
X-band - Expanded AM broadcast band (1610-1700 kHz)
Zulu - Military time zone (same as UTC)

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PS Form 3526, October 1999 (Reverse)

Ken Reitz, KS4ZR
ks4zr@firstva.com

Finding the Perfect Shortwave Receiver

In last month's exciting episode I showed you how to build what I called the only shortwave listening antenna you'll ever need. This month we'll go hunting for the perfect shortwave receiver.

At first glance in the shop window we're dazzled by the array of all manner of shortwave radios. There are inexpensive portables; expensive, little bitty hand-helds; weighty table models with four figure price tags; and strange looking "black box" computer attachments. It's all a little bit intimidating. How in the world are we going to choose?

❖ Reality Check

If you're just starting out in the shortwave listening hobby, regardless of how deep your pockets are, don't spring for the most expensive radio you can buy. You may find that after a few months you're no longer interested in this aspect of the monitoring hobby and you'll never recoup your initial expense. If you'd really like to have a pricey table communications receiver but balk at the $700 price tag, consider buying a used one. Many reputable dealers take used receivers as trade-ins and offer warranties on their purchase. This is a great way to get a top grade receiver at a deep discount and without fear of getting ripped off.

Terrific bargains on such receivers can be found at hamfests or through private sales from individuals. Here shopping can be a little tricky. Most hamfest sales are "as is" and final. Don't expect a warranty and you'll have little recourse if the item doesn't work to your satisfaction when you get home. Wherever possible make the transaction with a credit card so you'll at least have the credit card company on your side when it comes to hashing out issues of product performance.

Next, let's list a few items we should look for when we go shopping. Even though "shortwave" radio is normally thought of as that vast expanse of frequencies from just above the AM band to 30 MHz, many portable shortwave radios also tune "long wave" (generally considered to be from 50 kHz to just below the AM band) and the commercial FM band. Some can also tune the Aircraft Band. More expensive "communications receivers" are capable of rarefied spectrum tuning up to 2 GHz. Ask yourself what you're really interested in listening to. The fewer bands you need to be tuning in, the less expensive your purchase.

Finally, how do you intend to listen? Are you going to set up your receiver in a den or study where you can comfortably listen at a desk? Do you need to carry the radio around from place to place in the house? Planning to take your shortwave hobby on the road? Do you really want to tie up your computer with a PC-based receiver?

From $400 to $1,100, getting started in shortwave listening can be expensive

Are you planning to use an outdoor antenna? If so, how do you plan to hook it up to the radio? Take an inventory of your surroundings: are there big high voltage power cables nearby? Do you have a lot of dimmer switches in the house? Are there any nearby electrical devices operating when you're likely to be tuning in? It could be that your location will simply not be conducive to shortwave listening.

Tuning the HF bands is entirely different from the VHF-UHF world of scanning. The answers to all of these questions will determine what kind of radio you should start out with.

❖ Making Choices

By now I hope you've realized that there is no single perfect radio. They all have a drawback of some kind. If you stick with the shortwave listening hobby long enough you'll probably end up, as I have, with several different radios. I find that the one I use the most is a 15 year old, portable Uniden 2021 (no longer in production). Here's why I like it so much: When the power goes out (which seems to be several times a month where I live) and all other sources of news and entertainment are gone, this radio gives me the world of shortwave broadcasting, local FM radio news and music, AM sports programming and ham radio listening using just its built-in telescoping whip and batteries. Because it's so small I can also pack it along on trips or move it from place to place in the house. It has features I look for such as external antenna connection, BFO tuning for listening to SSB and CW modes, direct frequency tuning, built-in antenna trimmer, a frequency memory bank and will run on 110 VAC, six "C" batteries or 12 volt car battery.

Since this radio was made, far better radios with considerably more features have come along and are worth the consideration of newcomers to the shortwave listening hobby. Among the improvements are much smaller size, smaller battery power requirements, extensive memory capabilities, and built-in clocks with shut-off timers and alarm features. Some even have built-in cassette recorders (see side bar).

Most shortwave radios in the $200 class perform quite satisfactorily. I've even had success tuning in digital modes such as Slow Scan Television (SSTV), Radio Teletype (RTTY) and Weather Facsimile (WEFAX) with an inexpensive digital interface connecting my radio to a PC. Thanks to their common crystal-controlled phase locked loop tuning, these radios are very sensitive and, thanks to their simple layout, extremely user friendly. And, when attached to a good external antenna the performance on these

receivers will not degrade. In fact, they'll improve! There are a number of radios in this class worth checking out; see list below for models and sources.

❖ Final Analysis

Generally, shortwave radios in the under $100 class are not considered serious shortwave listening radios for several reasons. Instead of digital read-out PLL tuning, these radios typically use analog tuning which is harder to read and difficult to get separation between two nearby stations and, of course, have no memory for storing favorite frequencies. They usually have no capability of tuning SSB or CW transmissions either. Some operate only on batteries with no AC adapter available. Most have no external antenna connection, which is just as well because, if you were to hook up a decent antenna to such a receiver, the signal overload would make tuning even more difficult.

Buying one of the models listed below is a great starting point for the shortwave beginner. Not only are you getting a good starter receiver, but you'll be able to trade it in if you decide to upgrade to a more sophisticated desk-top receiver. Or you may decide, as I did, to keep it and use it as your back-up, traveling and/or emergency receiver. If you ever have to send in your "big bucks" receiver for repairs, you'll really appreciate having a good back-up.

❖ MODELS and SOURCES

Maker Model	Price	Batteries	Notes*
Grundig Yacht Boy 400PE	$200	6 "AA"	40 presets
Radio Shack DX-398	$250	4 "AA"	40 SW, 18 AM, 18 FM, 9 LW presets, has auto record timer
Sangean ATS-818CS	$230	7 "AA"	45 presets, built-in cassette recorder
Sony ICF-2010	$360	3 "D"	32 presets, Receives Air Band

*All of these models are occasionally discounted, look for sales

Sources
Amateur Electronic Supply 800-558-0411:
http://www.aesham.com
Grove Enterprises, Inc. 800-438-8155:
http://www.grove-ent.com
Radio Shack 800-THE-SHACK:
http://www.radioshack.com

Beginner's Corner Tip-of-the-Month

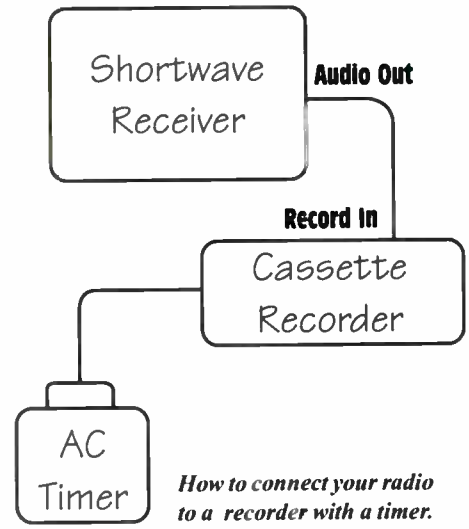
❖ Listen To BBC World Service in Your Car

Tired of listening to local radio during your daily commute? Here's a cheap and easy way to hear the latest news and features from the BBC World Service in your car. An hour before you take off for work, slip a blank cassette into a portable recorder, attach it to the audio output of your shortwave radio. Using the shortwave guide in this magazine, tune in the best frequency for the BBC and press the record button. When you're ready to hit the road, pop the cassette out of the recorder and slip it into your car's cassette as you take off for work.

All purpose portables give good performance, allow flexibility without breaking the budget. This model even has a programmable cassette recorder built-in.

The Sangean ATS-818CS is a perfect radio for this as it has a cassette recorder built-in which can be programmed to turn on and begin recording whenever your favorite program comes on. Radio Shack's DX-398 has three built-in timers and audio control jacks to let you record up to 3 different stations while you sleep. All you add is your own recorder!

You can also set up to do this automatically with your existing radio and cassette recorder using a simple timer switch (see diagram). Set your shortwave radio to the frequency you wish to record and turn it on (adjust for proper volume); run a patch cord from the audio out of the radio to the input of the cassette recorder; plug the AC cord of the cassette recorder into an appliance timer (such as Radio Shack's 61-1068) and set the timer to come on when the program is scheduled to air. When the timer kicks in, the recorder will start recording and whatever's coming through the patch cord will be recorded. If you're using an automatic reverse cassette recorder you'll get 90 minutes of news and information for a nice long commute. Of course, you can do this with any radio source. Want to listen to a favorite late night talk radio show but can't stay up that late? Record it!



How to connect your radio to a recorder with a timer.

Ask Bob

Bob Grove, W8JHD
bgrove@grove-ent.com

More on Police Radar

In our August column, we addressed a question about short-term frequency drift affecting accuracy in police radar speed detectors. A comment from a former police officer (Bob Scott, KD4EBM) reminded me that frequency drift wouldn't be a problem because the reflected signal is compared with the transmitted signal, so any frequency drift would automatically cancel. Thanks, Bob.

***Q.** I have an old BC800 scanner, and recently I haven't been able to hear anything but the NOAA weather broadcasts. What could be wrong? (John Heaton, Palm harbor, FL)*

A. There are several reasons why you might not be hearing anything but one station on your BC800 scanner. All of the following assume you are using the plug-in antennas, not an outdoor antenna:

You are using only one antenna jack (there are two antenna jacks; the shorter 800 MHz antenna goes into the higher connector on the back, the longer is for 30-512 MHz and plugs into the lower jack);

You are in a weak signal area, but close enough to the NOAA weather tower to hear it;

The antenna jack's center terminal has become loose from the circuit board;

The antenna jack's center terminal has flared too wide from wear to contact the antenna plug;

The RF preamplifier transistor has given up, possibly from a nearby lightning strike or intense radio signal, lowering overall sensitivity;

The construction of the building uses a great deal of metal reinforcement, shielding the radio's antenna from effective signals strengths;

You are not programming valid frequencies into the radio for your area.

***Q.** What is the difference between a ceramic filter and a mechanical filter? (Jim Wilson, Worcester, MA)*

A. Both devices utilize the principal of "resonance," the tendency for materials to respond to mechanical or electrical energy at specific frequencies. Ceramic materials do this to some degree, and they are very inexpensive. But mechanical filters, pioneered by Collins Radio, use carefully-prepared lengths of metal, somewhat like electronic tuning forks, to resonate sharply at a specific band of frequencies. Their steep "skirts," or upper and lower limits, exhibit considerable rejection of adjacent-frequency interference.

***Q.** I heard a news report that during the Philadelphia Republican convention, protest organizers preferred a certain model Nextel cellular telephone because it also could be used as a walkie-talkie. What frequencies and power would they use? Over what distances could they communicate? Would it be legal to listen to their intercommunications? (Pete Haas, Kent, OH)*

A. I hadn't heard that report, nor do I know which models these would be. But they would probably use 824-849 MHz (cellular handset transmit) at 1-2 watts with a conceivable range of a few hundred feet to perhaps a mile or so, depending upon terrain and interference.

Since neither phone is connected to a wireline service, it should be legal to monitor them. But if this model phone uses digitized speech, attempting to hear them would be futile.

***Q.** Why do some power-cube AC adaptors ("wall warts") cause electrical interference and poor performance on radios? Can they be assisted by using better power strips? (Ed, e-mail)*

A. Inexpensive power cubes have no voltage regulation or radio-frequency noise filtering; they rely on the radio to provide those (if it can). Radios with internal AC power supplies have better voltage regulation and noise filtering. Without it the radio may exhibit instability (frequency drift, reduced performance, AC hum, radio-frequency interference, dim display, audio "pumping" at higher volumes).

While some power strips do have noise reducing circuitry, none has voltage regulation, nor should they. The problem is not at the primary AC line where commercial regulation is better than 1%, it is at the output of the wall wart's DC, where the actual voltage varies with the load current needed by the accessory it's powering.

For example, most 12 VDC wall cubes measure about 16 volts without their powered accessory turned on, dropping to 12 volts when the accessory draws the amount of current stamped on the wall wart. If you exceed that current, the voltage continues to drop even lower.

***Q.** I was very interested in the comparison between the popular Austin Condor rubber antenna and the Diamond RH-77 which you recently published in MT. I bought a Diamond look-alike, a Comet CH-701X, from a ham radio dealer. It has excellent performance, too; is it the same antenna? (Bill Crocker, e-mail)*

A. Probably. There is a great deal of private labeling from the Far East; one manufacturer will turn out a product for a wide variety of distributors and vendors.

***Q.** What is going to happen to scanners when the world goes digital? I would like a new scanner, but is it going to become obsolete soon? (Jason Williams, e-mail)*

A. Scanners cannot legally decode scrambled transmissions, whether analog or digital, on any frequency. If the proposed APCO 25 digital system is determined to be for privacy, then no digital decoding is likely in future scanners. Still, over the next few years we will see a gradual – not mass – migration to digital among public safety agencies, much less so for business users. It's safe to buy a scanner without fear of it being obsolete soon.

The migration to digital will be slow, pushed by overzealous manufacturers' sales forces scaring two-way radio users into thinking their privacy will be compromised by massive and malicious eavesdropping with their present analog communications.

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 WWW site: www.grove-ent.com

Bright Ideas

Gary Webbenhurst
ab7ni@arrl.net

68 In late July, an F4 tornado hit Granite Falls, Minnesota, only about 95 miles from my home in South Dakota I was on scene less than two hours after it touched down. I spent four days assisting the American Red Cross with their disaster response. I could have used some help. Not a single local ham radio operator stepped forward.

This is an example of a situation in which local scanner buffs could have helped out. The Red Cross frequency (47.42 MHz) and the Salvation Army frequency (461.450 MHz) do not require a ham license. If you are interested, contact your local Red Cross or the Salvation Army. It is important that you get signed up before the disaster happens. These organizations will provide the training, ID badges, and transceivers. However, they have no scanners, and that's where you can help.

During those four days, I left my Scout Frequency Finder running in my vehicle. It logged many emergency and media frequencies. During my time off to rest, I kept the scanner going and logged much of the action. The Minnesota statewide fire mutual aid channel of 154.295 was incredibly busy. Likewise for the law enforcement interagency frequency of 155.475.My tip? Be prepared; you never know when a major event will happen.

69 Early August found me packing up and heading for my new home in Spokane, Washington. As I write this in late August, the Y2000 fire season is one of the busiest on record. Being a tree hugger, I cringe at the loss of our natural resources. I try to find something positive by listening on the scanner to the many busy fire channels. I am carefully updating my USFS/BLM/BIA/DNR frequency list. My tip? Update your own list for next season or email me for mine. My list is geared to the West Coast.

70 Let's see, how many shopping days till Christmas? The theme of this month's column is plotting (I mean planning), for your holiday gift wish list. I hope to give you some "bright" gift ideas. You can then convey your wishes to all the potential gift givers. You might want to make copies of this page and leave them lying around the house. Naturally, you would highlight your wish list items with a yellow highlight marker pen.

My tip is to get organized and get some catalogs. First on the list is the Radio Shack catalog. This year they are giving out FREE computer bar code readers to use in conjunction with their catalog. Note: these bar code readers and the accompanying software program have many other features. Run in and get yours now. (There also is a new separate "Commercial" catalog. Ask your local RS store manger about it.)

❖ Other Catalogs (sources of gift ideas):

Cabelas:
http://www.cabelas.com 1-800-237-4444
Digi-key at:
http://www.digikey.com or 1 800-344-4539
Forestry Suppliers Inc.:
http://www.forestry-suppliers.com or 1 800-647-5368
Galls Fire/Police:
http://www.galls.com 1-800-477-7766
Grove Enterprises:
http://www.grove-ent.com (on line catalog)
MFJ Enterprises:
http://www.mfjenterprises.com 1 800647-1800
National Fire Equipment:
http://www.nationalfirefighter.com or 1 800-423-8347
Sportys Pilot Shop:
http://www.sporys.com or 1 800-Liftoff

These are not necessarily radio catalogs, but I guarantee you will find some "must have" items that are related to our hobby.

71 I have tried fanny packs and backpacks to carry my sizable cache of radio equipment. While that often works, I have added a new mode of carrying around my equipment: a lightweight mesh vest. Several hobbyists make use of vests including hunters, fishermen, photographers, and explorers. These typically have many pockets on the outside. I also like the big inside pockets.

It means your radios are not on your belt where they tend to get banged around or even knocked to the ground. You can carry extra batteries, antennas, sunglasses, water bottle, simple first aid items, and of course extra radios. Discretely, no less. These can be worn over a T-shirt in warm weather or over a long sleeved shirt or jacket in the cooler weather. I suggest you get a XL size, as this allows plenty of movement. Check with your local camera, sporting goods stores or on line vendors. Here is a partial list:
http://www.vestedinterest.com/still.htm
http://www.cabelas.com/texis/scripts/store/+/CatalogDisplay/displayPOD/CabFALL1998/CabFALL1998AnAFAF/IA1511
http://www.bananarepublic.com/deptmain.asp?loc=man&sid=EN3RMG9JD5SR2GFV00A3HBSLGSPD5P92
My recommendation: http://thefstop.com/equipment/new/vest.html (about $55)

72 A new scanner would be nice, but it depends on your budget. If you are reading this magazine, then I will assume that you are up to speed on the new scanners and radios that hit the market. But if you're really into airshows or live near an airport, a dedicated aircraft scanner may be just the thing. Sporty's Pilot shop offers an aircraft-only scanner (118-137 and 225-400 MHz) for $150. Check it out at 1-800-Liftoff.

73 How about new computer simulation games? One is Incident Command and the other is Fire Rescue. You can practice your skills at being the "Incident Commander."

New Fire and Incident Command simulation software

74 I recently picked up a brand new ADI 201 VHF HT for only a hundred bucks at a hamfest. It only has forty channels and a rather slow scan rate, but it has CTCSS and a five-watt battery. I also picked up a very impressive Pryme remote speaker/microphone that feels like a $100 Motorola mic. Check out ADI and Pryme Radio Products at **http://www.adi-radio.com/** or 1-714 257-0300 (get their Spring 2000 Accessory catalog.)

Next month, I will suggest even more modest gift ideas. Enjoy your Thanksgiving.

Richard Barnett
ScanMaster@aol.com

Uniden-Bearcat BC780XLT Update

The highly anticipated release of the Uniden-Bearcat BC780XLT will soon be upon us and we thought it was time to begin outlining some of the features of this ultra-sophisticated scanner. First a quick check of the basics:

* 25-1300 MHz continuous coverage (less 512-706 UHF-TV and 800 MHz cellular)
* 500 channels (10 banks of 50)
* AM/FM/NFM/WFM modes (selectable by channel)
* Multiple step size options (selectable by channel) including 7.5 kHz for VHF and default 12.5 kHz step for 162-174 MHz
* CTCSS/DCS subaudible tone operation
* 2-line X 16 character alpha display (tag channels, banks, talkgroups, scan lists, and search ranges)
* 10 chainable user-selectable search ranges
* 10 service search ranges
* Motorola, Ericsson, and LTR Trunking capable (10 banks, 100 talkgroups per bank)

It is of course the last item which interests so many of our readers in particular. The 780, known as the TrunkTracker III, has the most advanced trunking capabilities ever designed into a scanner. This month, we'll take a look at the 780's Ericsson trunking features.

❖ The Basics

You can program up to 10 EDACS trunked systems into the scanner at one time. As usual, you must program them in LCN (logical channel number) order starting with the first frequency within the bank.

You can program up to 100 talkgroups into memory for each system. Each bank contains 10 scan lists with 10 talkgroup memory locations each, so you can turn your lists of 10 IDs on and off as you see fit.

You can scan your memory locations or you can search the entire system.

You can program talkgroups in both decimal and AFS mode. AFS (agency-fleet-subfleet) allows you to break down groups of users into their individual elements (a sub-fleet, otherwise known as a talkgroup), as well as into larger elements (the police "Agency" or the police patrol "Fleet"). You can then scan or search entire agencies or fleets without programming each talkgroup within those categories into memory.

Now the meaty part – the new features:

❖ Alpha-Tagging

Each talkgroup ID, each bank and each scan list is alpha-taggable (16 characters each).

❖ Pre-Setting Your Trunk System

In the past it was difficult, if not impossible, to program a trunk system before you were within the general vicinity of the system. You needed a control channel to put the radio into programming mode. With the BC-780 you can program your frequencies as well as all your IDs and alpha tag them in advance of coming with the vicinity of a trunk system (for both Motorola and Ericsson).

❖ Narrowband EDACS

For the first time ever you can monitor what is known as narrowband EDACS. Narrowband systems are typically found on 900 MHz and are generally used by utilities.

❖ I-Call Operation

I-CALLs are unit-to-unit transmissions made within the trunked system. Instead of a standard talkgroup broadcast wherein one unit is transmitting and a group of users hear the call (for example, a dispatcher broadcasting to a car but all cars in the district monitor the transmission), in an I-CALL only the two units involved are party to the conversation.

In Search Mode you can enable I-CALL reception through the MENU key, by bank. There are three settings:

1. OFF. As with all other scanners, the 780 will search the system and receive talkgroups but no I-CALLs will be heard.
2. ON. The scanner will stop on both regular talkgroup transmissions as well as on I-CALL transmissions. You can follow I-CALL conversations as well.
3. ONLY. You can set the search mode to only respond to I-CALL activity. Talkgroup transmissions will not be heard.

In Scan Mode you can enable I-CALL reception without going through the menu:

1. When you have found an I-CALL ID in Search, you can hit the Enter button to place that ID into Scan List memory. When you go back into Scan, any I-CALLs made by or received by that ID will be heard (note that there are a couple of ways these radio systems can be configured for relaying I-CALL information and that may require you to enter both I-CALL IDs into memory to hear both sides of a particular conversation.
2. You can enter ".0" into memory. This will allow you to hear all I-CALLs while you are scanning your favorite IDs in your Scan List. Many users may wish to dedicate a Scan List to the one memory location of ".0" so they can turn I-CALLs on and off during Scan with one keystroke as they desire.

Note that the display will show a lower-case letter I in the display along with the decimal notation of the I-CALL ID. In addition the word I-CALL will appear along with the ID number.

❖ Emergency Call

Any time there is an emergency call on the Ericsson system where an officer has pressed the emergency button on his radio, the display will flash "EMERGENCY" and a unique tone/beep sound will be heard.

❖ Patch Operation

There are times when a dispatcher will desire to patch together two or more talkgroups and create an entirely new talkgroup within which a variety of users will be able to easily communicate. Oakland, California, is a good example of this. Often times, late at night, two patrol groups will be dispatched by one individual rather than two. Instead of using one of the two talkgroups, a new talkgroup number is created by the system. In any previously made scanner, if you were scanning (rather than searching) you would have no idea you were missing communications except for the fact that things would be quieter than usual. The talkgroups on which you normally heard activity would be quiet.

The BC-780XLT will display the word PATCH ID on the screen during such a transmission and then alternately flash all the talkgroups included with the patch. The scanner knows that the talkgroup within your Scan List is now a part of the patch and that patch transmission will be heard.

❖ Blockout

On Uniden scanners, using AFS programming, you can listen to all communications within a talkgroup, a fleet, or an Agency, all with a few keystrokes. With the BC-780 you not only can do this, but you can also lock-out entire fleets or agencies during Search in the same way. Let's say you wanted to monitor all the communications within an Ericsson system except those of the Public Works "Agency" (Agency 12 for example) and the Police Traffic Bureau "Fleet" (Fleet 02-04 for example). While searching, simply enter those digits, press lockout, and they will have "blocked-out" all the fleets and subfleets during your search. You'll hear everything on the system except what you've specifically excluded.

For more details on the new scanner, check out **www.bc780XLT.com**.

❖ Trunking System News

Speaking of Ericsson systems, Tom Hirsch recently wrote us a very interesting follow-up to a story on a major Florida trunked system. While we have been so grateful to people who supply information they've found during business or vacation travel, there is always a higher likelihood of error in that these people are only monitoring for a short period of time. Tom recognizes this and we appreciate his outstanding work on correcting and clarifying a past report.

"Richard, I saw your information on the 5-channel EDACS system in the Daytona Beach area, published in the August *Monitoring Times*, and submitted by Brian Cathcart. As you know, just about every frequency or talkgroup list you see has errors in it. That's one of the most frustrating things about the trunk-tracking hobby. Also it's very irritating, when you bring these errors to the attention of the person posting the information, much of the time, the person posting the information shows little or no interest in correcting the false information, and often the information is not corrected in the databases after you identify the errors and give that information and the corrections to the people posting it on websites.

"Since I've exchanged info via e-mail with you, and since you are a writer for *Monitoring Times* I believe you're a person of integrity, and one who strives to be correct. You provide lots of helpful advice and information to scanner hobbyists. I'm therefore giving you corrections to the info in the article. I have sent a similar e-mail to Brian Cathcart, whom I have known for several years.

"(1) The City of Daytona Beach does NOT have its own separate trunking system. It had licenses for frequencies and previously operated on 1-2 trunking systems, but no longer. Daytona Beach is on the Volusia B system. The city signed a contract with the county and with Communications International to go on the Volusia system. Daytona may have given or sold some of its frequencies to the county to accommodate the additional loading of the system that it joined, but I have not seen any confirmation of that.

"(2) Daytona Beach, Holly Hill, Ormond Beach, and Daytona Beach Shores have eliminated their own separate city fire dispatching operations, and these are all dispatched (simulcast) on the Volusia A & B systems. EVAC, the emergency medical foundation dispatches for these cities, and for Volusia County Fire Services. EVAC also operates the ambulance service for all of Volusia County.

"(3) Volusia County Fire Services, along with the Sheriff, Beach patrol, and other county governmental agencies are simulcast on both A & B systems. The four cities mentioned above are dispatched by the county on the county FD dispatch talkgroup, and use the county fire tac talkgroups for working alarms.

"(4) The Volusia system has undergone numerous changes since its inception, so what was true a year ago or more may not be true any-

more. And what is true today might not be valid in the future. Some cities that have incorporated in the last few years, and other communities that will decide to incorporate, may decide to form their own police and fire departments, which would bring new agencies and talkgroups. (Of course, this is true of all kinds of conventional and trunked radio systems).

"(5) The cities are allocated to either the A or B system. My understanding is that the cities are assigned to the system that best covers their individual areas.

"(6) The system you are discussing in the August *MT* article is a 5-channel system. I have confirmed through two official sources that it has only 5 channels. It is NOT a Daytona Beach system, it's the county's system. This system might be used daily, but its primary use is for the special events that bring hundreds of thousands of visitors to Daytona Beach and the surrounding area (Speed Week and other major races; Bike Week; Spring Break; Black College Reunion; Biketoberfest). These events require lots of extra public safety personnel, and hundreds of officers from agencies around the state participate in working these events. I hope this information helps you. Thanks for all your help over these several years."

❖ Mysterious Mississippi

Just when we think maybe we have all the major trunked systems in the country pretty well documented on pages such as **www.trunktracker.com** or in *Police Call*, we are reminded that there are a couple of systems out there that we know nothing about. A system which should have been easier to understand, the Ericsson system for the city of Jackson, Mississippi, has only now been fully vetted.

It was always a mystery to us why we never could find anyone with information on Jackson. The answer, we believe, is simply that Mississippi is not much of a scanner state. Let's hope some state residents write with a rebuttal (and a few frequencies for our readers)! Now on to that Jackson system:

❖ Jackson

Ericsson Trunking
Logical Channel Numbering

01	855.2125
02	855.4875
03	855.7375
04	856.2125
05	856.4875
06	856.7375
07	857.4875
08	857.7375
09	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

Talkgroups

04-021	PD1 Dispatch
04-022	PD1 Car to car
04-023	PD1 Tactical
04-024	PD1 South Operations
04-041	PD 2 Dispatch
04-042	PD 2 Car to car
04-043	PD 2 Tactical
04-044	PD 2 S. Operations
04-061	PD 3 Dispatch
04-062	PD 3 Car to car
04-063	PD 3 Tactical
04-064	PD 3 South Operations
04-081	PD 4 Dispatch
04-082	PD 4 Car to car
04-083	PD 4 Tactical
04-084	PD 4 S. Operations
06-021	Fire Dispatch
06-022	Fireground 1
06-023	Fireground 2
06-024	Fireground 3
06-025	Fireground 4
06-026	Fireground 5
06-027	Fireground 6
06-030	Fireground 7
06-031	Fireground 8
06-032	Fireground 9

❖ Massachusetts Updates

We're naturally partial to scanning in "The Bay State." Massachusetts is 180 degree opposite from Mississippi when it comes to scanning. This state has always been a hot-bed for radio hobbyists, we're proud to say. Here are a few updates sent in by local colleagues and friends.

First Dominic Mallozzi, N1DM, who helps the town of **Natick** with their communications system. You'll note the level of detail in Dom's report. Hams and others experienced in radio can provide a great benefit for their community helping to select, construct and maintain radio systems. It's a great opportunity to volunteer and have fun at the same time.

"Natick has recently added some frequencies to its Fire Department license. Here's the rundown on usage. All VHF High band channels are using PL 107.2. Both the VHF repeaters have voting receivers and the Channel-1 repeater has a backup at the Public Safety Complex on East Central Street.

Ch. 1 154.205 out/ 156.045 in - Operations repeater (at Leonard Morse Hospital)
Ch. 2 154.205 direct
Ch. 3 155.310 out/ 153.830 in - Fireground repeater (at Leonard Morse Hospital)
Ch. 4 155.310 direct
155.160 - Medical on scene channel
46.360 - District 14 base and mobile (pl=100). There is now a base on this channel in the watch room at the FD. Obviously we still have the base and some older mobiles on 33.980. Nowadays when we buy a new lowband mobile it is for 46.36

"By the way, Natick DPW now also has a base listed at the town Emergency Operations Center (EOC) at the municipal safety complex in addition to their primary base at West Street. It's running 35 watts and the antenna is at the 60 foot level on the public safety tower and appears to do a good job.

"The Natick Emergency Radio Net (Natick RACES) continues to operate on 147.420 direct (no PL) and test every Monday night at 8 pm. We will be adding a repeater on 447.675 (pl=103.5) this summer (it's at my house now being packaged). The antenna is already up at the Public Safety complex (though I need to do some work on it also).

"The EOC at the Public Safety complex now has: PD channel 1, all FD channels, Natick CD (39.180), Natick DPW, MEMA Area 1 High Band and 2 M Races. All working and permanently installed. It's all located remotely from the 911 center to keep operations on a non-interference basis. It worked real well for the Y2K non-event."

Scott Billings, a dispatcher in **Plymouth County**, Massachusetts, and a longtime contributor, provided us with the following information:

New Plymouth County Area Frequencies and Tones

Rockland Police	453.73750 / 107.2
Middleboro Police	470.8250 / 103.5
Hanover Police	483.6250 / TX 118.8 REC 203.5
Middleboro Fire	470.700 / 203.5
Hanson Fire	482.925 (not in use yet)

Future Plymouth County Control Mutual-Aid Freq (not in use yet)
Ch. 1 483.100 / 203.5 Ch. 2 483.200 / 114.8
Ch. 3 483.400 / 127.3 Ch. 4 483.475 / 141.3
Ch. 5 483.775 / 156.7 Ch. 6 483.925 / 173.8

Frequencies and systems are changing faster than ever in Massachusetts as well as in the rest of the country. This type of detail which makes sense of the changes is invaluable to all readers. If you have similar detail on new systems in your area, please send to me care of *Monitoring Times* or to my e-mail address: *scanmaster@aol.com*

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Take advantage of *Monitoring Times* special savings by entering your order directly on the internet at the Communications Electronics web site. Visit CEI at http://www.usascan.com, click on "CEI News" and get big E-Value savings. Resellers, get special pricing when you fax your sales tax license to CEI at +1-734-663-8888.

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SAVE $90 on one **AOR AR16BQ**

Save $90 when you purchase your AOR16BQ scanner directly from Communications Electronics Inc. For fast delivery, enter your order through our web site http://www.usascan.com or call Communications Electronics at 1-800-USA-SCAN. TERMS: Good only in USA & Canada. Only one coupon is redeemable per purchase. Void where prohibited.

NEW AOR® AR16BQ-A Wide Range Scanner

Mfg. suggested list price $329.95/**Only $209.95 after rebate**

Looking for a great pocket sized, computer programmable receiver with frequency coverage from 500 KHz through 1,300 MHz, excluding the US cellular band? Introducing the AOR AR16B Wide Ranger, an advanced technology handheld radio scanner featuring wide band frequency coverage, 21 preset frequency band settings, 500 memory channels in five banks of 100 channels. Don't let its small size of 2.4" wide x 4.2" high x 1.2" deep fool you. The AR16B is a full-fledged AOR receiver from top to bottom with 500 memory channels, Narrowband FM, Wideband FM and AM modes. The weight is less then 6 ounces with the antenna and battery included. This receiver also features low power consumption for long battery life. It operates using two AA batteries. Built-in automatic squelch settings. Includes monitor function to receive weak signals. Built-in S-meter, multiple operating profiles, backlit keypad and display and twelve channel steps. Now, when you purchase your AOR AR16B directly from Communications Electronics, you'll get a free "Q" option package deal upgrade, a $30.00 extra special value. This upgrade includes two 1,300 mA NEX*cell* AA size rechargeable nickle metal hydride batteries and a MAHA MH-C204F AA/AAA Nickel Metal Hydride/Nickel Cadmium battery rapid charger upgrade. Includes one year limited AOR factory warranty. For quick delivery, order on-line at http://www.usascan.com or call 1-800-USA-SCAN.

Bearcat® 895XLT-A1 Radio Scanner

Mfg. suggested list price $729.95/**Special $194.95**

300 Channels • 10 banks • Built-in CTCSS • S Meter

Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High

Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125–868.995 MHz., 894.0125-956.000 MHz.

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US Military Expanding HF Services

The United States armed forces are increasing their presence on high frequency (HF) radio. Several broadcasts that were given up for dead at one time or another are now returning or expanding.

Most striking is the complete return of AFRTS, the Armed Forces Radio/Television Service. Along with the newsier American Forces Network (AFN), AFRTS went completely to satellite distribution around ten years ago. With only a few very brief exceptions, that was it for HF listeners until the summer of 1998.

Suddenly, selected AFN and AFRTS programs appeared on 6458.5 and 12689.5 kilohertz (kHz), plus a 4 MHz frequency that is no longer used. This came as a major surprise for a couple of reasons. These frequencies are in bands allocated for maritime telegraphy and teleprinting, and their upper-sideband voice (USB) broadcasts got some major interference from adjacent channels. Also, sources at AFRTS seemed as amazed as everyone else. While downlink pirates were briefly suspected, it turned out to be just the US Navy, filling some coverage holes at sea from communication stations in Key West and Puerto Rico.

Somebody must have been listening besides a few ships and world-radio fans. This HF "voice channel" survived several rumored cutoff dates. Finally, in August of 2000, HF became the primary feed for any ships at sea not equipped with the Navy's new Direct-To-Sailor (DTS) entertainment system. AFRTS quietly ended its contract with the International Maritime Satellite Organization (INMARSAT), though two remaining commercial birds will continue to cover land areas.

Since August 1, military comm stations worldwide have been scrambling to shift things around and get a greatly expanded HF schedule going. Frequencies change weekly. Everything is still USB, and these are still utility transmitters at bases. You won't get BBC clarity here, you won't hear all AFRTS audio channels at once, and interference is still possible, but a lot of people are greatly enjoying this programming.

❖ Tentative AFRTS/AFN HF Schedule

(Not all active at press time)

Location	Day kHz	Night kHz
Barrigada, Guam	13362.0	5765.0
Diego Garcia (island)	12579.0	4319.0
Keflavik, Iceland	10320.0	6350.0
Key West, FL	12689.5	12689.5
Lualualei, HI (Pearl Harbor)	6350.0	10320.0
Roosevelt Roads, PR	6458.5	6458.5
Siganello, Sicily	4993.0	10940.0

Updates and full AFN listing at **http://www.npr.org/worldwide/shortwave.html.** Reception reports to *QSL@mediacen.navy.mil.*

❖ US Air Force Weather

Until last winter, the Air Force Weather Agency (AFWA) had a number of broadcasts in radioteletype (RTTY) and radiofacsimile (FAX). Its Automated Weather Network "switch" (AWN) sent RTTY observations and forecasts to several military comm stations for broadcast. The former Global Weather Center (GWC), incorporated into AFWA in 1997, originated faxes from a high-tech, digital processing operation at Offutt Air Force Base, Nebraska.

In keeping with international weather "wire" protocol, AWN products used the identifier KAWN, and ex-GWC used KGWC. They still do. Neither are real callsigns, though. The actual transmitters were at Air Force and Navy bases.

These "legacy" products, useful mostly to allies and anyone else not equipped with the latest real-time weather systems, moved to an "on-request only" basis some time back. Content dropped off, hours decreased, and then they were gone. Only one frequency continued to send a "black" fax tone, whistling away forever at 1500 Hz. It still whistles today.

The absence, fortunately, proved temporary. First back was KAWN, on a very old frequency, 13530 kHz RTTY. It's still there, with a nice 850/75 signal audible 24 hours a day here in California. So far, no other frequencies have been found, but there does seem to be a second transmitter that very occasionally simulkeys for brief periods. That one is even stronger here.

The GWC weather faxes came back just as abruptly during the summer, and on completely new USB frequencies. 4855, 7398, and 7870 kHz are used at night (US time), then 15781 and 19363 kHz in the day. All broadcasts are 120/576, and usually tuned 1.9 kHz lower than listed. Faxes are sporadic, but on or just before the hour is the best bet.

For some reason, significant radar weather features are sent by the Air Force on a black background, even though the full chart would take exactly the same length of time. If there's no severe weather, you get 15 minutes of black, with a white sync band. Don't autoprint KGWC unless you have a good budget for ink!

❖ "Power Control" Identified

Power companies have been adding emergency HF capability for a while now. The process accelerated last year, amid dire predictions of global disruptions from the year 2000 computer bug.

Some companies even use Automatic Link Establishment, those cyclic, gobbling noises that show up on more frequencies every day. All this noise is made by the network, as it continually adapts itself to band conditions. Since last year, we've been copying the ALE "address" (a station identifier) of POWERCONTROL.

Finally, we know who this is. It's the HF network operated by the Niagara Mohawk Power Company in New York State. POWERCONTROL is in Syracuse, NY. There's also ERCCALBANY, which presumably is a facility called the ERCC at the state capital in Albany, NY. Frequencies are 2194, 3155, 4438, 5005, 6763, 6765, and 7300 kHz, all auto-scanning ALE. The radios can appear on any of these, but once the link is established subsequent communication is in more traditional modes.

Happy gobbling, and see you next month.

Utility Logs

Hugh Stegman

Abbreviations used in this column

ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
AWACS	Airborne Warning And Control System
CAMSLANT	Coast Guard Area Master Station, Atlantic
CAP	Civil Air Patrol
CIA	Central Intelligence Agency
CP	Command Post
CW	Morse code telegraphy ("Continuous Wave")
EAM	Emergency Action Message
FACSFAC	Fleet Area Control and Surveillance Facility
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
FM	Frequency Modulation
GHFS	Global High Frequency System
ID	Identifier
LDOC	Long Distance Operational Control
MFA	Ministry of Foreign Affairs
MWARA	Major World Air Route Area
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NORAD	North American Air Defense Command
PacTOR	Packet Teleprinting Over Radio
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SCOPE	System Capable Of Planned Expansion
SHARES	Shared Resources
SITOR	Simplex Teleprinting Over Radio
UK	United Kingdom
Unid	Unidentified
US	United States
VOLMET	Aviation Weather observations

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.

66.67 RBU-Russian CW time signal station, at 2119. (Ary Boender-Netherlands)

424.0 PIS-CW Navigational beacon, Pisarovina, Croatia, at 2148. (Boender-Netherlands)

2670.0 Hampton Roads-US Coast Guard District 5, with Notices To Mariners at 0130. (Ron Perron-MD)

3413.0 Shannon Volmet, with weather for European airports at 0430. (Ashe-MA)

4027.0 Cuban CW cut numbers transmission (M8), at 06C2. (Tom Sevart-KS)

4035.0 Cuban "Atencion" AM numbers (V2), at 0509. (Sevart-KS)

4172.0 Cuban CW cut numbers transmission (M8), at 0513. (Sevart-KS)

4271.0 CFH-Canadian Forces, Halifax, with FAX weather cnarts (120/576) at 0510. (Bob Hall-RSA)

4280.0 PBC-Dutch Navy, Goeree, with RTTY channel bulletins at 2213. (Boender-Netherlands)

4316.0 NMN-US Coast Guard CAMSLANT Chesapeake, with a rare human voice reading weather instead of the "Perfect Paul" synthesizer, at 0507. (Sevart-KS)

4372.0 Giant Killer-US Navy FACSFAC Virginia Capes, setting up a tracking net with several aircraft at 0031. (Perron-MD) Giant Killer working "2-L-O" and "5-L-B." at 0358. (Sevart-KS)

4469.0 Florida CAP 709-US Civil Air Patrol net control, taking hurricane-related check-ins from Georgia CAP 544 and Florida CAP 490, at 0040. (Perron-MD)

4583.0 DDK2-Hamburg Meteo, Germany, with 50-baud RTTY weather at 2219. (Boender-Netherlands)

4675.0 Gander-Gander Aeradio, Canada, working American 484 at 0503. (Sevart-KS)

5117.0 Cuban "Atencion" AM numbers at 0531. (Sevart-KS)

5135.0 Cuban AM "Atencion" station (V2), with 3 messages at 0502. WPSU905-Possible callsign of weak station in net with BDS500 and 501, also weak, at 0544. (Sevart-KS)

5550.0 NATO 44-European AWACS, enroute to the US, working New York Radio at 0201. (Allan Stern-FL)

6513.0 VFF-Iqaluit Radio, Canada, with Maritime Information Bulletins in French, at 0120. (Perron-MD)

6586.0 Teal 13-US Air Force Reserve "Hurricane Hunter," enroute to Miami, reporting position at 2244. (Perron-MD)

6712.0 Lajes-US Air Force, Azores, with Skyking broadcast, echoed by Croughton, UK, at 0232. (Perron-MD)

6737.0 Unid-Spanish language air/ground conversation, at 0346. (Perron-MD) *[This is a Latin American search and rescue frequency. –Hugh]*

6766.0 Cuban CW cut numbers transmission (M8), Sunday at 1203. (Camillo Castillo-Panama)

6779.0 DHJ59-German Navy Headquarters, Wilhelmshaven, Germany, making voice and RTTY checks with vessels at 0037 and 0155. (Perron-MD)

6824.0 Cuban CW cut numbers transmission (M8), Tuesday at 1205. (Castillo-Panama)

6837.0 FDG-French Air Force, Bordeaux testing in 50-baud RTTY at 2237. (Boender-Netherlands)

6853.0 Cuban CW cut numbers transmission (M8), Wednesday at 1203. (Castillo-Panama)

6854.0 Cuban AM "Atencion" station (V2), right on top of Cuban CW cut numbers transmission (M8), huge interference at 0303. (Castillo-Panama) *[I love when Cuba manages to interfere with itself. -Hugh]*

6981.0 Cuban CW cut numbers (M8), messages for AATRD NUMRD ATMGD, Monday at 1203. (Castillo-Panama)

6983.0 Cuban CW cut numbers (M8), messages for TAIAD AIRAD UUGMD, different Monday at 1203. (Castillo-Panama)

7064.0 "H"-Probably Russian Navy, with a single-letter channel marker (Enigma code MX), only heard during the submarine rescue attempt, at 1930. (Boender-Netherlands)

7079.0 Unid-Strange, syncopated, distorted, Chinese, female computer voice with barely numbers in irregular strings and 4-digit prefixes, on for at least 45 minutes in the 40-meter amateur band, lots of interference, started at 1130. (Gary Cohen-China)

7646.0 DDH7-Hamburg Meteo, Germany, with 50-baud RTTY weather at 2230. (Boender-Netherlands)

8077.0 Bravo Rear-US Marine Corps exercise, working Bogue Landing Field, NC, and Oak Grove Helicopter Outlying Field, also NC, at 0547. (Stern-FL)

8429.0 RRR34-Possibly Russian, tried several frequencies up to 8434 for ARQ calling markers, at 2300. (Geoff Halligey-UK)

8939.0 Moscow-Moscow Radio Volmet, in Russian, at 0056. (Perron-MD)

8971.0 Blue Star-US Navy, Puerto Rico, taking tracking data from aircraft Razor 09, at 0131. (Perron-MD) LY 771-US Navy, working Goldenhawk, ME, at 0138. Python 06-Possible US State Department aircraft, working Blue Star at 2315. (Stern-FL)

8987.0 MKL-Pitreavie Air, UK, with CW weather at 0603. (Sevart-KS)

8992.0 Salinas-US Air Force GHFS, PR, with a short test count and ID at 0352. (Jeff Haverlah-TX) *[Just possibly the first ID ever heard from this one. –Hugh]* FAP Lisboa-Portuguese Air Force headquarters, working aircraft AC 8027 at 0436. (Perron-MD) Magic 73-NATO AWACS per pilot ID, in a patch via Andrews GHFS to Raymond 24 (Tinker Air Force Base), at 1509. Shark 71-Probably US Coast Guard, radio check with Andrews at 2305. (Stern-FL)

9023.0 Chalice Alpha-US Air Force AWACS, trying to raise Northern Lights (NORAD Northeast Sector, Griffiss, NY) at 1944. (Perron-MD)

9259.0 P6Z-French MFA, Paris, with FEC traffic in plain French and encrypted, at 1420. (Day Watson-UK)

9924.0 Oscar Echo, Eglin AFB, FL, DOD net, going to secure voice with Oscar Kilo, NAS Key West, FL, at 1911. (Stern-FL) Oscar Echo, Oscar Kilo, and Oscar Papa (Patrick AFB), same exercise at 1936. Also heard on 7674, 9069 (Larry Van Horn-NC)

10047.0 4XZ-Israeli Navy, with CW marker, parallel on 8436 and 9255, at 0240. (Castillo-Panama)

Utility Logs (continued)

10345.0 Cuban CW cut numbers transmission (M8), at 0305. (Castillo-Panama)

10536.7 CFH-Canadian Forces, Halifax, with fax weather charts (120/576) at 0528. (Hall-RSA)

10665.0 CIA Counting Station (V5), with AM beeps and Spanish numbers from a female voice, two different days of the week, at 0300. (Larry McDermott-CA)

11175.0 Hickam-US Air Force GHFS, HI, running a patch for Korean military, breaking in at one point for a "Skyking" broadcast, at 0445. (Perron-MD) Offutt-US Air Force, NE, as identified at end of an EAM, at 1527. (Sevart-KS) *[The Offutt callsign is back, after several months' absence made us all think it had gone completely remote to Andrews. -Hugh]* Reach 831T-US Air Force transport, in a patch via Thule to Hilda East, requesting divert to Lajes instead of Ascension because their tanker had to cancel, then patch to Lajes weather office, at 2340. (Charles Kling-USA)

11214.0 Thumper-US Air Force AWACS, in a patch to Deer Hunter (NORAD Western Sector, McChord AFB, WA) via Trenton Military, Canada, at 2122. (Perron-MD)

11217.0 DHM91-German Air Force Transport Command HQ, Münster, Germany, working an aircraft at 0141. (Perron-MD)

11232.0 Sentry 54-US Air Force AWACS, patch via Trenton Military, Canada, to Raymond 24 (Tinker Air Force Base), in which an in-flight emergency was declared and the aircraft was given a go for direct emergency landing, at 1706. (Perron-MD)

11244.0 Offutt-US Air Force GHFS, NE, echoing a Skyking broadcast, identified by name, at 2251. (Haverlah-TX) *[There's Offutt again. –Hugh]*

11250.0 Reach 523T-US Air Force Air Mobility Command, in an apparent patch to Charleston CP initiated by ALE, at 2145. (Perron-MD)

11291.0 Dakar-Senegal ground station for MWARA nets AFI (Africa/Indian Ocean) and SAT (South Atlantic), working Swiss air 644, Iberia 685, and Air France 6855 at 0059. (Perron-MD)

11297.0 Unid Russian Volmet at 0235. (Perron-MD) *[Probably St. Petersburg. –Hugh]*

12070.0 Last Man-US Military, referred to this frequency as "Zulu 215," not usual 211, at 1822. (Haverlah-TX)

12603.0 SVU-Olympia Radio, Greece, with CW marker at 1847. (Boender-Netherlands)

12607.5 WNU-Slidell Radio, LA, with SITOR-B (FEC) weather at 2156. (Sevart-KS)

12657.0 UIW-Kaliningrad Radio, Russia, with ARQ calling markers at 1100. (Halligey-UK)

12730.0 NMC-US Coast Guard, San Francisco, with extremely clear fax weather charts (120/576), at 1530. (Hall-RSA) *[They're phenomenal here in CA, when multipath doesn't kick in. –Hugh]*

13227.0 ARIA 1-US Air Force Advanced Range Instrumentation Aircraft, possibly deployed for a rocket countdown, working ARIA Control, came from 10780 "Cape Radio" and went to 11104, at 1558. (Stern-FL)

13257.0 Razor 22-US military, in a patch via Trenton Military, discussing a data link problem during a large combat search and rescue exercise, at 2253. (Perron-MD)

13444.0 RFQPT-French Forces, Djibouti, with many pages of 5-letter groups in ARQ, at 1710. (Hall-RSA)

13528.0 "F"-Russian Navy single-letter CW channel marker (MX), at 1838. (Sevart-KS)

13580.0 HMF36-Korean Central News Agency, Pyongyang, North Korea, with RTTY testing (205/50) and some news in English, at 1225. (Hall-RSA)

14373.4 Unid-Looked like "ASAFO," repeating a command list in slow PacTOR, possibly a mail system in Ghana, at 1644. (Hall-RSA)

14373.4 Unid-West African mission net, Spanish conversation regarding a medical emergency, in 200/100 PacTOR, at 1630. (Hall-RSA)

14396.5 KGD34-US government, Arlington, VA, taking SHARES Coordination Net check-ins from KHA 908 (NASA, CA) and others, setting possible schedules at 1700. (John Maky-AR)

14455.0 NASA 809-ER-2, asking NASA Ops for weather in Pietersburg, RSA, then discussing an Iridium satellite link, at 2209. (Perron-MD)

14506.0 NMC-US Coast Guard, San Francisco, with the usual 200/200 PacTOR traffic list beacon, holding mail for ships NKJU, NSTF, NIKL, and NLPC, at 1511. (Hall-RSA)

14550.5 GYU-Royal Navy, Gibraltar, with 6-tone piccolo (UK teleprinting mode) at 1400. (Watson-UK)

14661.7 Egyptian Embassy, Berlin, Germany, with ARQ traffic and chatter in Arabic, at 1342. (Watson-UK)

15016.0 Andrews-US Air Force, MD, with Sky King broadcast, at 0410. Andrews, with many EAM in a short period, at 0425, 0435, 0440, 0442, 0447, and 0453. Elmendorf-USAF, AK, with EAM at 0450. Pine Rose-US military, working Hickam at 0455. (McDermott-CA)

16412.7 Unid-Kinshasa, Zaire, bank correspondence in French, in 200/200 PacTOR, at 1200. (Hall-RSA)

16781.0 Unid-Station relaying SITOR-B Philippine news, in English at 1242. (Hall-RSA)

16803.0 PNA-Manila Press Agency, with SITOR-B news about the Philippines in English, at 0337. (Ken Maltz-NY)

16807.5 ZLA-Awanui Radio, NZ, with CW channel ID and brief contact with a ship in Globe Wireless' new data mode, at 2030. (Watson-UK)

16811.0 CBV-Valparaiso Radio, Chile, with ARQ marker at 0332. (Maltz-NY)

16818.5 NMN-US Coast Guard, Portsmouth, VA, with ARQ marker at 0329. (Maltz-NY)

16830.5 SVU-Athens Radio, Greece, with ARQ marker at 0326. (Maltz-NY) *[Athens Radio is being replaced by Olympia Radio. –Hugh]*

16903.0 UIW-Kaliningrad Radio, Russia, with ARQ calling markers at 1100. (Halligey-UK)

16932.0 7TF-Boufarik Radio, Algeria, with CW marker at 0319. (Maltz-NY)

16951.5 RFTJE-French Navy, Dakar, Senegal, with RTTY marker in (825/75) at 0316. (Maltz-NY)

16959.0 FUM-French Navy, Papeete, Tahiti, with RTTY marker (806/75) at 0310. (Maltz-NY)

16984.0 PWZ33-Brazilian Navy, Rio de Janeiro, with PacTOR-FEC bulletins of shipping movements, several days at 0900. PWZ33, with a painfully slow PacTOR-FEC message, in Portuguese, at 1614. (Hall-RSA)

17155.4 8PO-Bridgetown Radio, Barbados, with ARQ marker at 0248. (Maltz-NY)

17165.6 CLA-Havana, Radio, Cuba, with CW marker at 0241. (Maltz-NY)

17940.0 Houston Radio-LDOC, TX, working unid aircraft enroute to Miami from Colombia, at 1850. (Perron-MD)

17982.0 Jeddah-LDOC, working an unknown carrier's flight 030 enroute to London Heathrow, then a phone patch in Arabic, at 1644. (Perron-MD)

17991.0 DHM91-German Air Transport Command HQ, Münster, Germany, working German Air Force 099, sent to frequency "Mike" (11217), at 1452. (Perron-MD)

18012.0 Cotam 1928-French Air Force aircraft, working Circus Fraize (Ft. de France), and Circus Vert (headquarters, Villacoublay), at 2055. (Perron-MD)

18040.5 HGX21-Hungarian MFA, Budapest, with a very long ARQ message in 5-letter groups, at 1516. (Hall-RSA)

18940.0 BDF-Shanghai Meteorological, with smeary 120/576 fax of Chinese weather charts, at 0750. (Watson-UK)

19131.0 Flint 911-US Drug Enforcement Agency aircraft, working Atlas (DEA, Cedar Rapids, IA) in a Colombian drug operation, at 1550. Flint 840-DEA, asking Atlas to pass traffic to Condor 700 (Mexico), at 1554. (Perron-MD)

26132.5 ZSC-Capetown Radio, with new ARQ channel marker, at 1135. (Hall-RSA)

27557.0 Unid-Over-the-horizon radar at 1652. (Sevart-KS)

30020.0 XKC0457-Commercial FM radio paging system, Ontario, Canada, with hospital pages at 1337 (Sevart-KS) *[Similar low-VHF pagers are all over Ontario. –Hugh]*

30220.0 Unid-Spanish FM voice, sounding a lot like an incoherent Cuban numbers broadcast called The Babbler (V21), at 1900. (Maky-AR)

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Digital Meteorology

While writing this column, I must confess to often feeling somewhat akin to a trusty undertaker waiting for the next old RTTY station to ride into the equivalent of Digital Dodge City only to be shot down by the young guns of satcomms and PSK. So, to preempt some more gunsmoke, let's focus this month on weather stations still active on shortwave.

❖ Synoptically Speaking

Before we look in detail at the stations themselves, it's probably worth reminding ourselves of the wealth of data sent by the "met" stations.

The majority of traffic is sent using standardized synoptic ("synop" for short) five-digit codes, themselves embedded in standardized message wrappers from which you can tell such information as the time and location of measurement. All of these codes are defined by the WMO (World Meteorological Organization) and recognized internationally for reporting surface and other kinds of weather.

Most commonly sent are the rather cryptic AAXX- and BBXX-type codes from land and sea-based observations stations, and also the more obvious METAR and TAF reports from airfields. As examples, here is a BBXX format, and a TAF (Terminal Air Forecast) report:

```
ZCZC 932
SMVX48 EDZW 221800
BBXX
FNOU 22184 99391 70256 41498 73510 10206 20186 40226 52007
70222 86231 22255 00226 20605 3//// 4//// 80193=
NNNN
```

```
KLYH 300116Z 300124 00000KT 5SM BKN250 BECMG 0507 2SM FM0900
00000KT 1SM SCT005 TEMPO 0912 3/4SM BKN005 FM1400 VRB03KT
4SM HZ SCT025 FM1700 22007KT P6SM SCT050=
```

Although these codes can of course be deciphered by hand (see Klingenfuss Publications' *Radio Code Manual* for plenty of examples of how to do this), many of today's sophisticated digital decoders can do the hard work for you. Activating the SYNOP module (the "W" key) within the Baudot, ARQ-E, E3, M2 and M4 modules of the Hoka line of decoders replaces the 5-digit codes with their actual meanings. This decoded information can also be saved to disk for later editing or inclusion into a database or other processing tool.

❖ The Met Stations

The following stations were known to be active during fall 2000.

"RBV73 & RBV77" Arkhangelsk Meteo
50bd/500Hz Baudot
3655 and 7760kHz with broadcasts 24hrs (alternating with Fax)

"DDK" Hamburg Meteo **(http://www.dwd.de/services/gfsf/telexpln.html)**
50bd/400Hz Baudot
4583, 7646, and 10100.8kHz with broadcasts 24hrs
147.3, 11039, and 14467.3kHz with broadcasts from 0530 to 2200UTC

"HZN" Jeddah Meteo
100bd/850Hz Baudot
3745, 4570, 7625, 10215, 11125, 17590, and 23370 with broadcasts 24hrs

"SUU" Cairo Meteo
100bd/850Hz Baudot
18254kHz with broadcasts from 0600 to 1800UTC
3959kHz with broadcasts from 1800 to 0600UTC
7319kHz with broadcasts 24hrs

"YOG" Bucharest Meteo
50bd/400Hz Baudot
5882kHz with broadcasts 24hrs (subject to heavy commercial QRM)

"IMB33" Rome Meteo
50bd/850Hz Baudot
11453kHz with broadcasts 24hrs

"5TY" ASECNA Nouakchott Meteo
13665.3 with broadcasts 24hrs

"RKR74" Irkutsk Meteo
50bd/500Hz Baudot
4560kHz with sporadic AAXX messages

"CFH" Canadian Forces Meteo, Halifax
75bd/850Hz Baudot
122.5, 4271, 6496.4, 10536, and 13510kHz with broadcasts 24hrs

"KAWN" USAF AWS, Saddlebunch Key FL (and other locations)
75bd/850Hz Baudot
7785, 10998.7, 13530, 19325, and 19327kHz with broadcasts 24hrs.

Stations previously active, now thought to be defunct or operating with very occasional schedules include Beijing, Bangkok, Delhi, St. Denis, Moscow, Murmansk, Grengel, Kiev, Warsaw, Prague and Pretoria Meteos. Nairobi Meteo (5YD/5YE) seems to be occasionally active on 9041 and 17441.6 with 100bd/850 Baudot.

❖ FAPSI's ETFNJX TKAGAS Uncloaked!

Those of you reading the August DD feature on the Russian FAPSI organization, will recall the strange sequence "ETFNJX TKAGAS" which often appears in preamble to certain messages.

Well, while playing some of this traffic through the Hoka decoder's character analysis duplex module, Leif Dehio made a startling discovery. When decoded in 24.4bd Baudot code, this string of characters produces "vmgtcnjbh," the familiar lead-in sequence seen in NATO KG84 (and Russian equivalent) encrypted RTTY. It's quite likely therefore that the ETFNJX TKAGAS string is in fact the encryption unit's lead-in/synchronzation sequence for the FAPSI network. One small mystery solved.

❖ Venezuelan ALE Network

A new ALE network using the frequencies 13475 and 15600kHz (USB) has come to light recently. Identifiers so far heard are Venezuelan, mostly river locations, but also some land stations:

CDDA	Unknown
GUASDUALITO	Guasdualito
PTOORDAZ	Puerto Ordaz
MEGEIQ	Unknown
MENEMAUROA	Menemauroa
MONTECANO	Montecano

More monitoring is needed to determine if this is a military or internal network. Please write or email if you have further information on this or any other ALE network. These, and thousands more ALE identifiers (known and unknown) are available at Utility Monitoring Central **(http://www.mindspring.com/~mike.chace/identa.html)**.

❖ 4XZ Settles on New Frequencies

4XZ, the Israeli Navy Station at Haifa completed one of its usual changes of frequency during July. It appears to have settled on the following new channels: 9256, 14695 and 18426kHz

When not sending weather forecast or other coded information, the station idles with a familiar "vvv de 4xz 4xz 4xz AR" marker. A profile on the station is available at Utility Monitoring Central **(http://www.mindspring.com/~mike.chace/mil/navy/Israel.txt)**.

Thanks to Day Watson, Klaus Betke and Murray Lehman for their help with the met stations. Until next time, happy digital listening.

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Radio Yugoslavia Expelled from Bosnian Shortwave Site

Radio Yugoslavia disappeared from SW around August 20, first reported by Bob Thomas, CT. Their website soon explained what happened, brought to our attention by Jean-Michel Aubier, France. Bosnian Serb authorities had ordered RY to vacate the Bijeljina transmiter site, which is actually across the border in Bosnia-Hercegovina. RY blamed this action on NATO and even Nazis, saying the facility was owned by Yugoslavia. RY had a lesser site within Serbia at Stubline, but unlike Bijeljina, it had been bombed by the allies on May 30, 1999, and was apparently not operational, as reported in the *WRTH* 2000 via Kai Ludwig, who then expected RY would arrange SW transmissions via their Russian buddies. Ludwig found a further statement about this on RY site **http://www.radioyu.org/news.html** :

"The editorial panel of Radio Yugoslavia has announced that an envoy in uniform of the commander of Republika Srpska Wolfgang Peritsch has handed over an ultimatum to the employees in the transmission center of Radio Yugoslavia in Bjeljina to leave the center within 48 hours and suspend the broadcasting of the programme of this country's state-run radio. The ultimatum was signed by Milorad Dodik, the head of the puppet government of Republika Srpska and the authorized person of the occupational administration - the OHR for Bijeljina.

"This illegal, immoral and violent act followed a series of threats to the employees in Radio Yugoslavia's transmission center in Bijeljina, who have been exposed to constant pressures ever since the installation of Dodik's puppet government. The violent act reflects the attitude of the NATO countries towards the media which are not run by the NATO authorities. In the course of the aggression against this country, Radio Yugoslavia's transmitters on Mt Ovcar, in Makis and Stubline were bombed... We will find ways to broadcast the truth to the world and we call on our colleagues, naturally those who have not sided with the enemies of this country, to support us..." Then RY announced its programs would be carried on the Russian Express 3A satellite and via Internet.

The Bijeljina site was originally supposed to have four 500 kW transmitters, but recently only one frequency had been used at a time, and before that, only two. This led to speculation by Kai Ludwig and Wolfgang Büschel that RY had already been quietly moving some of the equipment into Serbia. But shortages of power and spare parts could also account for the previous reduction. In any event, RY says it is constructing SW facilities in Serbia as rapidly as possible. New antennas would have to be built at Stubline; Büschel points out that the quickest and cheapest to build would be rhombics.

Actually, it is surprising that RY was able to hang onto Bijeljina for so long, says Noël Green. Would the Bosnians now use it for a SW service of their own? We point out that using transmitters in Russia or China would be more secure, far less likely to be bombed by NATO again! This may be a case where it is actually advantageous *not* to have one's own facilities – as long as there is a tight contract.

Vatican Relaying Switzerland and Russia

In early September, V. of Russia added a good but unlisted frequency at 0100-0200 to NAm in English: 11825. There was speculation it could be a foreign relay, perhaps via Vatican, which was to relay VOR starting B-00 on 9765 at this time (Kai Ludwig, Ivan Grishin, *DX Listening Digest*) It seems that Radio Vatican offered airtime for VOR instead of further payments for RV transmissions via CIS sites, actually a good deal for VOR as MCCBN, the Russian relay agency, has only two sites at hand anymore which are suitable for transatlantic transmissions: Grigoriopol' in Moldova/ Pridnestrovye and Tbilisskaya between the towns of Krasnodar and Armavir (Kai Ludwig, Germany)

I was surprised to learn about possible VOR relays via R. Vatican. This past June a high-ranking delegation from the Frequency Dept. of R. Vatican visited Moscow and held extensive talks with Russian authorities about all kinds of possible cooperation. Previously, when asked to relay VoR, R. Vatican officials answered that throughout history it has been their firm policy not to relay *any* stations. They are only authorized to *buy* air time. Moscow was asking for a local (AM) relay in Vatican.

If we actually discover any kind of relay activities, this will have to be sanctioned from the very top of Vatican hierarchy. Vatican is actively seeking rapprochement with the Russian Orthodox Church, and this relay can be seen as a gesture of good will. It can be perceived as a victory for Russia, as well. Generally, it appears that there is a new policy in Moscow to seek more barter opportunities when it comes to international broadcasting. Russia's active sales of radio time to foreign stations in recent years did not improve situation for Russian SW broadcasting industry.

It is easy to assume that huge amounts paid for air time have been simply pocketed by the corrupt officials involved. The dollar-paying customers were able to get the best transmitters and antennas available, while the underfunded VoR had to settle for some outdated, poorly performing equipment. I'm afraid that UK's Merlin that represents Russian relay facilities in the West may have become an accomplice, albeit an unwilling [or means unwitting? -gh] one, to many shady deals involving SW and AM transmitters based throughout CIS. Air time exchanges will hopefully make these high scale misappropriations a little more difficult (anon., *DXLD*)

Meanwhile, Bob Zanotti of Swiss Radio International confirms the relay arrangement with Vatican Radio. Effective October 29, the 100 kW at Santa Maria di Galeria will beam SRI at 326 degrees to the UK on 6165 from 1830 to 2030 Z. This arrangement will remain in effect for the winter period. Kai Ludwig explains that last winter's relays via Germany were too close to the UK, skipping over the target.

ANTARCTICA In late August, LRA36 was heard two days apart both closing at 2045*, frequency varying slightly from 15475.57 to 15475.74 (Michael Sander, Denmark, *A-DX* via *BCDX*)

ARGENTINA 7720-USB is new feeder for Radio Continental, at 0230 soccer // 8098-LSB which was stronger and clearer. 7720 again with Continental at 1127 recheck (Horacio Nigro, Uruguay, *DXLD*)

AUSTRALIA Christian Voice tentative test schedule from its newly acquired site at Cox Peninsula near Darwin was effective Sept 18-Oct 28 at 2230-0230 on 6010 13585 17775 21680, 250 and 300 kW, bearings between 290 and 363 degrees (Andrew Flynn, Head of Engineering, Christian Vision, via *BC-DX*) Nothing audible when checked the first day here; 17775 of course blocked by KVOH. This perhaps implies regular service will begin Oct 29 with B-00 season (gh)

BENIN Radio Nationale du Benin heard fair on 7210.27 one day at 0540, the next with ID at 0601 (Walt Salmaniw, BC, *DXLD*)

BRAZIL Summer time runs October 8 until February 18. States in the north and northeast continue

*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-00=winter season, October 29-March 31; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

on standard time (Djaci Franklin Silva, Brazil, *hard-core-dx*)

BRAZIL R. Educadora, Limeira, 2378 kHz at 0150 with charlatan program: "If you have nightmares, insomnia, cancer, leprosy, get in contact with spiritualist Mestre Caceji! Lost the woman you love? I'll get her back within nine days! Master Caceji is the man who does not fear the devil! If you are wandering around like a crab, call (019) 462.2468, talk with my assistant and make an appointment for tomorrow!" SINPO 55444 (Célio Romais, Porto Alegre, Brazil, *radio-escutas*, translated by gh)

CANADA CKZN, 6160, St. John's is on 24 hours a day as of July 10th. They relay CBN 640 except from 6 AM to 9:30 AM local when they relay a morning program from CFGB in Goose Bay, according to the station's engineer, Keith Durnford (Hans Johnson, *Cumbre DX*) So confusable with co-channel CKZU Vancouver, both with *CBC Overnight* WRN relays of foreign broadcasters, 4 hours apart (gh) I suspect a lot of eastern-North-American DXers have heard Newfoundland overnight, and still believe they heard Vancouver. Be careful folks – check program hour and time to make SURE you have the right Canadian time-zone before jumping to conclusions (Larry Russell, MI, *hard-core-dx*)

CENTRAL AFRICAN REPUBLIC Radio NDEKE LUKA ("bird of luck" in Sango and in Lingala) replaced Radio MINURCA on March 27, 2000. It will continue to act as a link between the UN, NGOs and the population. Its aim is to transmit impartial, rigorous and professional information on subjects like economical and social development, security, good governance, peace and human rights. Its programs will be mostly in French and Sango. It will also become a training centre for local journalists. Radio Ndeke Luka, c/o PNUD, Av. de l'Indépendance, BP 872, Bangui (CAR) (**http://www.hirondelle.org** via Tony Vaughan, BDXC-UK) Hirondelle foundation tells Cumbre DX that a shortwave transmitter is en route to Radio Ndeke Luka, to operate on Radio MINURCA's old frequencies of 5900 and 9900 (Hans Johnson)

CHINA [non] Falun Dafa Radio on new 12150 at 2220-2304* (Silvain Domen, Belgium, *DXLD*) We checked **http://falundafaradio.org/** and tho there would be little point in having Chinese text support installed, spotted these Arabic numerals, with times converted from local UT+8 to UT here: 2200-2300 15670 15680 15690 15700, 12120 12130 12140 12150, 13575 13580 13585 13590. 1400-1500 9350 9370 9380. Presumably only one transmitter applies to each set of adjacent frequencies, hopping around to avoid jamming (gh)

CONGO DR Radio Kahuzi: HCJB tells us that while the 1 kW transmitter going to this station is capable of tropical bands, most likely will use its old frequency [reported as both 6120 and 6210 -Johnson] as fixed-tuned radios have previously been distributed in the area. Kahuzi's old shortwave transmitter was 100 watts, built in USA (Hans Johnson, (C) *Cumbre DX*)

COSTA RICA On RFPI, 30 minutes of *Freespeech Radio News* airs Fri 2200, Sat 0130, 0600, 1400; encore: Sat 2200, Sun 0600, 1400. This is a production of Pacifica Reporters Against Censorship. Over 40 freelance reporters in 14 US states and four continents are boycotting Pacifica Network News for censoring legitimate news stories, putting their livelihoods on the line. For more info and to support the strike fund visit **http://www.savepacifica.net/strike/news** (*RFPI Weekly Update*)

RFPI expected to have FM-quality MP3 streaming by October but only during non-business hours of 0000-1200 UT and 24h on weekends, since the line is shared with University for Peace. Expects to have own line and 24/7 service by March (Joe Bernard, RFPI *Mailbag*) see also UN

R. Fides, the oldest Catholic station in CR, on AM and FM, has launched a new webpage, **http://www.radiofides.co.cr** and seems to be ready to start SW broadcasts, mentioning "TIAC has its international callsign on 9955 KC,', which would be new since it has not been on SW for many decades. An inquiry to the station has not been answered (*Radio Católica al Dia* via Nicolás Éramo, *radioescutas*) But what about all the Cuban jamming, and incidentally, WRMI? or does it have a deal with WRMI? (gh) No deal with Radio Fides. They're obviously crazy to choose 9955, unless they were assigned that by the government. That would be a clear conflict (Jeff White, WRMI, *DXLD*)

On 4260.7 at 1030-1100, ID as R. Pampa, which is a harmonic 3 x 1420, mixing with Cuban R. Rebelde harmonic on 4260, 6 x 710 (David Hodgson, TN, *World Of Radio*)

CUBA RHC is using a new antenna beaming straight north, 13 dB gain, beamwidth estimated 40 degrees to the -3 dB points, take off angle 14 degrees. On 11705 USB, -6 dB carrier, 30 kW PEP, English 0000-0500 (Arnie Coro, RHC, NASWA *Listeners Notebook*)

[non] Another story about R. Martí blowing the Elián rescue story by delaying it four hours, and the repercussions of same is *Broadcast Blunder* by Kathy Glasgow. See **http://www.miaminewtimes.com/issues/2000-08-31/feature2.html/page1.html** (Armando Mastrapa III, Crisis at Radio Martí **http://www.cubapolidata.com/carm/carm.html** via *hard-core-dx*)

DOMINICAN REPUBLIC On 2700.10 Ondas del Yuna harmonic 2 x 1350 at 0924 and 0943 two days apart with Bachata music, canned time check and ID, very good signal both days (Mark Mohrmann, VT, *DXLD*)

ECUADOR Radio Federación, Sucúa, reactivated on 5980 at 2250-2330* in Shuar (Yimber Gaviria, Colombia, *DXLD*)

On HCJB, Allen Graham canceled *El Mundo Futuro* [the science and religion program in English] because of his new duties in the Spanish section, leaving him time to produce only one show, *DX Partyline* (Roger Chambers, *swprograms*)

EQUATORIAL GUINEA R. Nacional, Malabo, 6249.35, 2220-2302* Spanish and vernacular talk, ID, local Af folk music, s/off with NA. Good. Down slightly from 6250 and on air one hour later than scheduled 2200*. Looking for LAm clandestines but only found this (Brian Alexander, PA, *DXLD*)

ETHIOPIA Radio Ethiopia has made its presence in the net, with help of Jonathan DeFabritis Publishing & Consulting, at: **http://www.angelfire.com/biz/radioethiopia/** (Pentti Lintujärvi, *hard-core-dx*) Includes some audio files like month-old English news from TV, not radio (gh)

GREECE VOG keeps messing with its underpublicized English hours. One Sunday at 1804 on 17705 via Delano, plenty of Greek music remained but no longer announced in English as *It's All Greek to Me* (gh)

GUIANA FRENCH On Sept 13, SRI announced, "For listeners on SW in Africa, Central and South America: A fire at the SRI relay station in French Guiana is disrupting broadcasts. Repair work is expected to take about a week. We apologize for any inconvenience (Jonathan Fowler, SRI via Larry Nebron) We immediately checked 9885 and 9905 at 0235 and found them about the same strength here and no satellite delay between them, only a slight reverb. Another Bonaire?

It soon became clear that all Montsinéry broadcasts were off, including RFI, R. Japan and CRI as well as SRI. R. Japan soon publicized a temporary substitute schedule using France and Ascension sites; CRI was gone from 9730 at 0400. Bob Zanotti and Ulrich Wegmüller of SRI informed us that following the Sept 10 explosion and fire in a high-voltage transformer, SRI transmissions via French Guiana had been moved on the same frequencies to Issoudun, France, and after a week had passed it was then expected to take a month to get the relays back on the air (far longer than Bonaire in April which had a worse fire). There was no infrastructural damage to the transmitters or antennas, themselves. There was some water damage to the facility. RFI said nothing about the fire on its website, continuing to list French Guiana relays, but most of these were probably moved back to France as well. The signals monitored here on some of the same frequencies were much weaker than before (gh)

GUYANA GBC reactivated on 3289.74, at 0230-0345+, English DJ chatter, local and US pops. ID as V. of Guyana, mentions of GBC Radio; fair. Also at 0650; nothing on 5950 (Brian Alexander, PA, *DXLD*) On 3289.7, The Voice of Guyana Sept 8 at 0645 BBC news relayed till 0800. Christian religious programming till 0840 Muslim call to worship, with Islamic chant, ran till 0845; ad for sheets from Gapwaters. At 0900 Indian subcontinental music followed by a rendition of Leo Sayer's "I Need You"! Very interesting station. Probably one of the most eclectic formats in the world, due to wide cultural mix. Excellent signal, very nice copy here (David Hodgson, TN, *Cumbre DX*)

ISRAËL IBA first moved an English broadcast from 1400-1430 to 1600-1630, then changed the only frequency, toward WEu and NAm, 15640 to 17535 (Moshe Oren, Bezeq, and via Doni Ronsenzweig) And should now be at 1700, perhaps on yet another frequency (gh)

Galei Zahal at 1045 very poor on v15784.23 (Wolfgang Büschel, Germany, *BC-DX*)

[non] Kol Israel Reshet Alef via DTK, Germany, noted on Sept. 3 at 0800-0845 excellent on 21590, instead of Voice of Hope program! (Ivo and Anguel, *Observer*, Bulgaria) That must be a first, Israël via Germany! Wrong satellite input? (gh)

KAZAKHSTAN You can hear a lot of SW transmissions from here - but all of them relays of various international broadcasters (Radio Free Asia, etc.). No transmissions of its own from this country at present (Kazak Radio or Radio Almaty) (Mikhail Timofeyev, St. Petersburg, *hard-core-dx*)

MÉXICO R. Mil, 6010, printed SW program schedule effective 1 June 2000 shows *Encuentro DX* at following times and days strictly converted now to UT after DST: Sat 0030, Sat 0600, 1430, 2300, Sun 1500, 2330, Mon 0500. Only the Sat 0600 broadcast of this is shown as simulcast on XEOY 1000 kHz. A few other programs noted: M-F 1200-1500 *Noticiario Enfoque*. UT Wed 0200-0300 *Grandeza Mexicana*. UT Fri 0200-0300 *Diálogos al Desnudo* (via Takeshi Sejimo, *Radio Nuevo Mundo*)

NICARAGUA On 5770 USB, Radio Miskut on late from tune-in at 0305 one UT Sunday until last check at 0500, with what sounded like a soccer game (Walt Salmaniw, Victoria, BC, *DXLD*) Wondering just when R. Miskut actually signs on, I left a receiver on frequency from before 1100, finally heard start up at *1200 just as fading out, but darkness lasts a little longer in Nov and Dec (gh)

NORWAY/DENMARK The first version of NRK and R. Denmark B-00 schedule lacks any 25 MHz channels. A pity no use of the top band is possible, even at solar max, and indeed 21 MHz is used only three hours a day, with heavy reliance on 18910 and 18950 eight hours a day:

0800-0855 18950 FE/NZ
0900-0955 21725 ME
1000-1055 21725 SAm/WAf
1100-1155 21760 SAm/WAf
1200-1255 18910 SEAs/WAu/Russia
1200-1255 18950 ENAm/Carib
1300-135518910 SEAs/WAu/Russia
1300-1455 18950 E&CNAm/Greenland
1600-1655 18950 WNAm/Greenland
1700-1755 18950 ENAm/Caribbean
1800-1855 18950 ENAm/Greenland

Norway occupies the first half of each hour, Denmark the second half. Nothing is in English (via Erik Køie, Radio Denmark)

PALESTINE [non] Via Iran, The Voice of the Islamic Revolution of Palestine has

been heard in reasonably clear airspace on 9610 from 0329 with the usual *Saut'l filistin...* and the obligatory patriotic songs. I haven't yet heard the listed // 7250 (Ray Merrall, UK, via Noël Green, DSWCI)

PERÚ La Voz del Campesino, 6956.57v, one day 0045-0248* folk music, s/off with national anthem; their particular recording is not performed very well and sounds like a local town band. Another day closed at 2400* (Brian Alexander, PA)

R. Comas, Lima, on new 4880.5 at 0130 (Rogildo Fontenelle Aragão, Cochabamba, Bolivia, *hard core dx*) On 4881.2 at 0329-0455* with cumbias and salsa, announcing 1300 and new 4880 (Nicolás Éramo, Argentina, *Cumbre DX*) Has a website at **http://homepages.go.com/homepages/r/a/d/radio_cantogrande/** eMail: rtcomas@protelsa.com.pe (Pentti Lintujärvi, *hard-core-dx*)

For news coverage of the latest events, audio live and on demand from Radio Programas del Perú (730 kHz + FM) **http://www.rpp.com.pe** and CPN Radio (1470 kHz + FM) **http://www.terra.com/pe/cpn/radio1.htm** (Henrik Klemetz, *hard-core-dx*)

RUSSIA Khanty-Mansiysk transmitting center tells me they really have an official Radio Mayak relay at 0100-2000 UT (winter timing), 4520 kHz, 5 kW, UGD-type aerial system (Mikhail Timofeyev, St. Petersburg, *hard-core-dx*)

Main state broadcasting network Radio Rossii has changed its program format. One and the same program without any "time shifted versions" is on the air 24 hours a day starting on September 4th (there had been five 20 hours a day versions starting at 1700, 1900, 2100, 2300 and 0100 UT in the summer - one hour later in the winter). Checked at 1630, all these frequencies were parallel: 4485, 4895, 5290, 5905, 5930, 5940, 6160, 7220, 7360, 9490, 12025, 15165, 15305 and 17660 (Mikhail Timofeyev, St. Petersburg, *hard-core-dx*)

SOMALIA In late August, traces of presumed R. Hargeisa were audible on 7530 in the window 0327-0400 (John Sgrulletta, NY, *Cumbre DX*)

Radio Galkaacyo has settled on 6985. Has new inverted V antenna, 300 watts. English program is going well, training and enthusiasm for this will ensure it continues when I leave. *1000-1215* and *1600-1715*, English at 1200 and 1700.

Radio Banaadir now on 7020, ex 7214. Heard at 1040 till 1100*, also trying in local evening, but blocked by jamming (Sam Voron, Somalia, via Hans Johnson, *Cumbre DX*)

SRI LANKA [non] SLBC Skelton UK relay Sat only 6010 at 1858-1958 suffered from a buzzy bass tone on the uplink. Better programming than before, with a lot of local SL music, but inexcusably announced four times last winter's frequency 5975 instead of 6010, in use since March (Wolfgang Büschel, Germany, *BC-DX*)

TURKEY VOT has started webcasting, especially for areas with SW reception problems such as WNAm. Check **http://www.trt.net.tr** (Reshide Morali, VOT *Letterbox* via George Poppin, *DXLD*) Hunting around for audio link, I learnt that ABD is the abbr. for USA in Turkish: Amerika Birlesik Devletleri. Unfortunately, the internet feed often dropped out for congestion or went to noise for several seconds. And the accompanying schedule was one hour off, still showing winter UT timings in the summer! Far too many SW stations just don't get DST. But it's nice to have VOT webcasting too! (gh)

UGANDA Will wonders never cease? Radio Uganda, Kampala, 4976, full data QSL letter in 5-1/2 years for 4 IRCs which were returned because our local postmaster stamped the wrong side. v/s Machel Rachel Makibuuka. This deserves a return thank you note and proper postal reimbursement (Mark Mohrmann, VT, *DXLD*)

UKRAINE RUI puts an 11840/11705 mixing product on 11570 at 1400-1615* interfering with Pakistan fundamental (Noël Green, UK, *BC-DX*)

Mixing products will occur every time that two signals are influenced by a non-linearity in the system, for instance an oxidized contact or a dirty isolator, any element that distorts the signals. The impedance (AC resistance) seen by the signal varies with the momentary amplitude. I think that rainy weather and more specifically snowy weather with streaming water or ice on the isolators and in the curtain elements is one explanation for occasional mixing products. They may also be caused by a switch that has not been properly closed (Olle Alm, Sweden, *BC-DX*)

Such mixing products arise when a sufficient amount of one transmitter's output reaches the PA stage of the other through the antenna connections. Another instance was the now silent Kopani site with 7150 and 5915 fundamentals mixing on 4680 heard in NAm (Kai Ludwig, *BC-DX*)

UNITED KINGDOM Imagination Radio did not renew its one-year contract to broadcast on shortwave via Merlin. So its final weekly soft-rock show was September 29 at 1900-2000 on 6010. It will continue via satellite or other media (via Thomas Völkner, Kim Elliott)

UNITED NATIONS [non] UN Radio is back on shortwave, from Sept. 4 to Africa via Merlin [but probably changing for B-00 season]:

Language	UTC	Site	kHz	Beam	Main Target
French	1700-1715	Meyerton	6120	076	Antananarivo
		Meyerton	21490	42	Kinshasa
		Skelton	17580	180	Dakar, Abidjan
English	1730-1745	Woofferton	15265	140	Nairobi
		Meyerton	6125	005	Johannesburg, Harare
		Ascension	17710	065	Lagos
Arabic	1830-1845	Skelton	17565	180	Casablanca, Algiers
		Woofferton	15265	140	Cairo

It has been 15 years since UN Radio has been on shortwave. Each program includes five minutes of world news, a three minute in-depth report on one of the main items in the news, and two three-minute features targeted to various geographical regions and focusing on issues including gender, environment, health and development (David Smith, UN Radio, via RN *Media News*)

With its faithful broadcast of UN Radio programming, including daily news, during its entire 13-year existence, Radio for Peace International, Costa Rica, does not deserve to be overlooked in all the excitement about "UN Radio returning to SW.' Even David Smith and UN Radio itself, as interviewed on *Media Network*, appeared unaware that UN Radio has, in fact, been on SW all this time via RFPI, and has even been QSLing! While UN Radio taped programs are distributed far and wide, many to radio stations which never get around to airing them, but they are a great source of reusable tapes, to my knowledge RFPI is the only SW station which had been broadcasting *UN Daily News*, via phone feed. The Sept-Nov schedule shows RFPI with UN programming on 15049, 21815-USB, and 6970 at night:

UN TODAY, M-F 2145-2200 and 2345-2400, repeated Tue-Sat 0545, 1345
UN PERSPECTIVE, Tue 2330, Wed 0730, 1530, Fri 2130, Sat 0530, 1330
UN SCOPE, Wed 2130, Thu 0530, 1330, Fri 2245, Sat 0645, 1445
UN WOMEN, Wed 2330, Thu 0730, 1530, Fri 1845, Sat 0245, 1045 (gh)

USA *World Of Radio* anticipated on WWCR as UT shifted from Oct 29: Thu 2130 15685 (from Dec 9475), Fri 1030 7435, Sat 0130 3215, 1230 15685, Sun 0330 and 0730 5070, 1930 15685, Mon 0100 3215, 0600 3210, Tue 1200 15685.

Don't You Believe WINB switches to "12960" at 0000 UT. This appears more than once on **http://www.winb.com** so the webmaster must believe it. If you hear WINB on 12960 the engineer must believe it too, but it is supposed to be and actually was heard here opening at 0000 on *12160*. Program schedule is also posted, so I looked thru it for *anything* but gospel. Nope (gh)

Ed Evans, station manager of WSHB, Herald Broadcasting Syndicate, sends samples of two new QSL cards "for the new Millennium." One has a good shot of a slewable 4x4 curtain antenna against a blue sky (not easy to photograph, but done so by Wendell Davis), and the other the antenna field at sunset, with a large dish in the foreground (gh)

National Public Radio provides AFRTS USB SW info at **http://www.npr.org/worldwide/shortwave.html**

Location	Daytime	Evening
Key West, FL	12689.5	12689.5
RR, Puerto Rico	6458.5	6458.5
Sigonella, Sicily	4993.0	10940.0 [sic]
Barrigada, Guam	13362.0	5765.0
Diego Garcia	12579.0	4319.0
Keflavik, Iceland	10320.0	6350.0
Lualualei, HI	6350.0	10320.0

(Larry Van Horn, ***MT***)

Includes an extremely long minute-by-minute program schedule including NPR shows, but not all SW frequencies carry this stream (gh) Posted info still contradicted by monitoring: Guam 13362 heard all night (Finbarr O'Driscoll, Ireland, *DXLD*) Iceland believed not really active as same frequencies listed for Hawaii, and reception in Sweden indicates the latter (Stefan Björn, *hard-core-dx*) Same in Czech Republic, and 10940.5 from Sicily heard day and night (Karel Honzík, *ibid.*) Pearl Harbor's 6350 is mostly television audio, Jay Leno, David Letterman, Monday Nite Football, even, egads, *Survivor* and *Big Brother*. It's great to have Armed Forces back on the international ether, but... ("Mankel", *DXLD*)

WBCQ plans to add daytime frequency in 15 or 17 MHz band, compatible USB. Looking for a programmer wishing to cover NAm, daytime, say 8am to 5pm Eastern (Allan Weiner, WBCQ Central, *DXLD*) On *Allan Weiner Worldwide*, UT Sat 0000 [0100 after DST] on WBCQ 7415, Allan was upset about E-mails accusing WBCQ of being a Station of Hate. (gh)

WXLW, 950 in Indianapolis, heard on SW 9320 at 2350 with gun rights show, 2400 ID, still at 0100 (Liz Cameron, MI) That would be WGTG in Georgia carrying a program originating with WXLW. *Should* be a legal WGTG ID on the hour, but don't bet on it (gh) No ID at 0100 and the programming was more disjointed than the usual stuff (Liz, *DXLD*)

[non] Herald Broadcasting's service to Indonesia at 1200-1300 on 17635 is listed as via Taiwan, but Taiwan has no other broadcasts above the 15 MHz band, so this seems unlikely. WSHB refuses to reveal the actual site. Jim Moats heard a V. of Russia IS before the carrier went off. Wolfgang Büschel suggests it is actually via Novosibirsk with typical CIS tune-up tones from 1156. Joe Hanlon agrees that propagation points to central Asia (*DXLD*)

UZBEKISTAN Radio Tashkent heard on 3rd harmonic 21855 (3 x 7285 kHz) at 1520 – 1930 in Dari, Uzbek, Farsi, Arabic (Ivo and Anguel, *Observer*, Bulgaria)

VIETNAM [non] Que Huong: studying their website and WHRI's, this clandestine appears to be on 12150 via Tajikistan 2300-2400 Mon-Fri and via KWHR Saturdays only on 17510, ex Mon-Sat (Hans Johnson, *Cumbre DX*)

ZIMBABWE [non] Mailing address for clandestine V. of the People, 7215 via Madagascar is: P O Box CY 3093, Causeway, Harare, Zimbabwe (RN *Media Network*)

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

Broadcast Logs

GLOBAL FORUM

Gayle Van Horn

0000 UTC on 3270
NAMIBIA: NBC. Time ticks to station ID, "Nambian Broadcasting Corporation," followed by Radio Australian news. Fair strength but high thunderstorm interference levels. (Dave Valko, PA/*Cumbre DX*)

0014 UTC on 4960
DOMINICAN REP.: Radio Villa. Spanish. Frequent regional music to "*Radio Villa de...San Domingo Republica Dominicana*," audible to 0201. (Lee Silvi, Mentor, AL)

0014 UTC on 4840
INDIA: All India Radio-Mumbai. Sign on interval signal to vocal tune and station ID. Local haunting Hindi music, and then weak live talk by man, with fairly decent signal; // 4800, 3315, 3345, 5010. (Valko, PA/*Cumbre*)

0020 UTC on 9845
BONAIRE: Radio Netherlands relay. *Dutch Horizons* featuring the *Frisian Homecoming.* (Bob Relay also noted on 1845, 21590. Fraser, Cohasset, MA)

0032 UTC on 3494.57
BOLIVIA: Radio Padilla. (Presumed) Non stop Latin pops to ballads. Signal audible past 0106 but weaker. Signal slowly drifting to 3494.68 and wobbly. (Valko, PA/*Cumbre*)

0055 UTC on 11800
ITALY: RAI: News report that the editorial department of RAI plans to feature more foreign news stories. (Fraser, MA)

0100 UTC on 5637.21
PERU: Radio Peru. Spanish. Lively Peruvian vocals to mentions of Peru, and Ancash, Pasco, Santa Rosa and Cusco. Time checks and mentions of kilohertz at 0124. Sounded like an ID at 0133 with mentions on San Ignacio plus phone number. Signal went off around 0200 in mid-song. Fair, on later than usual or reactivated? (Valko, PA/*Cumbre*)

0145 UTC on 4890
PERU: Radio Chota. Spanish. Evening messages to station ID. Peruvians audible; **Radio Andahuaylas** 4840, 0150-0205; **Radio Sicuani** 4826.4, 0205-0225; **Radio Madre de Dios** 4950, 0130-0145; **Radio Reina de la Selva** (presumed) 5486.7, 0235-0240; **Radio Ilucan** 5678, 0225-0235. (Michael Schnitzer, Hassfurt, Germany/*Hard Core DX*)

0300 UTC on 11615
CZECH REP.: Radio Prague. National news and report on European Union to weather forecast. Czech via **Radio Free Europe/Radio Liberty** 11815, 0300 Russian service, with time tips, regional music and "Radio Svoboda" identification. (William McGuire, Cheverly, MD)

0359 UTC on 9634.96
COLOMBIA: Radiodiff. Nacional de Colombia. Latin music to Spanish announcer's chat. Good reception, but spoiled by **Deutsche Welle's Antigua** relay *0400 on 9640. (Walter Salmaniw, Victoria, BC, Canada/*HCDX*)

0442 UTC on 14565 LSB
PIRATE: (South America) Radio Fronteras. Heard with usual music program and Spanish ID 0442, poor reception. (Salmaniw, CAN/*HCDX*)

0805 UTC on 3290
GUYANA: Voice of. Sunday morning broadcast drifting from 3289.8 kHz. English sports report on cricket. Easy listening to country and western music, and weather update to "this is Voice of Guyana", at 0930. Indian sub continental music with strong-poor modulation, // 5950 inaudible. (Roger Chambers, Utica, NY/*ODXA*)

0938 UTC on 3234.87
PERU: Radio Luz y Sonido. Long excited talk from male announcer's mentions of Peru into local time check. Peruvian campo song 0945. ID, "Luz y Sonido" into time check repeat, plus station phone number quote. Noted under pulsing utility tone. Peru's **Radio Sicuani** 4826.37 , with unbelievable signal! Text in Aymara and program *Nuevo Amanecer.* Rapid signal fade by 1000. (Valko, PA/*Cumbre*)

1049 UTC on 12085
MONGOLIA: Voice of Mongolia. English service Mailbag program, hosted by woman. Very readable with strong signal and slight flutter. That is until 1055, when signal dropped off mid-program. (Mark Fine, Remington, VA)

1110 UTC on 15700
BULGARIA: Radio Bulgaria. *Folk Studio* program featuring the *State Folk Song and Dance Ensemble* // 17500. (Fraser, MA)

1215 UTC on 9580
AUSTRALIA: Radio Australia. Report on the 100th anniversary of the *Australian Constitutional Act.* (Fraser, MA) Station audible 0500-0515, 15515 with national news, ID and update on continuing disputes in East Timor. (McGuire, MD)

1507 UTC 5975
GERMANY: Radio Frantz. Very good signal from the *Love Parade* program, terrible music. SIO=344. (Daniele Canonica, Muggio, Switzerland)

1738 UTC on 17720
PHILLIPPINES: Radio Pilipinas. English service text by male/female in an apparent phone interview. Fairly strong signal, but made difficult to understand due to periodic interference from co-channel **Radio Romania Int'l**. Romania signed off at 1756, allowing Pilipinas to take over the channel; // 15190 heard, equally as strong at times. (Fine, VA)

1830 UTC on 15385
USA: KJES. Religious text and recitation. **WHRA,** Green bush, ME noted 17650, 2050; **KWHR**, Naalehu, HI audible 17510, 2250 with religious text and music. Good readable signal, slight fading for this Asian targeted broadcast. (Vern Breitkoph, North Vancouver, BC, Canada)

1920 UTC on 10940
SICILY: Armed Forces Radio. CNN News, NPR News and sports roundup. Additional AFN Freqs not parallel noted audible 2340-0015; 6456, 12689, 4993. (Silvi, OH)

2030 UTC on 15485
RUSSIA" Voice of WS. Music & Musicians featuring the *Festival Musical Olympus* at St. Petersburg // 11675 kHz. (Fraser, MA)

2045 UTC on 11734.07
TANZANIA: Radio Tanzania Zanzibar. Talk by woman in presumed Swahili, into regional music at 2047. Very strong signal at this time, but weak audio is obliterated by **China Radio Int'l** on 11735. (Fine, VA)

2048 UTC on 6305.95
PIRATE: Radio Laguna. Rock music format to clear ID and chat from male/female announcers. Whistle interference, recheck 2100-2130. (Zacharias Liangas, Retziki, Greece/HCDX)

2114 UTC on 14565 LSB
PIRATE: (South America) Radio Blandegue. Music program to low level text. Signal fair-poor including preamp including noise level a S4. (Liangas, GRC/HCDX)

2154 UTC on 7255
NIGERIA: Voice of. *Business News* followed by *Sports News* segment at 2156. Main news points by woman 2158, with ID 2159 continuing past 2200 with additional English news. French service commencing 2202. Very strong, crystal clear signal. (Fine, VA)

2300 UTC on 4471.5
BOLIVIA: Station ID with fair-to good signal. Additional Bolivian's audible to 0000; **Radio Santa Ana** 4649; **Radio Eco** 4702.2; **Radio Yura** 4716.8; **Radio Mallku** 4796.4; **Radio San Miguel** 4926.0. (Canonica, SUI)

2310 UTC on 11775
ROMANIA: Radio Romania Int'l. Poor signal for national and regional news. Report on Kosovo including commentary. (McGuire, MD) Audible 1744, 17805.10. English to Europe with ID, no other parallel's noted. (Salmaniw, CAN/*HCDX*)

2325 UTC on 6035
COLOMBIA: LA Voz del Guaviare. (Presumed). Spanish chat, ads with very low signal and severe static interferences. SIO=141. (Canonica, SUI)

2355 UTC on 9900
EGYPT: Radio Cairo. Fair-good quality for Interview segments to station ID and Arabic By Radio program. (McGuire, MD)

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

Gayle Van Horn, gayle@webworkz.com

Ready For an Address Update?

Thanks to our readers who replied to my invitation to provide address updates for *MT*'s Address Directory. Here's an additional address to try for **China Radio International**: P.O. Box 4216, CRI-2, Beijing 100040, China.

Thanks to Sheldon Daitch for his **Voice of America** zip code revision. The former 20547 is still used for the former USIA building, and VOA mail addressed there will eventually get there; however, using 20237 may improve your delivery.

With the renewed interest in **Armed Forces Radio** broadcasts, send your letter or report to: Naval Media Center, NDW Anacostia Annex, 2713 Mitscher Road, SW, Washington, DC 20373-5819 USA or directly via the website: **http://www.mediacen.navy.mil/**

A recent query asked "Why did you remove **Radio Denmark** from the [English Language] Shortwave Guide?" Radio Denmark no longer broadcasts in English. For many years, the Danish 50kW shortwave transmitter in Herstedvester near Copenhagen had major difficulties being heard, due to the limited capacity.

Since the Herstedvester closure in 1990, Radio Danmark has been broadcasting via Radio Norway International in Danish only. The only exceptions are an occasional special English broadcast. Unfortunately, the station replies with a no data card, but does accept English reports with one or two IRCs. Consult your *World Radio-TV Handbook* for frequency schedules and information. They usually verify within a few months, and an extra enclosure might improve your verification.

EGYPT

Radio Cairo, 9990 kHz. Full data card unsigned, plus schedule. Received in six weeks for two IRCs and an English report. Reply received from the Propagation Department; Epyptian Radio & Television Union, 24th Floor, TV Building (Maspiro), P.O. Box 1186, Cairo 11511 Egypt. (Sam Wright, Biloxi, MS)

GERMANY

Deutsche Welle, 11990 kHz. No data station card for the station's last Japanese broadcast, plus *Deutschland* magazine, sticker and card signed by the Japanese staff. Received in 67 days for a Japanese report and mint stamps. Station address: Raderbergguertel 50, D-50968 Cologne, Germany. (Kazutoshi Ogino, Japan, *Cumbre DX*) DW website: **http://www.dwelle.de>**

Radio Vilnius via Juelich, Germany, 6120 kHz. Full data station card unsigned. Received in 31 days for an English report. Station address: Lietuvos Radijas, Konarskio 49,LT-2674 Vilnius, Lithuania. (Robert Hillton, Charleston, SC) Website: **http://lrtv.lt/lt_lr.html**

MEDIUM WAVE

KLBB 1400 kHz AM. Full data QSL letter signed by Kim Koday, plus fridge magnets and bumper sticker. Received in seven days for an AM follow up report. Station running 1 kW, my best Graveyard QSL, medium wave QSL # 2,683. (Pat Martin, Seaside, OR)

KFLD 870 kHz AM. Letter and QSL signed by Ronald S. Sweattle-Director of Engineering, plus bumper sticker and bus card. Received in seven days for an AM report. Station address: 2621 West A. Street, Pasco, WA 99301. (Martin, OR)

4RF, 1629 kHz AM, Brisbane, Queensland. Full data card received in 17 days for a taped report. Station address: c/o John Wright, 4/33 Kerrie Cresent-Peakhurst NSW 2210, Australia. Station is 400 watt, this my 218th Aussie QSL. (Martin, OR)

1630 kHz AM, La Plata, Argentina. Full data color jpeg email QSL and attached letter from Juan Marcelo Escande (LW2ENS). Received in about an hour for an AM follow up report. Email address: *escande@red92.com* (Martin, OR)

XEUT, 1630 kHz AM, Mexicali, Mexico. Full data beautiful certificate and letter signed by Martha Adriana Marquez-Jefa de Radio Universidad & Gabriel Estrella Valenzuela-Director General. Station stickers for FM station enclosed. Received in three weeks for an AM report and one U.S. dollar. Station address: UABC-Radio, P.O. Box MSC 5163, 233 Pauline Ave., Calexico CA 92231-2646. (Martin, OR) Received along with certificate, large 24th Anniversary Radio Universidad FM poster with letter schedule, and questionnaire. (Terry Palmersheim, USA/*HCDX*)

WSTA, AM, Virgin Islands. Full data *Certificate of Reception* signed by Peter E. O'Malley-Program Director, plus baseball schedule and decal. Report was for their webcast broadcast **http://www.wtsa.vi/**, but they do not list an email address. Only QSL from U.S. Virgin Islands other than amateur radio. Webcast # 4 QSL. (Bill Flynn, OR/*Cumbre*)

NORWAY

Radio Danmark, 11635, 13800 kHz. No data global card unsigned, plus form letter on station letterhead. Received in 63 days for an English report, plus two IRCs. Station address: Radioavisen, Rosenorns Alle 22, DK-1999 Frederiksberg C., Denmark. (Brian Bagwell, St Louis, MO) website: **http://www.dr.dk/rdk.**

TAJIKISTAN

Voice of Russia via Dushanbe, 11500 kHz. Full data scenery QSL card, plus transmitter notation, unsigned. Received for an English report, one IRC and souvenir postcard. Station address: ul. Pyatnitskaya 25, Moscow, Russia. (Silvi, OH) Website: **http://www.vor.ru**

TURKEY

Voice of Turkey, 15295 kHz. Full data large *Turkish Folk Art* card unsigned, plus two VOT pennants, program/frequency schedule, stickers and tourist brochures. Received in 36 days for an English report, one IRC and souvenir postcard. Station address: P.K. 333, Yenisehir, 06443 Ankara, Turkey (Tom Banks, Dallas, TX) Website: **http://www.tsr.gov.tr**

UKRAINE

Radio Ukraine International. Confirmation via email for AM report, received in 12 days, note that card would be sent via airmail. Email address: *VSRU@rcu.gov.ua* (or) *mo@ukrradio.ru.kiev.ua* Station reportedly plans to begin webcast programming. (Flynn, OR/*Cumbre*) Station address: Kreshchatik str., 26, 252001 Kiev, Ukraine.

UNITED KINGDOM

Radio Wales International 9735 kHz. Full data paper QSL signed by Jenny O'Brien. Received in one month for an English report. Station address: Pros Kairon, Crymych, Pembrokesshire SA41 3QE Wales. (Marlin A. Field, Hillsdale, MI)

World Beacon 9675 kHz. Full data card signed by Scott Westerman-President plus form letter with schedule. Received in three weeks for an English report. Station address: 8133 Baymeadows Way, Jacksonville, FL 32256. (Field, MI)

UNITED STATES

KJES, 15385 kHz. Full data QSL card unsigned, plus station history letter and frequency schedule. Received in 35 days for an English report, no enclosures. Station address: The Lord's Ranch, 230 High Valley Road, Vado, NM 88072 USA. (Vern Breitkoph, North Vancouver, BC Canada)

PIRATE- WHYP, 6950 kHz. Full data Al Fansome/Radio Bob sheet unsigned. Received in five weeks for an email report to; *whyp1530@yahoo.com* (Bill Wilkins, Springfield, MO)

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☐	Alinco DJ-X10T soft case	CAS 19	$12.95
☐	Icom R2 soft case	CAS 20	$29.95
☐	Icom R3 leather case	CAS 2	$19.95
☐	Icom R3 Cigarette Adaptor	DCC 18	$24.95
☐	AR8200II leather case	CAS 21	$29.95
☐	AR8200II soft case	CAS 25	$12.95
☐	Universal Cigarette Adaptor	DCC 3	$12.95

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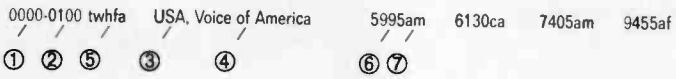
How to Use the Shortwave Guide



Convert your time to UTC.

Broadcast time on Â and time off Á 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 Â , then alphabetically by country Â, followed by the station name Ä. (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 Å will appear in the column following the time of broadcast, using the following codes:

Day Codes

s	Sunday
m	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a	Saturday
mon	monthly

In the same column Ã, 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 Ä 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 publication.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area Æ 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
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Consult the propagation charts.

To further help you find a strong signal, we've included a chart on page 64 which takes into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the section of the chart for the region in which you live and find the line for the region in which the station you want to hear is located. The chart indicates the optimum frequencies (in megahertz-MHz) for a given time in UTC. (Users outside North America can use the same procedure in reverse to find best reception from North America.)

Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours – space does not permit 24-hour listings. Our program manager changes the stations and programming featured each month to reflect the variety available on shortwave, though BBC programs are almost always included.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The capital letter stands for a day of the week, using the same day codes as in the frequency listing (see above), and the four digits represent a time in UTC.

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Program Highlights

John Figliozzi

A Fond Adieu, Media Network

With its October 26 program, **Radio Netherlands'** ***Media Network*** has regrettably ended its rather incredible two decade run as the premier source for information about communications in general and radio in particular. One can only imagine the herculean effort that it has taken to put this program together and meet deadline each and every week over that time—especially taking into account the ever increasing rapidity with which the field has been and is changing.

Every one of us should take the time to say a heartfelt "thank you" to Jonathan Marks (and to his colleagues) for that effort and for providing us with a weekly illustration of the word "excellence", for all these years. This program—indeed, this *institution*—that he created and developed with such evident care and pride will be sorely missed.

In the short term, RNMN's Thursday slot will be filled by a program titled ***Encore***, which will feature re-airings of some of RN's most popular programs.

Another New BBC On-Air

The World Service monthly program magazine has undergone another facelift and this one appears to be a major improvement. Cleaner graphics, a more manageable size, and better and more efficient use of color are just three observations one can quickly recognize in the new style. Program details now also include a UTC listing of the times programs are broadcast to all regions. At least with respect to its magazine, the BBC appears to be listening and responding to its audience.

Highlighting Time Changes

This month, the program listings section of the SWG focuses on the stations whose programs are undergoing a time shift in response to our switch to standard time. Of course, some of this is educated guesswork because most stations almost never release advance information about their plans. Even attempts to get the BBC World Service's plans in this regard from their Press Office proved fruitless. Since program and frequency departments don't always guess the same, check the previous hour for frequencies if there are none listed.

Frequencies

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		Australia, Radio	9660pa	12080va	15240pa	17580pa
				17750as	17795vo	21740vc	
0000	0100		Bulgaria, Radio	9400na	11700na		
0000	0015		Cambodia, National Radio Of	11940as			
0000	0100		Canada, CBC Northern Service	9625do			
0000	0100		Canada, CFRX Toronto ON	6070do			
0000	0100		Canada, CFVP Calgary AB	6030do			
0000	0100		Canada, CKZN St John's NF	6160do			
0000	0100		Canada, CKZU Vancouver BC	6160do			
0000	0100		Costa Rica, R for Peace Intl	15050va	21815va		
0000	0100		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
0000	0027		Czech Rep, Radio Prague Intl	11615na	13580na		
0000	0100		Ecuador, HCJB	9745na	15115no	21455usb	
0000	0030		Egypt, Radio Cairo	9900om			
0000	0100	a/monthly	Finland, Scondv Weekend Radio	11690va			
0000	0100		Guyana, Voice of	3289do	5949do		
0000	0045		India, All India Radio	7410as	9705as	9950as	11620as
				13625as			
0000	0015		Japan, Radio	6050eu	6145eu	6155af	13650as
				17810as			
0000	0100		Malaysia, Radio	7295do			
0000	0100		Malaysia, RTM Kota Kinabalu	5980do			
0000	0100		Malaysia, RTM Sarawak	7160do			
0000	0030		Mexico, R Mexico International	5985am	9705am		
0000	0100	vl	Namibia, Namibian BC Corp	3270af	3289af		
0000	0100		Netherlands, Radio	6165na	9845na		
0000	0100		New Zealand, R New Zealand Int	17675pa			
0000	0100		New Zealand, ZLXA	3935do	7290do		
0000	0056		North Korea, R Pyongyang	4405va	11460na	11710na	13760na
				15180no			
0000	0100	vl	Papua New Guinea, NBC	9675do	11880do		
0000	0100		Singapore R Corp of Singapore	6150do			
0000	0100	vl/as	Solomon Islands, SIBC	5020do			
0000	0100	vl/a	Solomon Islands, SIBC	9545do			
0000	0100		Spain, R Exterior Espana	6055na			
0000	0030		Thailand, Radio	9655af	9690af	11905af	
0000	0030		UK, BBC World Service	3915as	5965as	5975na	6175na
				6195as	7110as	9410me	9590am 9915sa
				11945as	11955as	12095sa	15280as 15310as
				15360as	17615as	17790as	
0000	0100	as	UK, Global Kitchen Merlin	3955eu	7325eu		
0000	0100		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	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	0030		USA, Voice of America	7215as	9770as	11760as	15185as
				15290as	17735as	17820as	
0000	0100	twhfa	USA, Voice of America	5995am	6130ca	7405am	9455af
				9775am	11695co	13740am	
0000	0100		USA, W8CQ Monticello ME	7415na	9330na		
0000	0100		USA, WEWN Birmingham AL	5825va	13615na		
0000	0100		USA, WGTG McCaysville GA	6890va	9320am		
0000	0100		USA, WHRA Greenbush ME	7580no			
0000	0100		USA, WHRI Noblesville IN	5745no	7315sa		
0000	0100		USA, WINB Red Lion PA	12160am			
0000	0100		USA, WJCR Upton KY	7490va	13595as		
0000	0030		USA, WRMI Miami FL	9955am			
0000	0100		USA, WSHB Cypress Crk SC	9430no	15285am		
0000	0100		USA, WTJC Newport NC	9370na			
0000	0100	sm	USA, WWBS Macon GA	11900eu			
0000	0100		USA, WWCR Nashville TN	3215na	5070na	7435no	13845na
0000	0100		USA, WYFR Okeechobee FL	6085no	9505na		
0000	0100	vl	Vanuatu, Radio	3945do	4960do	7260do	
0000	0100		Zambia, Christian Voice	4965do			
0015	0100		Japan, Radio	6050eu	6145no	6155eu	
0030	0100		Iran, VCIRI	9022am	9835no	11970na	
0030	0100		Kirgiziya, Kirgiziya Radio	4010eu			
0030	0100		Sri Lanka, Sri Lanka BC Corp	4940do	9770		
0030	0100		Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as
				15425as			
0030	0100		Thailand, Radio	15395na			
0030	0100		UK, BBC World Service	5965as	5975na	6175na	6195as
				9410as	9590am	9915sa	11955as
				12095sa	15280as	15310as	15360as
				17790as			
0030	0100		USA, VOA Special English	7215as	9770as	11760as	15185as
				15290as	17735pa	17820as	
0030	0100	twhfa	USA, WRMI Miami FL	7385na			
0030	0100	sm	USA, WRMI Miami FL	3955am			
0050	0100		Italy, RAI International	6010na	9675na	11800na	
0050	0100		UK, International BC Tamil	11570as			

Selected Programs

Daily

0000 New Zealand, R. NZ Intl.: RNZ News (domestic network newscast)
0000 Bulgaria, R. Bulgaria: News (world/Bulgarian news)

Sundays

0000 USA, WEWN Birmingham AL:Web of Faith (religious program)
0000 USA, WHRI Noblesville IN (1): New Harvest
0005 New Zealand, R. NZ Intl.: Bookmarks (NZ books/writers)
0008 Canada, R. Canada Intl.: Global Village (music/reports from musical venues around the world)
0010 Bulgaria, R. Bulgaria: Views Behind the News (current events commentaries)
0030 New Zealand, R. NZ Intl.: Future Indicative (prog for the disabled)
0030 USA, WWCR Nashville TN: The Watchman Repairer
0035 Bulgaria, R. Bulgaria: Answering Your Letters

Sundays/Mondays

0000 Canada, R. Canada Intl.: CBC News

Mondays

0000 USA, WEWN Birmingham AL: The World Over (current events from Catholic perspective)
0000 USA, WWCR Nashville TN (1): There's No Place Like Home
0000 USA, WHRI Noblesville IN (1): News
0008 Canada, R. Canada Intl.: Roots and Wings (world and folk music)
0010 Bulgaria, R. Bulgaria: Folk Studio (Bulgarian folk music)
0015 USA, WWCR Nashville TN (1): New Horizons (technology mag.)
0030 Bulgaria, R. Bulgaria: Bulgarian Plaza (cultural magazine)[fortnightly]
0030 Bulgaria, R. Bulgaria: Walks and Talks (interesting places in Bulgaria)[fortnightly]
0030 USA, WWCR Nashville TN (1): The Old Record Shop (vintage)

Mondays-Fridays

0005 New Zealand, R. NZ Intl.: Cadenza (light classics)

Mondays-Saturdays

0005 USA, WHRI Noblesville IN (1): Music (Christian contemporary & country/southern gospel)

Tuesdays

0000 USA, WEWN Birmingham AL: Catholic History in the US
0020 Bulgaria, R. Bulgaria: Sports (weekend results in Europe/Bulgaria)
0045 Bulgaria, R. Bulgaria: Magazine Economy (Bulgarian economics)

Tuesdays-Thursdays

0000 USA, WWCR Nashville TN (1): American Sovereign (anti-gun control program, contd from 2302)

Tuesdays-Saturdays

0000 Canada, R. Canada Intl.: World at Six (main domestic network evening newscast)
0000 USA, WHRI Noblesville IN (1): Bible Pathway
0010 Bulgaria, R. Bulgaria: Events and Developments (current affairs)
0025 Bulgaria, R. Bulgaria: Timeout for Music (Bulgarian pop/classical/folk)
0030 USA, WEWN Birmingham AL: Catholic Jukebox

Tuesdays-Sundays

0035 Bulgaria, R. Bulgaria: Keyword Bulgaria (Bulgaria and things Bulgarian)

Wednesdays

0000 USA, WEWN Birmingham AL: To Tell You the Truth (Catholic religious program)
0045 Bulgaria, R. Bulgaria: Arts and Artists (Bulgarian cultural events/personalities)

Thursdays

0000 USA, WEWN Birmingham AL: Mission of the Messiah (Catholic religious program)
0045 Bulgaria, R. Bulgaria: History Club (Bulgaria's past)

Fridays

0000 USA, WEWN Birmingham AL: Bedrock Basics (Catholic religious program)
0000 USA, WWCR Nashville TN (1): Freedom Now (anti-income tax program)
0045 Bulgaria, R. Bulgaria: The Way We Live (everyday life in Bulgaria)

Saturdays

0000 USA, WEWN Birmingham AL: Holy Spirit in Our Life (religious program)
0000 USA, WWCR Nashville TN (1): American Sovereign (anti-gun control program, contd from 2302)
0005 New Zealand, R. NZ Intl.: Home Grown (NZ music/interviews w/ Liz Barry)[to 0200]
0030 New Zealand, R. NZ Intl.: Musical Chairs (the life and work of contemporary NZ musicians)
0045 Bulgaria, R. Bulgaria: Radio Bulgaria Calling (for radio hobbyists)

0100 UTC SHORTWAVE GUIDE

8:00 PM EST
7:00 PM CST
5:00 PM PST

Frequencies

0100	0200		Anguilla, Caribbean Beacon	6090am			
0100	0200	vl	Australia, ABC/Katherine	5025do			
0100	0200	vl	Australia, ABC/Tennant Creek	4910do			
0100	0200		Australia, Radio	9660pa	12080va	15240pa	15415as
				17580pa	17750as	17795va	21725pa
0100	0200		Canada, CBC Northern Service	9625do			
0100	0200		Canada, CFRX Toronto ON	6070do			
0100	0200		Canada, CFVP Calgary AB	6030do			
0100	0200		Canada, CKZN St John's NF	6160do			
0100	0200		Canada, CKZU Vancouver BC	6160do			
0100	0130		Canada, R Canada International	5960am	9755am	11715am	13670am
				15170am	15305am		
0100	0156		China, China Radio International	9570na			
0100	0200		Costa Rica, R for Peace Intl	15050va	21815va		
0100	0200		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
0100	0200		Cuba, Radio Havana	6000na	9820na	11705na	
0100	0127		Czech Rep, Radio Prague Intl	7345na	11615na		
0100	0200		Ecuador, HCJB	9745na	15115na	21455usb	
0100	0130	a/monthly	Finland, Scandv Weekend Radio	11690va			
0100	0115		Finland, YLE/R Finland	11985na	13770na		
0100	0145		Germany, Deutsche Welle	6040na	9640am	11810na	13720am
0100	0130	s	Germany, Universal Life	9435as			
0100	0200		Guyana, Voice of	3289do	5949do		
0100	0200		Indonesia, Voice of	9525va	11785va	15149va	
0100	0130		Iran, VOIRI	9022am	9835ca	11970na	
0100	0200	as	Italy, IRRS	7120va			
0100	0110		Italy, RAI International	6010na	9675na	11800na	
0100	0200		Japan, Radio	9515me	11860as	11870me	15325as
				15590as	17685pa	17835sa	17845pa
0100	0200		Malaysia, Radio	7295do			
0100	0200		Malaysia, RTM Kota Kinabalu	5980do			
0100	0200		Namibia, Namibian BC Corp	3270af	3289af		
0100	0130		Netherlands, Radio	6165na	9845na		
0100	0200		New Zealand, R New Zealand Int	17675pa			
0100	0200		New Zealand, ZLXA	3935do	7290do		
0100	0156		North Korea, R Pyongyang	3560va	11735va	15229va	17734va
0100	0200	vl	Papua New Guinea, NBC	9675do	11880do		
0100	0200		Singapore R Corp of Singapore	6150do			
0100	0200	vl/as	Solomon Islands, SIBC	5020do			
0100	0200	vl/o	Solomon Islands, SIBC	9545do			
0100	0200		Spain, R Exterior Espana	6055na			
0100	0200		Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as
				15425os			
0100	0130		Switzerland, Swiss R International	9885am	9905am		
0100	0200		UK, BBC World Service	5965as	5975na	6175na	6195as
				9410me	9590am	9915sa	11955as
				12095sa	15280as	15310as	15360as
				17790as			
0100	0200		Ukraine, R Ukraine International	5905eu	6020eu	9640eu	13590eu
0100	0200		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	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	15250os	17740as
				17820as			
0100	0130	twhfa	USA, Voice of America	5995am	6130ca	7405am	9455af
				9775am	13740am		
0100	0200		USA, WBCQ Monticello ME	7415na	9330na		
0100	0200		USA, WEWN Birmingham AL	5825na	13615na		
0100	0200		USA, WGTG McCaysville GA	6890va	9320am		
0100	0200		USA, WHRA Greenbush ME	7580na			
0100	0200		USA, WHRI Noblesville IN	5745na	7315sa		
0100	0200		USA, WINB Red Lion PA	12160am			
0100	0200		USA, WJCR Upton KY	7490va	13595as		
0100	0200	twhfa	USA, WRMI Miami FL	7385na			
0100	0200	sm	USA, WRMI Miami FL	9955am			
0100	0200		USA, WSHB Cypress Crk SC	9430na	15285am		
0100	0200		USA, WTJC Newport NC	9370na			
0100	0200	sm	USA, WWBS Macon GA	11900eu			
0100	0200		USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0100	0200		USA, WYFR Okeechobee FL	6065na	15165as		
0100	0130		Uzbekistan, Radio Tashkent	7190as	9375as	9530as	9715as
0100	0200	vl	Vanuatu, Radio	3945do	4960do	7260do	
0100	0127		Vietnam, Voice of	7250na	9695na		
0100	0200		Zambia, Christian Voice	4965do			
0130	0200		Austria, R Austria International	9655no	9870am	13730am	
0130	0159		Canada, R Canada International	5960am	9755am		
0130	0159	sm	Canada, R Canada International	11715am	13670am	15305am	
0130	0200	a/monthly	Finland, Scandv Weekend Radio	11720va			
0130	0145	vl	Libya, Voice of Africa	11815af	17725af		
0130	0200		Lithuania, Radio Vilnius	9855na			
0130	0200		Slovakia, Adventist World Radio	11600as			
0130	0200		Sweden, Radio	13625as			
0130	0200		UK, RTE Radio	6155am			
0130	0200	twhfo	USA, VOA Special English	7405am	9775am	13740am	
0130	0200	twhfa	USA, Voice of America	5995am	6130ca	9455af	
0140	0200		Vatican City, Vatican Radio	9650au	12055au		
0145	0200		Albania, R Tirana International	6115na	7160no		

Selected Programs

Daily

0100 Canada, CBC Northern Sce.: CBC News
0100 New Zealand, R. NZ Intl.: RNZ News (domestic network newscast)
0100 Ukraine, R. Ukraine Intl.: News

Sundays

0100 Finland, YLE/R. Finland: Capital Cafe (Finns and what they're talking about)
0100 USA, WWCR Nashville TN (3): Power of Prophecy (conservative Christian religious/political program)
0105 Canada, CBC Northern Sce.: Finkelman's 45s (music of the 50s/60s/70s){to 0300}
0105 New Zealand, R. NZ Intl.: Eureka! (science in NZ)
0118 Ukraine, R. Ukraine Intl.: Baroque (culture and the arts in Ukraine)
0125 Finland, YLE/R. Finland: The Senate Square
0130 USA, WWCR Nashville TN (1): Life's Railway to Heaven (Christian evangelical program)

Sundays/Mondays

0100 USA, WEWN Birmingham AL: Mother Angelica (discussing the Catholic faith)
0130 Mexico, R. Mexico Intl.: Musical programming (contemporary/traditional Mexican music)

Mondays

0100 USA, WWCR Nashville TN (1): World of Radio (news of shortwave radio w/Glenn Hauser)
0100 USA, WWCR Nashville TN (3): News
0102 USA, WWCR Nashville TN (3): Discoveries in Health (alternative medicine){cont'd from 0000}
0105 Canada, CBC Northern Sce.: On Stage (Canadian classical music performances)
0106 Ukraine, R. Ukraine Intl.: Hello From Kiev (responses to listener letters/music)
0120 Ukraine, R. Ukraine Intl.: Music from Ukraine (Ukrainian folk music)
0130 USA, WWCR Nashville TN (1): DVA
0145 USA, WHRI Noblesville IN (1): Truth for the World (evangelical Christian program)

Mondays-Fridays

0105 New Zealand, R. NZ Intl.: Wayne's Music (a personal selection by Wayne Mowat)

Tuesdays

0100 USA, WEWN Birmingham AL: The Journey Home (conversations with those who have returned to the Catholic Church)

Tuesdays-Fridays

0125 Ukraine, R. Ukraine Intl.: Closeup (current issues in Ukraine)
0130 USA, WWCR Nashville TN (1): News
0135 USA, WWCR Nashville TN (1): The Sower

Tuesdays-Saturdays

0100 USA, WWCR Nashville TN (1): Looking Beyond This Life

Tuesdays-Sundays

0110 Ukraine, R. Ukraine Intl.: Ukraine Today (news/interviews/reports)

Wednesdays

0100 USA, WEWN Birmingham AL: Mother Angelica (discussing the Catholic faith)

Thursdays

0100 USA, WEWN Birmingham AL: Mother Angelica (discussing the Catholic faith)

Fridays

0100 USA, WEWN Birmingham AL: Life on the Rock (discussing the Catholic faith with teens)

Saturdays

0100 USA, WEWN Birmingham AL: The World Over (current events from Catholic perspective)
0100 USA, WWCR Nashville TN (3): American Sovereign (anti-gun control program)
0105 New Zealand, R. NZ Intl.: Home Grown (NZ music/interviews w/ Liz Barry){cont'd from 0006}
0130 USA, WWCR Nashville TN (1): World of Radio

Frequencies

0200	0300		Anguilla, Caribbean Beacon	6090am			
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, Radio	9660po	12080va	15240pa	15415as
				15515va	17580po	17750as	21725po
0200	0210		Bangladesh, Bangla Betar	4882as			
0200	1215		Cambodia, National Radio Of	11940as			
0200	0300		Canada, CBC Northern Service	9625do			
0200	0300		Canada, CFRX Toronto ON	6070do			
0200	0300		Canada, CFVP Calgary AB	6030do			
0200	0300		Canada, CKZN St John's NF	6160do			
0200	0300		Canada, CKZU Vancouver BC	6160do			
0200	0229		Canada, R Canada International	9755am	11715am	13670am	15170am
				15305am			
0200	0300		Costa Rica, R for Peace Intl	15050va	21815va		
0200	0300		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
0200	0225		Croatia, Croatian Radio	9925na			
0200	0300		Cuba, Radio Havana	6000na	9820na	11705na	
0200	0300		Ecuador, HCJB	9745na	15115na	21455usb	
0200	0300		Egypt, Radio Cairo	9475am			
0200	0300	a/monthly	Finland, Scandv Weekend Radio	11720va			
0200	0245		Germany, Deutsche Welle	9615as	11945as	11965as	
0200	0210	mtwhf	Greece, Voice of	7450va	9420va	12110va	15630va
0200	0300		Guyana, Voice of	3289do	5949do		
0200	0230		Hungary, Radio Budapest	9560na			
0200	0300		Kenya, Kenya BC Corp	4935do			
0200	0300		Malaysia, Radio	7295do			
0200	0300		Malaysia, RTM Kota Kinabalu	5980do			
0200	0230		Myanmar, Radio	7185do			
0200	0300		Namibia, Namibian BC Corp	3270af	3289af		
0200	0300		New Zealand, R New Zealand Int	17675pa			
0200	0300		New Zealand, ZLXA	3935do	7290do		
0200	0256		North Korea, R Pyongyang	11844va	13649va		
0200	0300	vl	Papua New Guinea, NBC	9675do	11880do		
0200	0256		Romania, R Romania International		9510na	9690na	11830no
				11885as	11940no	15105as	15380po
				17790po			
0200	0300		Russia, Voice of Russia WS	9665na	11825na	11990no	12045as
				15595na	17595na		
0200	0300		Singapore R Corp of Singapore	6150do			
0200	0230		Slovakia, R Slovakia International	5930na	7230ca	9440sa	
0200	0300	vl/as	Solomon Islands, SIBC	5020do			
0200	0300	vl/a	Solomon Islands, SIBC	9545do			
0200	0300		South Korea, R Korea Intl	7275as	11725sa	11810sa	15575no
0200	0300		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as
				15425as			
0200	0300		Taiwan, R Taiwan International	5950na	9680na	11740as	11825pa
				15345as			
0200	0300		UK, BBC World Service	5975na	6135am	6175na	6195eu
				9410eu	9770af	9915sa	11760me
				11955as	12095sa	15280as	15310as
				15360as	17790os		
0200	0230	a	UK, Wales Radio Intl/Merlin	9765na			
0200	0300		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
0200	0300		USA, KAIJ Dallas TX	5755va			
0200	0230		USA, KJES Vado NM	7555no			
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	11725os
				11820as	13650as	15250as	17740os
				17820as			
0200	0300		USA, WBCQ Monticello ME	7415na	9330na		
0200	0300		USA, WEWN Birmingham AL	5825va			
0200	0300		USA, WGTG McCaysville GA	5085va	6890am		
0200	0300		USA, WHRA Greenbush ME	7580na			
0200	0300		USA, WHRI Noblesville IN	5745na	7315sa		
0200	0230		USA, WINB Red Lion PA	12160am			
0200	0300		USA, WJCR Upton KY	7490va	13595as		
0200	0300		USA, WRMI Miami FL	7385na			
0200	0300		USA, WSHB Cypress Crk SC	7535na	9430na		
0200	0300		USA, WWCR Nashville TN	3215na	5070no	5935na	7435na
0200	0300		USA, WYFR Okeechobee FL	6065na	9505na		
0200	0300	vl	Vanuatu, Radio	3945do	4960do	7260do	
0200	0300		Zambia, Christian Voice	4965do			
0215	0220		Nepal Radio	5005as	7165as		
0230	0300		Albania, R Tirana International	6115na	7160na		
0230	0300		Sweden, Radio	9495na			
0230	0300		USA, WTJC Newport NC	9370na			
0230	0257		Vietnam, Voice of	7250no	9695na		
0250	0300		Vatican City, Vatican Radio	7305am	9605am		
0250	0300	vl	Zambia, National BC Corp	6165do	6265do		
0257	0300	vl	Malawi, Malawi BC Corp	3380do			

Selected Programs

Daily

0200 Canada, R. Canada Intl.: RCI News
0200 Finland, YLE/R. Finland: Compass North (news of Finland)
0200 Hungary, R. Budapest: News
0200 Russia, V. of Russia WS: News
0230 Austria, R. Austria Intl.: Report from Austria (reports on Austria)
0230 Russia, V. of Russia WS: News in Brief

Sundays

0200 Canada, CBC Northern Sce.: CBC News
0200 USA, WEWN Birmingham AL: St. Joseph Radio Presents
0200 USA, WWCR Nashville TN (1): Faith Holiness Church
0200 USA, WWCR Nashville TN (3): Tomorrow's News Today
0205 New Zealand, R. NZ Intl.: Feature (changing series/programs)
0208 Canada, R. Canada Intl.: Venture Canada (Canadian business)
0210 Hungary, R. Budapest: DX Blockbuster (for sw radio hobbyists)
0230 Canada, R. Canada Intl.: Earth Watch (environmental issues)
0230 USA, WWCR Nashville TN (1): Ken's Country Classics
0230 USA, WWCR Nashville TN (3): Alternative Health Care 101
0232 Russia, V. of Russia WS: Moscow Yesterday and Today
0235 Austria, R. Austria Intl.: Listeners' Letters
0245 Austria, R. Austria Intl.: Music from Austria (Austrian artists)
0245 USA, WWCR Nashville TN (3): Ask WWCR (listener letters)

Sundays/Mondays

0230 Mexico, R. Mexico Intl.: Musical programming (contemporary/traditional Mexican music)

Mondays

0200 USA, WEWN Birmingham AL: Introduction to Mariology
0200 USA, WHRI Noblesville IN (1): News
0200 USA, WWCR Nashville TN (1): Gospel Crusade Ministries
0200 USA, WWCR Nashville TN (3): Power on High [live]
0205 New Zealand, R. NZ Intl.: Tagata O Te Moana (Maori affairs)
0205 USA, WHRI Noblesville IN (1): Music
0208 Canada, R. Canada Intl.: Arts in Canada
0210 Hungary, R. Budapest: ..And the Gatepost [monthly]
0210 Hungary, R. Budapest: Europe Unlimited [monthly]
0210 Hungary, R. Budapest: Heading for Hungary (travel notes)[monthly]
0210 Hungary, R. Budapest: Spotlight [monthly]
0211 Russia, V. of Russia WS: Sunday Panorama
0224 Russia, V. of Russia WS: Russia in Personalities
0230 Canada, R. Canada Intl.: The Mailbag (listener mail/questions)
0230 USA, WWCR Nashville TN (1): Search for Truth
0232 Russia, V. of Russia WS: Timelines (life in Moscow)
0235 Austria, R. Austria Intl.: Week in Review
0245 Austria, R. Austria Intl.: Profile of Austria (Austrian people and places)
0245 USA, WWCR Nashville TN (1): A Last Day Message

Tuesdays

0200 USA, WEWN Birmingham AL: Truth Talks (religious program)
0205 New Zealand, R. NZ Intl.: Country Life (news and views from NZ)
0232 Russia, V. of Russia WS: Folk Box (traditional music of CIS)

Tuesdays-Saturdays

0200 USA, WWCR Nashville TN (1): Call to Decision Ministries
0200 USA, WWCR Nashville TN (3): News
0202 USA, WWCR Nashville TN (3): Point of View (political discussion)
0205 Canada, R. Canada Intl.: Spectrum (Canadian current affairs mag.)
0210 Hungary, R. Budapest: Hungary Today (current events magazine)

Tuesdays-Sundays

0211 Russia, V. of Russia WS: Commonwealth Update

Wednesdays

0200 USA, WEWN Birmingham AL: Religious Catalog
0205 New Zealand, R. NZ Intl.: Spectrum (NZ people/places/events)
0230 New Zealand, R. NZ Intl.: Insight
0230 USA, WEWN Birmingham AL: Pro-Life Update
0232 Russia, V. of Russia WS: Jazz Show

Thursdays

0200 USA, WEWN Birmingham AL: Right Here, Right Now (religious)
0205 New Zealand, R. NZ Intl.: Eureka! (science in NZ)[fortnightly]
0205 New Zealand, R. NZ Intl.: Mailbox [fortnightly]
0230 New Zealand, R. NZ Intl.: The World in Sport
0232 Russia, V. of Russia WS: Russian Musical Highlights of the 20th Century
0254 Russia, V. of Russia WS: Russia in Personalities

Fridays

0200 USA, WEWN Birmingham AL: Faith and Family (religious)
0205 New Zealand, R. NZ Intl.: Arts Week (arts issues)
0230 New Zealand, R. NZ Intl.: New Zealand, R. NZ Intl. Top 5
0232 Russia, V. of Russia WS: Music Calendar [1st wk. only]
0232 Russia, V. of Russia WS: Yours for the Asking [exc. 1st wk.]
0246 Russia, V. of Russia WS: Music At Your Request [exc. 1st wk.]

Saturdays

0200 USA, WEWN Birmingham AL: Off the Shelf
0205 New Zealand, R. NZ Intl.: Music feature
0232 Russia, V. of Russia WS: Christian Message from Moscow (the Russian Orthodox Church)

Saturdays/Sundays

0200 New Zealand, R. NZ Intl.: RNZ News (domestic newscast)
0230 USA, WEWN Birmingham AL: Register Radio (program of the weekly 'National Catholic Register')

Frequencies

0300	0400		Anguilla, Caribbean Beacon	6090am			
0300	0400	vl	Australia, ABC/Alice Springs	4835da			
0300	0400	vl	Australia, ABC/Katherine	5025da			
0300	0400	vl	Australia, ABC/Tennant Creek	4910da			
0300	0400		Australia, Radio	9660pa	12080va	15240pa	
				15415as	15515va	17580pa	
				17750as	21725pa		
0300	0330	sm w fa	Belarus, R Belarus Internatianal	6070pa	7210va		
0300	0400	vl	Botswana, Radio	3356da	4820do	7255do	
0300	0400		Bulgaria, Radio	9400na	11700na		
0300	0400		Canada, CBC Northern Service	9625do			
0300	0400		Canada, CFRX Toronto ON	6070do			
0300	0400		Canada, CFVP Calgary AB	6030do			
0300	0400		Canada, CKZN St John's NF	6160do			
0300	0400		Canada, CKZU Vancouver BC	6160do			
0300	0356		China China Radio International	9690na			
0300	0400		Costa Rica, Faro del Caribe	5054ca	6175ca	9644ca	
0300	0400		Costa Rica, R for Peace Intl	15050va	21815va		
0300	0400		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
0300	0400		Cuba, Radio Havana	6000na	9820na	11705na	
0300	0327		Czech Rep, Radio Prague Intl	7345na	7385na	11615na	
0300	0400		Ecuador, HCJB	9745na	15115na	21455usb	
0300	0330		Egypt, Radio Cairo	9475am			
0300	0400	a/monthly	Finland, Scandv Weekend Radio	11720va			
0300	0345		Germany, Deutsche Welle	9535na	9640na	11810na	
				13780am	15105na		
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	4935do			
0300	0400	vl	Lesotho, Radio	4800do			
0300	0400		Malaysia, Radio	7295do			
0300	0400		Malaysia, Voice of Islam	6175as	9750as	15295as	
0300	0400		Namibia, Namibian BC Corp	3270af	3289af		
0300	0400		New Zealand, R New Zealand Int	17675pa			
0300	0400		Oman, Radio Sultanate of	15355va			
0300	0400	vl	Papua New Guinea, NBC	9675do	11880do		
0300	0400		Russia, Voice of Russia WS	9665na	11990na	13690na	
				15595na	17595na		
0300	0330		S Africa, Adventist World Radio	6015af			
0300	0330		S Africa, Channel Africa	6035af			
0300	0400		Singapore R Corp of Singapore	6150do			
0300	0400	vl/as	Solomon Islands, SIBC	5020do			
0300	0400	vl/a	Solomon Islands, SIBC	9545do			
0300	0400		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as
				15425as			
0300	0400		Taiwan, R Taiwan International	5950na	9680na	11745as	11B25as
				15345as			
0300	0330		Thailand, Radio	9655am	11905am	15395na	
0300	0400		Uganda, Radio	4976da	5026do		
0300	0400		UK, BBC World Service	3255af	5975na	6005af	6135am
				6175na	6190af	6195eu	7120af
				7160af	9410eu	11730af	11760me
				11955as	12095af	15280as	15310as
				15360as	17760as	17790as	21660as
0300	0400		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
0300	0400		USA, KAIJ Dallas TX	5755va			
0300	0400		USA, KTBN Salt Lake City UT	7510na			
0300	0400	vl	USA, KVOH Los Angeles CA	9975am			
0300	0400		USA, KWHR Naalehu HI	17510as			
0300	0400		USA, Voice of America	6080af	6115af	7105af	7275af
				7290af	7340af	9575af	9885af
				17685af			
0300	0330	smtwh	USA, Voice of America	4960af			
0300	0400		USA, WBCQ Monticello ME	7415na	9330na		
0300	0400		USA, WEWN Birmingham AL	5825va			
0300	0400		USA, WGTG McCaysville GA	5085va	6890am		
0300	0400		USA, WHRA Greenbush ME	7580na			
0300	0400		USA, WHRI Noblesville IN	5745na	7315sa		
0300	0400		USA, WJCR Upton KY	7490va	13595as		
0300	0400		USA, WRMI Miami FL	7385na			
0300	0400		USA, WSHB Cypress Crk SC	7535eu			
0300	0400		USA, WTJC Newport NC	9370na			
0300	0400		USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0300	0400		USA, WYFR Okeechobee FL	6065na	9505na		
0300	0400	vl	Vanuatu, Radio	3945do	4960do	7260do	
0300	0310		Vatican City, Vatican Radio	7305am	9605am		
0300	0400		Zambia, Christian Voice	6065do			
0300	0400	vl	Zambia, National BC Corp	6165do	6265do		
0300	0400	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
0310	0340		Vatican City, Vatican Radio	9660af			
0330	0357		Czech Rep, Radio Prague Intl	11600as	15470as		
0330	0400		Hungary, Radio Budapest	9835na			
0330	0345	vl	Libya, Voice of Africa	11815af	17725af		
0330	0400		Myanmar, Radio	9730do			
0330	0400		Sweden, Radio	15245na	15245		
0330	0400		UAE, Radio Dubai	12005na	13675na	15395na	15400na
0330	0357		Vietnam, Voice of	9795na	9830na		
0345	0400	f	Seychelles, FEBA Radio	11885af			
0357	0400	vl	Malawi, Malawi BC Corp	5995do			

Selected Programs

Daily

0300 Bulgaria, R. Bulgaria: News (world/Bulgarian news)
0300 Canada, CBC Northern Sce.: CBC News
0300 Russia, V. of Russia WS: News
0330 Hungary, R. Budapest: News
0330 Russia, V. of Russia WS: News in Brief

Sundays

0300 USA, WEWN Birmingham AL: Saint Joseph Radio Presents
0300 USA, WHRI Noblesville IN (1): New Harvest
0300 USA, WWCR Nashville TN (1): Open Bible Dialogue
0300 USA, WWCR Nashville TN (3): Communications World
0305 Canada, CBC Northern Sce.: A Propos (music of Quebec)
0305 New Zealand, R. NZ Intl.: A Question of Religion (religious)
0308 Canada, R. Canada Intl.: Vinyl Cafe (music and musings)
0310 Bulgaria, R. Bulgaria: Views Behind the News (current events)
0311 1/2/5 Russia, V. of Russia WS Moscow Mailbag
0330 USA, WEWN Birmingham AL: 2000: The Great Jubilee
0330 USA, WWCR Nashville TN (3): World of Radio
0332 Russia, V. of Russia WS: Songs from Russia (post melodies)
0340 Hungary, R. Budapest: DX Blockbuster (for sw radio hobbyists)
0345 Bulgaria, R. Bulgaria: Radio Bulgaria Calling
0346 Russia, V. of Russia WS: You Write to Moscow (listener letters)

Mondays

0300 USA, WEWN Birmingham AL: Tap of the Week
0300 USA, WWCR Nashville TN (1): News
0300 USA, WWCR Nashville TN (3): Power of Prophecy
0305 USA, WWCR Nashville TN (1): Pat Boone Show
0308 Canada, CBC Northern Sce.: Sunday Showcase (radio drama)
0308 Canada, R. Canada Intl.: Tapestry (Canadian spiritual life)
0310 Bulgaria, R. Bulgaria: Folk Studia (Bulgarian folk music)
0311 Russia, V. of Russia WS: Moscow Mailbag (Joe Adamov)
0332 Russia, V. of Russia WS: This is Russia (Russia and Russians)
0335 Bulgaria, R. Bulgaria: Answering Your Letters
0340 Hungary, R. Budapest: ..And the Gatepast [monthly]
0340 Hungary, R. Budapest: Europe Unlimited [monthly]
0340 Hungary, R. Budapest: Heading for Hungary [monthly]
0340 Hungary, R. Budapest: Spotlight [monthly]

Mondays to Fridays

0305 New Zealand, R. NZ Intl.: In Touch With NZ (interviews/topical)
0330 New Zealand, R. NZ Intl.: In Touch w/..... (events in NZ)

Mondays-Saturdays

0300 USA, WHRI Noblesville IN (1): News
0305 USA, WHRI Noblesville IN (1): Music (Christian contemporary)

Tuesdays

0311 Russia, V. of Russia WS: Science and Engineering
0320 Bulgaria, R. Bulgaria: Sports (weekend results in Europe/Bulgaria)
0330 Bulgaria, R. Bulgaria: Bulgarian Plaza [fortnightly]
0330 Bulgaria, R. Bulgaria: Walks and Talks [fortnightly]
0330 USA, WEWN Birmingham AL: Catholic Heritage Program
0332 Russia, V. of Russia WS: Kaleidoscope (economic/social/cultural)

Tuesdays to Fridays

0300 USA, WEWN Birmingham AL: Catholic World Today
0300 USA, WWCR Nashville TN (1): Sweet Liberty

Tuesdays-Saturdays

0300 Canada, R. Canada Intl.: CBC News
0300 USA, WWCR Nashville TN (3): Scriptures for America [live]
0305 Canada, R. Canada Intl.: Spectrum (Canadian current affairs)
0310 Bulgaria, R. Bulgaria: Events and Developments (current affairs)
0315 Canada, CBC Northern Sce.: The Arts Today (daily cultural report)
0340 Hungary, R. Budapest: Hungary Today (current events magazine)
0345 Canada, CBC Northern Sce.: Between the Covers

Wednesdays

0310 New Zealand, R. NZ Intl.: In the Garden (gardening phone-in)
0311 Russia, V. of Russia WS: Newmarket (business/investment)
0330 USA, WEWN Birmingham AL: The Carpenter Shop (religious)
0332 Russia, V. of Russia WS: Russian Musical Highlights of the 20th Century (100 part music history series)
0345 Bulgaria, R. Bulgaria: Magazine Economy (economic report)
0354 Russia, V. of Russia WS: Russia in Personalities

Thursdays

0311 Russia, V. of Russia WS: Moscow Mailbag (Joe Adamov answers listeners' questions)
0330 USA, WEWN Birmingham AL: Life is Worth Living (teachings of late Archbishop Fulton J. Sheen)
0332 Russia, V. of Russia WS: Moscow Yesterday and Today (850 years of history)
0345 Bulgaria, R. Bulgaria: Arts and Artists (Bulgarian cultural events/personalities)

Fridays

0305 New Zealand, R. NZ Intl.: The World in Sport (interviews/the week's results)
0311 Russia, V. of Russia WS: Science and Engineering (latest developments)
0330 USA, WEWN Birmingham AL: Crisis Magazine (Catholic perspectives on popular culture)
0332 Russia, V. of Russia WS: Russian by Radio (language instruction)
0345 Bulgaria, R. Bulgaria: History Club (Bulgaria's past)

Saturdays

0300 USA, WWCR Nashville TN (1): News
0302 USA, WWCR Nashville TN (1): Golden Age of Radio (vintage American programs)
0305 New Zealand, R. NZ Intl.: Music feature
0311 Russia, V. of Russia WS: Newmarket (business/investment in the CIS)
0330 USA, WEWN Birmingham AL: 2000, The Great Jubilee (Catholic contemplations on the Millennium)
0332 Russia, V. of Russia WS: Audio Book Club (Russian classic/contemporary literature)
0345 Bulgaria, R. Bulgaria: The Way We Live (everyday life in Bulgaria)

Saturdays to Thursdays

0330 Mexico, R. Mexico Intl.: Musical programming (contemporary/traditional Mexican music)

FREQUENCIES

0400	0500		Anguilla, Caribbean Beacon	6090am			
0400	0500	vl	Australia, ABC/Alice Springs	4835do			
0400	0500	vl	Australia, ABC/Katherine	5025do			
0400	0500	vl	Australia, ABC/Tennant Creek	4910do			
0400	0500		Australia, Radio	9660pa	12080va	15240pa	15415as
				15515va	17580pa	17750as	21725pa
0400	0500	vl	Botswana, Radio	3356do	4820do	7255do	
0400	0500	vl	Cameroon, RTV/Yaounde	4850do			
0400	0500		Canada, CBC Northern Service	9625do			
0400	0500		Canada, CFRX Toronto ON	6070do			
0400	0500		Canada, CFVP Calgary AB	6030do			
0400	0500		Canada, CKZN St John's NF	6160do			
0400	0500		Canada, CKZU Vancouver BC	6160do			
0400	0429	as	Canada, R Canada International	11835me	11975me	15215me	
0400	0456		China China Radio International	9730na			
0400	0500		Costa Rica, R for Peace Intl	15050va	21815va		
0400	0500		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
0400	0425		Croatia, Croatian Radio	9925no			
0400	0500		Cuba, Radio Havana	6000na	9820na	11705na	
0400	0500		Ecuador, HCJB	9745na	15115na	21455usb	
0400	0445		Germany, Deutsche Welle	7225af	9565af	9765af	13690af
0400	0500	vl	Guatemala, Radio Cultural	3300do	5955do		
0400	0500		Guyana, Voice of	3289do	5949do		
0400	0500	irreg	Iraq, Radio Iraq International	9684va	11787va		
0400	0500		Kenya, Kenya BC Corp	4935do			
0400	0500	vl	Lesotho, Radio	4800do			
0400	0500	vl	Malawi, Malawi BC Corp	3380do	5995do		
0400	0500		Malaysia, Radio	7295do			
0400	0500		Malaysia, Voice of Islam	6175as	9750as	15295as	
0400	0500	stwhfa	Mexico, R Mexico International	9705am			
0400	0500		Myanmar, Radio	9730do			
0400	0500		Namibia, Namibian BC Corp	3270af	3289af		
0400	0500		New Zealand, R New Zealand Int	17675po			
0400	0500		New Zealand, ZLXA	3935do	7290do		
0400	0500	vl	Nigeria, Radio/Enugu	6025do			
0400	0430	vl	Nigeria, Radio/Kaduna	6090do	7275do		
0400	0500	vl	Papua New Guinea, NBC	9675do	11880do		
0400	0456		Romania, R Romania International		9510no	11885no	11940na
				15105na	15335as	17745as	
0400	0500		Russia, Voice of Russia WS	7125na	9665na	11990na	15595na
				17595na	17650na	17660na	17690na
0400	0430		S Africa, Channel Africa	5955af			
0400	0500		Singapore R Corp of Singapore	6150do			
0400	0500	vl/as	Solomon Islands, SIBC	5020do			
0400	0500	vl/o	Solomon Islands, SIBC	9545do			
0400	0430		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as
				15425as			
0400	0430		Switzerland, Swiss R International	9610eu	9885am	9905am	
0400	0500		Turkey, Voice of	6155va	11655as	21715as	
0400	0500		Uganda, Radio	4976da	5026do		
0400	0500		UK, BBC World Service	3255af	5975na	6005af	6005af
				6135am	6175na	6190af	6195eu
				7120af	7160af	9410eu	11760me
				12095eu	15280as	15310eu	15420af
				15575me	17640af	17760as	17790as
				21660as	21830as		
0400	0500		Ukraine, R Ukraine International	6020eu	9640eu	12045eu	13590eu
0400	0500		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
0400	0500		USA, KAIJ Dallas TX	5755va			
0400	0500		USA, KTBN Salt Lake City UT	7510na			
0400	0500	vl	USA, KVOH Los Angeles CA	9975am			
0400	0500		USA, KWHR Naalehu HI	17780as			
0400	0500		USA, Voice of America	6080af	7170va	7265af	7275af
				7290af	9575af	9885af	11965me
				15205va	17725af		
0400	0500		USA, WBCQ Monticello ME	7415na	9330na		
0400	0500		USA, WEWN Birmingham AL	5825va			
0400	0500		USA, WGTG McCaysville GA	5085va	6890am		
0400	0500		USA, WHRA Greenbush ME	7580no			
0400	0500		USA, WHRI Noblesville IN	5745na	7315sa		
0400	0500		USA, WJCR Upton KY	7490va	13595as		
0400	0500	stwhfa	USA, WRMI Miami FL	7385no			
0400	0500	m	USA, WRMI Miami FL	9955am			
0400	0500		USA, WSHB Cypress Crk SC	7535eu	15195af		
0400	0405		USA, WWCR Nashville TN	5070na	5935na	7435na	
0400	0405	sm	USA, WWCR Nashville TN	3210na			
0400	0405	twhfo	USA, WWCR Nashville TN	3215na			
0400	0455		USA, WYFR Okeechobee FL	6065na	9505na	9985eu	
0400	0500		Zambia, Christian Voice	6065do			
0400	0500	vl	Zambia, National BC Corp	6165do	6265do		
0400	0500	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
0405	0500		USA, WWCR Nashville TN	3210no	5070na	5935na	7435no
0425	0440		Italy, RAI International	5975af	7150af		
0430	0500		Austria, R Austria International	6015na	6155eu	13730eu	
0430	0500		Italy, IRRS	3985va			
0430	0500		Netherlands, Radio	6165no	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		Sri Lanka, Sri Lanka BC Corp	6130do			
0430	0530		Swaziland, Trans World Radio	3200af	4775af		
0430	0500		Switzerland, Swiss R International	9885am	9905am		
0445	0500		USA, WYFR Okeechobee FL	9985eu			

SELECTED PROGRAMS

Daily

0400 Canada, CBC Northern Sce.: CBC News
0400 New Zealand, R. NZ Intl.: RNZ News (domestic network news)
0400 Russia, V. of Russia WS: News
0400 Turkey, V. of Turkey: News
0400 Ukraine, R. Ukraine Intl.: News
0400 USA, WEWN Birmingham AL: Holy Rosary (Catholic service)
0410 Turkey, V. of Turkey: Press Review (Turkish periodicals)
0430 Russia, V. of Russia WS: News In Brief

Sundays

0400 Mexico, R. Mexico Intl.: DXperience (for radio hobbyists)
0400 USA, WWCR Nashville TN (1): Watch America
0400 USA, WWCR Nashville TN (3): Spectrum (communications)
0402 USA, WHRI Noblesville IN (1): 20 The Countdown Magazine (contemporary Christian music charts)[to 0600]
0405 Canada, CBC Northern Sce.: Saturday Night Blues
0405 New Zealand, R. NZ Intl.: Whenua! (people/issues/comment)
0415 Turkey, V. of Turkey: Outlook (Turkish international relations)
0418 Ukraine, R. Ukraine Intl.: Baroque (culture and the arts)
0420 Turkey, V. of Turkey: DX Corner (for radio hobbyists)[fortnightly]
0420 Turkey, V. of Turkey: Turkish Album [fortnightly]
0430 USA, WEWN Birmingham AL: Inside the Bible
0430 USA, WWCR Nashville TN (1): Banner of Truth (evangelical)
0432 Russia, V. of Russia WS: Christian Message from Moscow
0440 Turkey, V. of Turkey: Turkey On-Line (technology in Turkey)
0445 USA, WWCR Nashville TN (1): A Study in God's Word (Bible)

Mondays

0400 USA, WWCR Nashville TN (1): Profiles
0400 USA, WWCR Nashville TN (3): Bible Home Church
0402 USA, WWCR Nashville TN (1): America's Heroes (political)
0405 Canada, CBC Northern Sce.: Jazz Beat (studio sessions/concert)
0405 USA, WHRI Noblesville IN (1): 20 The Countdown Magazine
0406 Ukraine, R. Ukraine Intl.: Hello From Kiev (listener letters/music)
0411 Russia, V. of Russia WS: Sunday Panorama (weekly magazine)
0415 Turkey, V. of Turkey: Blue Voyage (Turkey and the sea)
0425 Turkey, V. of Turkey: Turkish Music
0420 Ukraine, R. Ukraine Intl.: Music from Ukraine (folk music)
0424 Russia, V. of Russia WS: Russia in Personalities
0430 USA, WEWN Birmingham AL: An Ignatian Retreat (St. Ignatius Loyola)
0432 Russia, V. of Russia WS: Audio Book Club (literature)
0440 Turkey, V. of Turkey: Yesterday and Today (Turkish history)

Tuesdays

0415 Turkey, V. of Turkey: Last Week (week in review in Turkey)
0425 Turkey, V. of Turkey: Hues and Colors of Anatolia (touring Turkey)
0432 Russia, V. of Russia WS: 20th Century Year after Year (history series)
0440 Turkey, V. of Turkey: Wonders of Turkey (spectacular sites in Turkey)

Tuesdays-Fridays

0400 USA, WWCR Nashville TN (3): Scriptures for America
0402 USA, WWCR Nashville TN (1): The Sower
0425 Ukraine, R. Ukraine Intl.: Closeup (current issues in Ukraine)

Tuesdays-Saturdays

0400 Mexico, R. Mexico Intl.: Antena Radio Summary
0400 USA, WHRI Noblesville IN (1): Politics and Religion
0400 USA, WWCR Nashville TN (1): News
0405 USA, WWCR Nashville TN (1): Point of View (political discussions)
0430 USA, WEWN Birmingham AL: Franciscan University Connection

Tuesdays-Sundays

0410 Ukraine, R. Ukraine Intl.: Ukraine Today (news/interviews)
0411 Russia, V. of Russia WS: News and Views (news developments)
043■ Mexico, R. Mexico Intl.: Musical programming (Mexican music)

Wednesdays

0415 Turkey, V. of Turkey: The Chosen Land
0425 Turkey, V. of Turkey: Developments in Balkans and Turkey
0432 Russia, V. of Russia WS: Alternative programs (history/culture)
0440 Turkey, V. of Turkey: Turkey-A Haven for Tourists (places to visit)

Thursdays

0415 Turkey, V. of Turkey: Review of the Foreign Media
0425 Turkey, V. of Turkey: Letter-Box (letters from listeners)
0432 Russia, V. of Russia WS: 20th Century Year after Year (history)
0440 Turkey, V. of Turkey: Power Balances in Mideast & Turkey

Fridays

0415 Turkey, V. of Turkey: Turkish Influence in Western Painting
0425 Turkey, V. of Turkey: Anatolia Project (Turkey's religious sites)
0432 Russia, V. of Russia WS: Alternative programs (history/culture)
0440 Turkey, V. of Turkey: Impressions of Turkey (foreign visitors' views)

Saturday

0400 USA, WWCR Nashville TN (3): Health programming (various programs)[live to 0600]
0402 USA, WWCR Nashville TN (1): World of Radio (news of shortwave radio w/Glenn Hauser)
0405 New Zealand, R. NZ Intl.: Tagata O Te Moana
0415 Turkey, V. of Turkey: Gone but not Forgotten (Turkish historical figures)
0425 Turkey, V. of Turkey: Diary of Istanbul (view of the city)
0432 Russia, V. of Russia WS: 20th Century Year after Year (history)
0440 Turkey, V. of Turkey: Festivals & Fairs in Turkey

Frequencies

0500	0600		Anguilla, Caribbean Beacon	6090am			
0500	0600	vl	Australia, ABC/Alice Springs	4835do			
0500	0600	vl	Australia, ABC/Katherine	5025do			
0500	0600	vl	Australia, ABC/Tennant Creek	4910da			
0500	0600		Australia, Radia	9660pa	12080va	15240pa	15515va
				17580pa	21725pa		
0500	0600	as	Australia, Radio	17750as			
0500	0526		Belgium, Radio Vlaanderen Intl	15565am			
0500	0600	vl	Botswana, Radio	3356do	4820do	7255do	
0500	0600	vl	Cameroon, RTV/Yaounde	4850do			
0500	0515		Canada, CBC Northern Service	9625do			
0500	0600		Canada, CFRX Toronto ON	6070do			
0500	0600		Canada, CFVP Calgary AB	6030do			
0500	0600		Canada, CKZN St John's NF	6160do			
0500	0600		Canada, CKZU Vancouver BC	6160do			
0500	0529		Canada, R Canada International	5995am	6145va	7290va	9595va
				9755am	11710va	11830am	13755va
				15330va			
0500	0556		China China Radio International	9560na			
0500	0600		Costa Rica, R for Peace Intl	15050va	21815va		
0500	0600		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
0500	0600		Cuba, Radio Havana	9550na	9820na	9830na	
0500	0600		Ecuador, HCJB	9745na	15115na	21455usb	
0500	0600	a/monthly	Finland, Scandv Weekend Radio	11720va			
0500	0545		Germany, Deutsche Welle	9670na	9785no	11810na	11985na
0500	0600		Guyana, Voice of	3289do	5949do		
0500	0530		Israel, Kol Israel	9435va	15640va	17535va	
0500	0600		Italy, IRRS	3985va			
0500	0600		Japan, Radio	5975eu	6110na	7230eu	11715as
				11760as	11840as	13630na	15590pa
0500	0600		Kenya, Kenya BC Corp	4935do			
0500	0600	vl	Lesotho, Radio	4800do			
0500	0600	vl	Liberia, R Liberia International	5100do			
0500	0600	vl	Malawi, Malawi BC Corp	3380do	5995do		
0500	0600		Malaysia, Radio	7295do			
0500	0600		Malaysia, RTM Sarawak	7160do			
0500	0600		Malaysia, Voice of Islam	6175as	9750as	15295as	
0500	0530	twhfa	Mexico, R Mexico International	9705am			
0500	0600		Myanmar, Radio	9730do			
0500	0600		Namibia, Namibian BC Corp	3270af	3289af		
0500	0530		Netherlands, Radio	6165no	9590na		
0500	0600		New Zealand, R New Zealand Int	17675pa			
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	7275do	9570do
0500	0600	vl	Nigeria, Radio/Lagos	3326do	4990do		
0500	0600	vl	Nigeria, Voice of	7255af	15120af		
0500	0504		Pakistan, Radio	15175me	17835me	21460me	
0500	0600	vl	Papua New Guinea, NBC	9675do	11880do		
0500	0600		Russia, Voice of Russia WS	7125na	7180na	9665na	11990na
				15425na	15595na	17565na	17650na
				17660na	17690na		
0500	0530		S Africa, Adventist World Radio	5960af	6015af		
0500	0530		S Africa, Channel Africa	11720af			
0500	0600		Singapore R Corp of Singapore	6150do			
0500	0600	vl	Solomon Islands, SIBC	5020do	9545do		
0500	0600		Spain, R Exterior Espana	6055na			
0500	0600		Sri Lanka, Sri Lanka BC Corp	6130do			
0500	0600		Swaziland, Trans World Radio	4775af	6100af	9500af	
0500	0530		Uganda, Radio	4976do	5026do		
0500	0600		UK, BBC World Service	3255af	5975na	6005af	6175am
				6190af	6195eu	7160af	9410eu
				9740as	11760me	11765af	11955pa
				12095eu	15280as	15310as	15360as
				15420af	15575me	17640me	17760as
				17790as	17885af	21660as	
0500	0600		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
0500	0600		USA, KAIJ Dallas TX	5755va			
0500	0600		USA, KTBN Salt Lake City UT	7510na			
0500	0600	vl	USA, KVOH Los Angeles CA	9975am			
0500	0600		USA, KWHR Naalehu HI	11565pa	17780as		
0500	0600		USA, Voice of America	5970af	6035af	6080af	7170va
				7195af	11965me	12080af	13670af
				15205va			
0500	0600		USA, WBCQ Monticello ME	7415na	9330na		
0500	0600		USA, WEWN Birmingham AL	5825va			
0500	0600		USA, WGTG McCaysville GA	5085va	6890am		
0500	0600		USA, WHRA Greenbush ME	11565af			
0500	0600		USA, WHRI Noblesville IN	5745na	7315sa		
0500	0600		USA, WJCR Upton KY	7490va	13595as		
0500	0530		USA, WRMI Miami FL	7385na			
0500	0600		USA, WSHB Cypress Crk SC	7535eu	9840af		
0500	0600		USA, WTJC Newport NC	9370na			
0500	0600		USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0500	0600		USA, WYFR Okeechobee FL	5985na	9985eu	11580eu	
0500	0600	vl	Vanuatu, Radio	3945do	4960do	7260do	
0500	0520		Vatican City, Vatican Radio	9660af	11625af	15570af	
0500	0600		Zambia, Christian Voice	6065do			
0500	0600	vl	Zambia, National BC Corp	6165do	6265do		
0500	0530	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
0515	0525		Rwanda, Radio	6055do			
0520	0530		Vatican City, Vatican Radio	9660af	11625af	15570af	
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do		
0530	0600		Thailand, Radio	9655eu	11905eu	21795eu	
0530	0600		UAE, Radio Dubai	13675au	15435au	21700au	
0530	0600	mtwhfa	USA, WRMI Miami FL	7385na			
0530	0600	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		

Selected Programs

Daily

0500 Israel, Kol Israel: News
0500 New Zealand, R. NZ Intl.: RNZ News (network newscast)
0500 Russia, V. of Russia WS: News
0500 USA, WEWN Birmingham AL: Mother Angelica (Catholic faith)
0530 Austria, R. Austria Intl.: Report from Austria (Austria/Europe)
0530 Russia, V. of Russia WS: News in Brief

Sundays

0500 USA, WWCR Nashville TN (1): News
0500 USA, WWCR Nashville TN (3): The Right Perspective
0502 USA, WWCR Nashville TN (1): Bible's Greatest Heroes
0505 New Zealand, R. NZ Intl.: Storytime Omnibus (stories)
0511 Russia, V. of Russia WS: Russian Musical Highlights of the 20th Century (100 part music history series)
0532 Russia, V. of Russia WS: Moscow Yesterday and Today
0535 Austria, R. Austria Intl.: Listeners' Letters
0545 Austria, R. Austria Intl.: Music from Austria (artists/performances)

Mondays

0500 USA, WHRI Noblesville IN (1): 20 The Countdown Magazine (contemporary Christian music charts)[cont'd from 0405]
0500 USA, WWCR Nashville TN (1): Lyon Gold and Silver
0500 USA, WWCR Nashville TN (3): Watch America (political)
0511 Russia, V. of Russia WS: Russian Musical Highlights of the 20th Century (100 part music history series)
0530 USA, WWCR Nashville TN (3): Alternative Health Care 101
0532 Russia, V. of Russia WS: Jazz Show
0535 Austria, R. Austria Intl.: Week in Review
0545 Austria, R. Austria Intl.: Profile of Austria (people and places)
0545 USA, WWCR Nashville TN (3): You Can Make It Happen (self-help)

Tuesdays

0500 Mexico, R. Mexico Intl.: Regional Roots and Rhythms (music)
0511 Russia, V. of Russia WS: Moscow Mailbag (Joe Adamov)
0532 Russia, V. of Russia WS: Music Calendar (momentous musicians)
0532 Russia, V. of Russia WS: Yours for the Asking (music requests)
0546 Russia, V. of Russia WS: Music At Your Request [exc. 1st wk.]

Tuesdays-Sundays

0500 Canada, CBC Northern Sce: CBC News
0500 USA, WHRI Noblesville IN (1): News
0500 USA, WWCR Nashville TN (1): News
0505 USA, WHRI Noblesville IN (1): Music (Christian contemporary)

Wednesdays

0500 Mexico, R. Mexico Intl.: Mail Box (letters from listeners)
0511 Russia, V. of Russia WS: Science and Engineering
0530 Mexico, R. Mexico Intl.: Musical programming (Mexican music)
0532 Russia, V. of Russia WS: Russian Musical Highlights of the 20th Century (100 part music history series)
0546 Russia, V. of Russia WS: Russia in Personalities

Thursdays

0500 Mexico, R. Mexico Intl.: Mosaic of Mexico (life in Mexico)
0511 Russia, V. of Russia WS: Newmarket (business/investment)
0532 Russia, V. of Russia WS: Folk Box (traditional music of CIS)

Fridays

0500 Mexico, R. Mexico Intl.: Creators of Mexican Art (Mexican artists)
0511 Russia, V. of Russia WS: Moscow Mailbag (Joe Adamov answers listeners' questions)
0530 Mexico, R. Mexico Intl.: Musical programming (contemporary/traditional Mexican music)[to 0600]
0532 Russia, V. of Russia WS: Audio Book Club (Russian classic/contemporary literature)

Saturdays

0500 Mexico, R. Mexico Intl.: Mail Box (letters from listeners)
0500 USA, WWCR Nashville TN (3): Health programming [continued from 0400]
0505 New Zealand, R. NZ Intl.: Focus on Politics (the week in New Zealand politics)
0511 Russia, V. of Russia WS: Science and Engineering (latest developments in the CIS)
0505 New Zealand, R. NZ Intl.: In a Mellow Tone (jazz, mood music)
0532 Russia, V. of Russia WS: Timelines (life in Moscow thru foreign eyes w/Estelle Winters)

GRUNDIG Best in Technology

Yacht Boy 400 Professional Edition (YB 400PE)

The most powerful compact Radio AM/FM Shortwave Receiver.

"The Best compact shortwave portable we have tested" Lawrence Magne.-Editor in Chief, Passport to World Band Radio.

The Big Breakthrough! Power, performance, and design have reached new heights! The Grundig 400 Professional Edition with its sleek titanium look is packed with features like no other compact radio in the world.

Pinpoint Accuracy! The Grundig 400PE does it all: pulls in AM, FM, FM-Stereo, every shortwave band (even aviation and ship-to-shore)-all with lock-on digital precision.

Ultimate Features! Auto tuning! The Grundig 400PE has auto tuning on shortwave and stops at every signal and lets you listen. With the exceptional sensitivity of the 400PE, you can use the auto ture to catch even the weakest of signals.
Incredible timing features! The Grundig 400PE can send you to sleep listening to your favorite music.
You can set the alarm to wake up to music or the morning traffic report, then switch to BBC shortwave for the world news.
The choice is yours!

Powerful Memory! Described as a smart radio with 40 memory positions, the Grundig 400PE remembers your favorites-even if you don't!

Never Before Value! Includes deluxe travel pouch, stereo earphones, owner's manual, external antenna and a 9 volt Grundig AC adapter. Uses 6 AA batteries (not included)

Style • Titanium look

Shortwave, AM and FM • Continuous shortwave from 1.6 - 30 MHz, covering all existing shortwave bands plus FM-stereo, AM and Longwave. • Single sideband (SSB) circuitry allows for reception of two-way communication such as amateur radio, military, commercial, air-to-ground and ship-to-shore.

Memory Positions • 40 randomly programmable memory positions allow for quick access to favorite stations.

Multi-function Liquid Crystal Display • The LCD simultaneously displays the time, frequency, band, alarm and sleep timer.

Clock, Alarm and Timer • Two alarm modes: Beeper and radio.
• Dual clocks show time in 24 hour format.
• Sleep timer programmable in 15 minute increments.

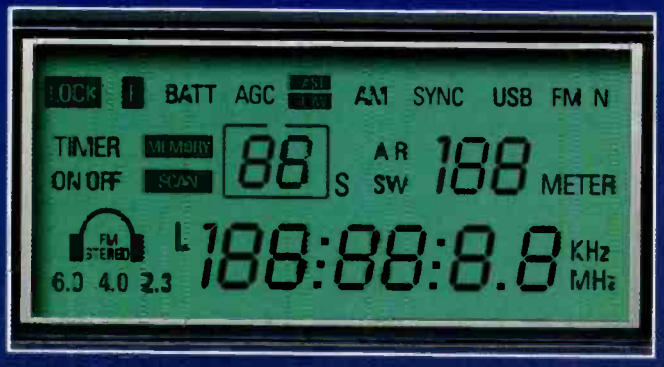
Dimensions: 7.75" L × 4.5" H × 1.5" W

Weight: 1 lb. 5 oz.

by GRUNDIG

Lextronix / Grundig, P.O. Box 2307, Menlo Park, CA 94026 • Tel: 650-361-1611 • Fax: 650-361-1724
Shortwave Hotlines: (US) 1-800-872-2228 (CN) 1-800-637-1648 • Web: *www.grundigradio.com* • Email: *grundig@ix.netcom.com*

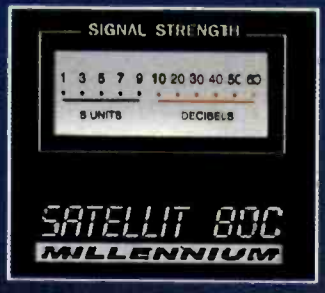
GRUNDIG The Ultimate in



The LCD
Big! Bold! Brightly Illuminated 6" by 3½". Liquid Crystal Display shows all important data: Frequency, Meter band, Memory position, Time, LSB/USB, Synchronous Detector and more.

Ultra fine-tuning of 50Hz on LSB/USB, 100Hz in SW, AM and Aircraft Band and 20 KHz in FM.
• For Fixed-step Tuning: Big, responsive Up/Down tuning buttons.
• For direct frequency entry: a responsive, intuitive numeric keypad.

The Signal Strength Meter
Elegant in its traditional Analog design, like the gauges in the world's finest sports cars. Large Well Lit. Easy to read.

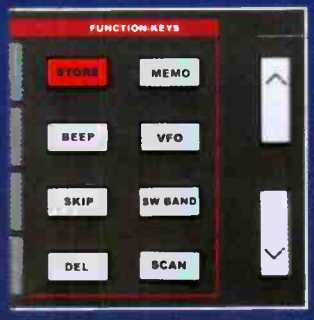


The Frequency Coverage
Longwave, AM and shortwave: continuous 100-30,000 KHz. FM: 87-108 MHz VHF Aircraft Band: 118-137 MHz.

The Tuning Controls
• For the traditionalist: a smooth, precise tuning knob, produces no audio muting during use.

THESE ARE THE SATELLIT 800 MILLENNIUM'S MAJOR FEATURES. FOR A DETAILED SPECIFICATION SHEET, CONTACT GRUNDIG.

Digital Technology



The Operational Controls
Knobs where you want them; Buttons where they make sense. The best combination of traditional and high-tech controls.

The Sound
Legendary Grundig Audio Fidelity with separate bass and treble controls, big sound from its powerful speaker and FM-stereo with the included high quality headphones.

The Technology
Today's latest engineering:
- Dual conversion superheterodyne circuitry.
- PLL synthesized tuner.

The Many Features
- 70 user-programmable memories.
- Two, 24 hour format clocks.
- Two ON/OFF sleep timers.
- Massive, built-in telescopic antenna.
- Connectors for external antennas – SW, AM, FM and VHF Aircraft Band.
- Line-out, headphone and external speaker jacks.

The Power Supply
A 110V AC adapter is included for North America (a 220V AC adapter is available upon request). Also operates on 6 size D batteries. (not included)

Dimensions: 20.5" L X 9" H X 8" W

Weight: 14.50 lbs.

by GRUNDIG

Lextronix / Grundig, P.O. Box 2307, Menlo Park, CA 94026 • Tel: 650-361-1611 • Fax: 650-361-1724
Lines: (US) 1-800-872-2228 (CN) 1-800-637-1648 • Web: www.grundigradio.com • Email: grundig@ix.netcom.com

GRUNDIG Best in Technology

Yacht Boy 300 Professional Edition (YB 300PE)

Power and Performance with the Affordable Yacht Boy 300 Professional.

Designed for the traveller, the titanium look digital radio provides incredible power and performance for an incredibly low price! Packed with features this radio is an excellent value, accompanied with 3 AA batteries, AC adapter, earphones, supplementary Antenna and carrying case

State-of-the-art features include:

- Digital tuning with 24 user-programmable memory presets
- 13 SW Bands (2.30-7.80 MHz; 9.10-26.10 MHz)
- Illuminated multifunction LCD display screen
- AM/FM stereo via earphones
- Clock, alarm and 10 to 90 minute sleep timer
- Digital tuning display
- Direct frequency entry
- DX/ local selector
- Titanium look finish
- External antenna jack
- Dynamic micro speaker
- Earphone jack
- Telescopic antenna

Dimensions: 5.75" L × 3.5" H × 1.25" W

Weight: 9.92 oz

by GRUNDIG

Lextronix / Grundig, P.O. Box 2307, Menlo Park, CA 94026 • Tel: 650-361-1311 • Fax: 650-361-1724
Shortwave Hotlines: (US) 1-800-872-2228 (CA) 1-800-637-1648 • Web: www.grundigradio.com • Email: grundig@ix.netcom.com

Frequencies

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, Radio	9660as	12080va	15240pa	15415as
				15515va	17580pa	17750as	21725pa
0600	0700	vl	Botswana, Radio	7255do	9600da	7255do	
0600	0700	vl	Cameroon, RTV/Yaounde	4850do			
0600	0700		Canada, CFRX Toronto ON	6070do			
0600	0700		Canada, CFVP Calgary AB	6030do			
0600	0700		Canada, CKZN St John's NF	6160do			
0600	0700		Canada, CKZU Vancouver BC	6160do			
0600	0700		Costa Rica, R for Peace Intl	15050va	21815va		
0600	0700		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
0600	0700		Cuba, Radio Havana	9550na	9820no	9830na	
0600	0700		Ecuador, HCJB	9745na	15115na	15160usb	21455va
0600	0700	a/monthly	Finland, Scandv Weekend Radio	11720va			
0600	0645		Germany, Deutsche Welle	6140eu	13790af	15275af	17860af
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do		
0600	0700		Guyana, Voice of	3289do	5949do		
0600	0700	vl/mtwhf	Italy, IRRS	7120va			
0600	0700		Japan, Radio	5975eu	7230eu	11740as	11840as
				13630no	15230pa	21570po	
0600	0700		Kenya, Kenya BC Corp	4935do			
0600	0700		Kuwait, Radio	15110as	15230as		
0600	0700	vl	Lesotho, Radio	4800do			
0600	0700	vl	Liberia, ELWA	4760do			
0600	0700	vl	Liberia, R Liberia International	5100do			
0600	0700	vl	Malawi, Malawi BC Corp	3380do	5995do		
0600	0700		Malaysia, Radio	7295do			
0600	0700		Malaysia, RTM Sarawak	7160do			
0600	0700		Malaysia, Voice of	6175as	9750as	15295as	
0600	0700		Myanmar, Radio	9730do			
0600	0700		Namibia, Namibian BC Corp	3270af	3289af		
0600	0700		New Zealand, ZLXA	3935do	7290do		
0600	0700	vl	Nigeria, Radio/Enugu	6025do			
0600	0700	vl	Nigeria, Radio/Ibadan	6050do			
0600	0700	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
0600	0700	vl	Nigeria, Radio/Lagos	3326do	4990do		
0600	0700	vl	Nigeria, Voice of	7255af	15120af		
0600	0700	vl	Papua New Guinea, NBC	9675do	11880do		
0600	0641		Romania, R Romania Internat onal		11940na	15335no	
0600	0700		Russia, Voice of Russia WS	17625au	17665au	21790au	
0600	0630		S Africa, Channel Africa	15215af			
0600	0615		S Africa, Trans World Radio	11640af			
0600	0700		Sierra Leone, Sierra Leone BS	3316do			
0600	0700		Singapore R Corp of Singapore	6150do			
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do		
0600	0700		Sri Lanka, Sri Lanka BC Corp	6130da			
0600	0700		Swaziland, Trans World Radio	4775af	6100af	9500af	
0600	0630		Switzerland, Swiss R International	9610eu			
0600	0700		Uganda, Radio	5026do	7110do	7196do	
0600	0700		UK, BBC World Service	6055af	6175am	6190af	6195eu
				7160af	9410eu	9580va	9740as
				11760me	11765af	11940af	11940af
				11955pa	12095eu	15310as	15360as
				15420af	15485eu	15565as	15575af
				17640af	17760as	17790as	17885af
				21660as			
0600	0700		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
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	0630		USA, Voice of America	5970af	6035af	6080af	7170va
				7195af	9680af	11805af	11965me
				11995af	12080af	13670af	15205va
0600	0615		USA, WBCQ Monticello ME	7415na			
0600	0615		USA, WBCQ Monticello ME	7415na			
0600	0700		USA, WEWN Birmingham AL	5825va			
0600	0700		USA, WHRA Greenbush ME	11565af			
0600	0700		USA, WHRI Noblesville IN	5745na	7315sa		
0600	0700		USA, WJCR Upton KY	7490va	13595as		
0600	0700	twhfa	USA, WRMI Miami FL	7385na			
0600	0700		USA, WSHB Cypress Crk SC	13650af			
0600	0700		USA, WTJC Newport NC	9370na			
0600	0700		USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0600	0700		USA, WYFR Okeechobee FL	5985na	7355eu		
0600	0700	vl	Vanuatu, Radio	3945do	4960do	7260do	
0600	0620		Vatican City, Vatican Radio	4005eu	5880eu	7250eu	
0600	0700		Yemen, Rep of Yemen Radio	9779me			
0600	0700		Zambia, Christian Voice	9865do			
0600	0700	vl	Zambia, National BC Corp	6165do	6265do		
0600	0700	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
0605	0610		Croatia, Croatian Radio	9470au	11970al		
0610	0620	mtwhf	Greece, Voice of	7475va	9375va	9420va	15630va
0615	0630	a	S Africa, Trans World Radio	11640af			
0615	0700	as	USA, WBCQ Monticello ME	7415na			
0630	0645		Finland, YLE/R Finland	15250va	21670va		
0630	0700		Georgia, Georgian Radio	11805eu			
0630	0700	mtwhfa	UK, BBC World Service	6175am			
0630	0700		USA, Voice of America	7170va	9680af	11805af	11965me
				15205va			
0630	0700	as	USA, Voice of America	5970af	6035af	6080af	7195af
				11995af	12080af	13670af	
0630	0645		Vatican City, Vatican Radio	11625af	13765af	15570af	
0641	0656		Romania, R Romania International		9570eu	9665eu	11885na
				11940no	15250eu	15335na	
0645	0655	as	Germany, Trans World Radio	6045eu			
0655	0700		Germany, Trans World Radio	6045eu			

Selected Programs

Daily

0600 Canada, CBC Northern Sce.: CBC News (sign oF at 0605)
0600 Canada, R. Canada Intl.: Canada, R. Canada Intl. News
0600 New Zealand, R. NZ Intl.: RNZ News (domestic network newscast)
0630 Austria, R. Austria Intl.: Report from Austria (reports on Austria/Europe/world)

Sundays

0600 USA, WEWN Birmingham AL: Teaching of Jesus Christ (Catholic religious program)
0600 USA, WHRI Noblesville IN (1): Joy of Living (religious program)
0600 USA, WWCR Nashville TN (1): New and Living Way
0600 USA, WWCR Nashville TN (3): The Right Perspective (conservative political phone-in)[cont'd from 0400]
0605 Canada R. Canada Intl.: Arts in Canada (Canadian cultural events/personalities)
0605 New Zealand, R. NZ Intl.: Mauri! (Maori current affairs)
0615 USA, WHRI Noblesville IN (1): Feed the Hungry
0630 New Zealand, R. NZ Intl.: This Week in Parliament (NZ legislative report)
0630 USA, WHRI Noblesville IN (1): Mercies of God (evangelical Christian program)
0630 USA, WWCR Nashville TN (1): Lutheran Reformation Hour (religious program)
0635 Austria R. Austria Intl.: Listeners' Letters
0645 Austria R. Austria Intl.: Music from Austria (Austrian artists/performances)

Mondays

0600 USA, WWCR Nashville TN (1): World of Radio (news of shortwave radio w/Elena Hauser)
0600 USA, WWCR Nashville TN (3): News
0630 New Zealand, R. NZ Intl.: Eureka! (Science in NZ)
0605 USA, WWCR Nashville TN (3): Spoken Word of God
0630 USA, WWCR Nashville TN (1): Communications World (worldwide broadcast/electronic media w/Kim Elliott)
0635 Austria, R. Austria Intl.: Week in Review
0645 Austria, R. Austria Intl.: Profile of Austria (Austrian people and places)

Mondays-Fridays

0600 USA, WHRI Noblesville IN (1): John Hagee Today (Christian evangelical program)
0605 Canada, R. Canada Intl.: First Edition (current events magazine)
0615 USA, WWCR Nashville TN (3): Five Minutes to Victory (evangelical Christian program)
0620 USA, WWCR Nashville TN (3): Bible Pathways
0625 USA, WWCR Nashville TN (3): It Happened Today (today in history)
0630 USA, WHRI Noblesville IN (1): In Touch
0630 USA, WWCR Nashville TN (3): Prophecy Club
0655 USA, WHRI Noblesville IN (1): Bible Pathway

Tuesdays

0600 USA, WWCR Nashville TN (3): Ask WWCR (listener letters)
0630 New Zealand, R. NZ Intl.: Spectrum (NZ people/places/events)

Wednesdays

0600 USA, WWCR Nashville TN (3): A Visit with Mrs. G (Christian children's program)
0630 New Zealand, R. NZ Intl.: Musical Chairs (profiles/music)

Thursdays

0600 USA, WWCR Nashville TN (3): The Sower
0630 New Zealand, R. NZ Intl.: Bookmarks (NZ books and authors)

Fridays

0600 USA, WWCR Nashville TN (3): The Sower
0630 New Zealand, R. NZ Intl.: Sports Story (anthologies)

Saturdays

0600 USA, WHRI Noblesville IN (1): DXing with Cumbre (SWL news w/Marie Lamb)
0700 USA, WWCR Nashville TN (1): Amerikan Expose
0600 USA, WWCR Nashville TN (3): News
0605 Canada, R. Canada Intl.: Earth Watch (environmental issues)
0605 New Zealand, R. NZ Intl.: Saturday Night (music/memories)
0605 USA, WWCR Nashville TN (3): Spoken Word of God
0615 USA, WWCR Nashville TN (3): Shower of Power
0630 USA, WHRI Noblesville IN (1): World Harvest Country Style
0630 USA, WWCR Nashville TN (3): Battle Cry Sounding (Aggressive Christianity Missions Training Corps program)

FREQUENCIES

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, Radio	9660pa	12080va	15240pa	15415as	
				17580pa	17750as	21725pa		
0700	0800	vl	Botswana, Radio	7255da	9600do	7255do		
0700	0800	vl	Cameroon, RTV/Yaounde	4850do				
0700	0800		Canada, CFRX Toronto ON	6070do				
0700	0800		Canada, CFVP Calgary AB	6030do				
0700	0800		Canada, CKZN St John's NF	6160da				
0700	0800		Canada, CKZU Vancouver BC	6160do				
0700	0800		Costa Rica, R for Peace Intl	15050va	21815va			
0700	0800		Costa Rica, University Network	5030am	6150va	7375na	9725na	
				11870va	13749af			
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu			
0700	0800		Ecuador, HCJB	11755pa	15160eu	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	11720va				
0700	0800		Germany, Trans World Radio	6045eu				
0700	0800		Germany, Voice of Hope	5975eu				
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do			
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do			
0700	0800		Guyana, Voice of	3289do	5949do			
0700	0800	vl/as	Italy, IRRS	7120va				
0700	0800		Kenya, Kenya BC Corp	4935do				
0700	0800		Kuwait, Radio	15110as	15230as			
0700	0800	vl	Lesotho, Radio	4800do				
0700	0800	vl	Liberia, ELWA	4760do				
0700	0800	vl	Liberia, R Liberia International	5100do				
0700	0800	vl	Malawi, Malawi BC Corp	3380do	5995do			
0700	0800		Malaysia, Radio	7295do				
0700	0800		Malaysia, RTM Sarawak	7160da				
0700	0800		Malaysia, Voice of	6275as	9750as	15295as		
0700	0730	mtwhfa	Malta, Voice of Mediterranean	7150eu				
0700	0800		Myanmar, Radio	9730do				
0700	0800	namibia,	Namibian BC Corp	3270af	3289af			
0700	0705		New Zealand, R New Zealand Int	17675pa				
0700	0800		New Zealand, ZLXA	3935do	7290do			
0700	0800	vl	Nigeria, Radio/Enugu	6025do				
0700	0800	vl	Nigeria, Radio/Ibadan	6050do				
0700	0800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0700	0800	vl	Nigeria, Radio/Lagos	3326do	4990do			
0700	0800		Palau, KHBN/Voice of Hope	9965as	9985as	15725as		
0700	0730	vl	Papua New Guinea, NBC	9675do	11880do			
0700	0756		Romania, R Romania International		15250af	17735af		
0700	0800		Russia, Voice of Russia WS	15490au	17625au	17655au	17665au	
				21790au				
0700	0800		Sierra Leone, Sierra Leone BS	3316do				
0700	0800		Singapore R Corp of Singapore	6150do				
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do			
0700	0800		Sri Lanka, Sri Lanka BC Corp	6130do				
0700	0720		Swaziland, Trans World Radio	4775af	6100af	9500af		
0700	0800		Taiwan, R Taiwan International	5950na				
0700	0800		Uganda, Radio	5026do	7110do	7196do		
0700	0730	as	UK, BBC World Service	17885af				
0700	0730	mtwhfa	UK, BBC World Service	6190af				
0700	0800		UK, BBC World Service	6190af	9580va	9740as	11760me	
				11765af	11940af	11955pa	12095eu	
				15310as	15360as	15400af	15485eu	
				15565eu	17640eu	17760as	17790as	
				17830af	21660as			
0700	0800		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
				6350va	6458va	6847va	10320va	
				10940va	12579va	12689va	13362va	
				16847va				
0700	0800		USA, KAIJ Dallas TX	5755va				
0700	0800		USA, KTBN Salt Lake City UT	7510na				
0700	0800		USA, KWHR Naalehu HI	11565po	17780as			
0700	0730	a	USA, Voice of America	6873va				
0700	0800		USA, WBCQ Monticello ME	7415na				
0700	0800		USA, WEWN Birmingham AL	5825va				
0700	0800		USA, WHRA Greenbush ME	11565af				
0700	0800		USA, WHRI Noblesville IN	5745no	7315sa			
0700	0800		USA, WJCR Upton KY	7490va	13595as			
0700	0800		USA, WSHB Cypress Crk SC	13650af				
0700	0800		USA, WTJC Newport NC	9370na				
0700	0800		USA, WWCR Nashville TN	2390na	3210na	5070na	5935na	
0700	0745		USA, WYFR Okeechobee FL	7355eu	13695va	15170eu		
0700	0800	vl	Vanuatu, Radio	3945do	4960do	7260do		
0700	0800		Zambia, Christian Voice	9865do				
0700	0800	vl	Zambia, National BC Corp	6165do	6265do			
0700	0800	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
0705	0710		Croatia, Croatian Radio	9470au	11970al			
0705	0710	mtwhfa	Croatia, Croatian Radio	6165eu	7365eu	9830eu		
0705	0800		New Zealand, R New Zealand Int	15175pa				
0730	0800		Austria, R Austria International	15410me	17870me			
0730	0800	th	Georgia, Georgian Radio	6080eu				
0730	0740	as	Guam, Trans World Radio	15200as				
0730	0800	vl	Papua New Guinea, NBC	4890do	9675do			
0730	0800		Switzerland, Swiss R International	15545af	17685af	21750af		
0730	0800	as	UK, BBC World Service	15575as	17885af			
0730	0745	mtwhf	Vatican City, Vatican Radio	4005eu	5880eu	7250eu	9645eu	
				11740eu	15595eu			
0740	0800		Guam, Trans World Radio	15200as				
0745	0800		Germany, Deutsche Welle	6140eu				
0745	0755	as	Monaco, Trons World Radio	9870eu				
0750	0800	as	Greece, Voice of	9775au				
0755	0800		Monaco, Trans World Radio	9870eu				

0800	0900		Anguilla, Caribbean Beacon	6090am				
0800	0830	vl	Australia, ABC/Alice Springs	4835do				
0800	0830	vl	Australia, ABC/Katherine	5025do				
0800	0830	vl	Australia, ABC/Tennant Creek	4910do				
0800	0900		Australia, Radio	5995pa	9710pa	12080va	13605pa	
				15240va	15415as	17750as	21725pa	
0800	0826		Belgium, Radio Vlaanderen Intl	5985eu	9865as			
0800	0900	vl	Botswana, Radio	7255do	9600do	7255do		
0800	0900	vl	Cameroon, RTV/Yaounde	4850do				
0800	0900		Canada, CFRX Toronto ON	6070do				
0800	0900		Canada, CFVP Calgary AB	6030do				
0800	0900		Canada, CKZN St John's NF	6160do				
0800	0900		Canada, CKZU Vancouver BC	6160do				
0800	0900		Costa Rica, R for Peace Intl	15050va	21815va			
0800	0900		Costa Rica, University Network	5030am	6150va	7375na	9725na	
				11870va	13749af			
0800	0900		Ecuador, HCJB	11755pa	15150eu	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	11720va				
0800	0900		Germany, Deutsche Welle	6140eu				
0800	0820		Germany, Trans World Radio	6045eu				
0800	0900		Germany, Voice of Hope	5975eu	21590me			
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do			
0800	0900	as	Guam, Trans World Radio	15200as	15330as			
0800	0900		Guyana, Voice of	3289do	5949do			
0800	0900		Indonesia, Voice of	9525va	11785va	15149va		
0800	0900	vl/as	Italy, IRRS	7120va				
0800	0900		Kenya, Kenya BC Corp	4935do				
0800	0900	vl	Lesotho, Radio	4800do				
0800	0900	vl	Liberia, ELWA	4760do				
0800	0900	vl	Liberia, R Liberia International	5100do				
0800	0810	vl	Malawi, Malawi BC Corp	3380do	5995do			
0800	0900		Malaysia, Radio	7295do				
0800	0825		Malaysia, Voice of	6275as	9750as	15295as		
0800	0900		Monaco, Trans World Radio	9870eu				
0800	0830		Myanmar, Radio	9730do				
0800	0900		Namibia, Namibian BC Corp	7165af	7215af			
0800	0900		New Zealand, R New Zealand Int	15175pa				
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	0804		Pakistan, Radio	17525eu	21460eu			
0800	0900		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as	
0800	0900	vl	Papua New Guinea, NBC	4890do	9675do			
0800	0900		Russia, Voice of Russia WS	15490au	17495au	17625au	17655au	
				21790au				
0800	0900	s	S Africa, Amateur Radio League	9750af	21560af			
0800	0900		Sierra Leone, Sierra Leone BS	3316do				
0800	0900		Singapore R Corp of Singapore	6150do				
0800	0830		Slovakia, R Slovakia International	9440au	15460au	17550au		
0800	0900	vl	Solomon Islands, SIBC	5020do				
0800	0900		South Korea, R Korea Intl	9570au	13670eu			
0800	0900		Sri Lanka, Sri Lanka BC Corp	6130do				
0800	0900		Uganda, Radio	5026do	7110do	7196do		
0800	0900		UK, BBC World Service	6190af	9740as	11940af	11955pa	
				12095eu	15360as	15400af	15485eu	
				15565eu	17640eu	17760as	17830af	
				21660as				
0800	0900	as	UK, BBC World Service	15310as	17885af	21830va		
0800	0900		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
				6350va	6458va	6847va	10320va	
				10940va	12579va	12689va	13362va	
				16847va				
0800	0900		USA, KAIJ Dallas TX	5755va				
0800	0900		USA, KNLS Anchor Point AK	11765os				
0800	0900		USA, KTBN Salt Lake City UT	7510na				
0800	0900		USA, KWHR Naalehu HI	11565po	17780as			
0800	0900		USA, Voice of America	11775as	13610as	15150as		
0800	0900		USA, WEWN Birmingham AL	5825va				
0800	0900		USA, WHRA Greenbush ME	11565af				
0800	0900		USA, WHRI Noblesville IN	5745no	7315sa			
0800	0900		USA, WJCR Upton KY	7490va	13595as			
0800	0900		USA, WSHB Cypress Crk SC	9845au	9860eu			
0800	0900		USA, WWCR Nashville TN	2390na	3210na	5070na	5935na	
0800	0900	vl	Vanuatu, Radio	3945do	4960do	7260do		
0800	0900		Zambia, Christian Voice	9865do				
0800	0900	vl	Zambia, National BC Corp	6165do	6265do			
0800	0900	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
0805	0810		Croatia, Croatian Radio	13820au				
0805	0810	s	Croatia, Croatian Radio	6165eu	7365eu	9830eu		
0815	0900	f	Seychelles, FEBA Radio	15460as				
0820	0850	s	Germany, Trans World Radio	6045eu				
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	a	Austria, R Austria International	21650os	21765ou			
0830	0900		Georgia, Georgian Radio	11910eu				
0830	0900		Switzerland, Swiss R International	9885au	13685au			
0830	0900		USA, WTJC Newport NC	9370na				
0840	0900	a	Armenia, Voice of	4810eu	15240eu			
0855	0900	s	Taiwan, CBS	11725as				

FREQUENCIES

0900	1000		Anguilla, Caribbean Beacon	6090am			
0900	1000	vl	Australia, ABC/Alice Springs	2310do			
0900	1000	vl	Australia, ABC/Katherine	2485do			
0900	1000	vl	Australia, ABC/Tennant Creek	2325do			
0900	1000		Australia, Radio	13605pa	21820as		
0900	1000	as	Australia, Radio	11550va	11880va	17750va	
0900	1000	vl	Botswana, Radio	7255do	9600do	7255do	
0900	1000	vl	Cameroon, RTV/Yaounde	4850do			
0900	1000		Canada, CFRX Toronto ON	6070do			
0900	1000		Canada, CFVP Calgary AB	6030do			
0900	1000		Canada, CKZN St John's NF	6160do			
0900	1000		Canada, CKZU Vancouver BC	6160do			
0900	0956		China China Radio International	11730po	15210pa		
0900	1000		Costa Rica, R for Peace Intl	15050va	21815va		
0900	1000		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
0900	0929		Czech Rep, Radio Prague Intl	21745va			
0900	1000		Ecuador, HCJB	11775po	21455usb		
0900	1000	mtwhf	Eqt Guinea, Radio Africa	15185af			
0900	1000	os/vl	Eqt. Guinea, Radio East Africa	15185af			
0900	1000	a/monthly	Finland, Scandv Weekend Radio	11690va			
0900	1000		Germany, Deutsche Welle	6140eu			
0900	0945		Germany, Deutsche Welle	6160po	12035pa	12055as	15410af
				17770as	17800af	21560as	21680as
				21790af	21775as		
0900	1000	a	Germany, Good News World R	5985eu	5995eu		
0900	1000		Germany, Voice of Hope	5975eu	21590me		
0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do		
0900	0915		Guam, Trans World Radio	15200as	15330as		
0900	1000		Guyana, Voice of	3289do	5949do		
0900	1000	vl/as	Italy, IRRS	7120va			
0900	1000		Kenya, Kenya BC Corp	4935do			
0900	1000	vl	Lesotho, Radio	4800do			
0900	1000	vl	Liberia, ELWA	4760do			
0900	1000	vl	Liberia, R Liberia International	6100do			
0900	1000		Malaysia, Radio	7295do			
0900	1000	s	Malta, Voice of Mediterranean	11770eu			
0900	0920		Monaco, Trans World Radio	9870eu			
0900	1000		Namibia, Namibian BC Corp	7165af	7215af		
0900	1000		New Zealand, R New Zealand Int	15175pa			
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	4990do		
0900	1000		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
0900	1000	vl	Papua New Guinea, NBC	4890do	9675do		
0900	1000		Russia, Voice of Russia WS	15490au	17495au	17625au	17655au
				21790au			
0900	1000		Sierra Leone, Sierra Leone BS	3316do			
0900	1000		Singapore R Corp of Singapore	6150do			
0900	1000	vl	Solomon Islands, SIBC	5020do			
0900	1000		Sri Lanka, Sri Lanka BC Corp	6130do			
0900	1000		Uganda, Radio	5026do	7110do	7196do	
0900	0930		UK, BBC World Service	6190af	6195va	9605as	9740as
				11760me	11765as	11940af	11945af
				11955pa	12095eu	15190sa	15310as
				15360as	15400af	15485eu	15565eu
				15575as	17640eu	17760as	17790as
				17830af	17885af	21470af	21660as
0900	0930	mtwhfa	UK, BBC World Service	11945as			
0900	1000		UK, Merlin Network One	6130eu			
0900	1000		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
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 Americo	11775as	13610as	15150as	
0900	1000		USA, WEWN Birmingham AL	5825va			
0900	1000		USA, WHRA Greenbush ME	11565af			
0900	1000		USA, WHRI Noblesville IN	5745na	7315sa		
0900	1000		USA, WJCR Upton KY	7490va	13595as		
0900	1000		USA, WSHB Cypress Crk SC	9455sa	9860eu		
0900	1000		USA, WTJC Newport NC	9370na			
0900	1000		USA, WWCR Nashville TN	2390na	5070na	5935na	7435na
0900	1000	vl	Vanuatu, Radio	3945do	4960do	7260do	
0900	1000		Zambia, Christian Voice	9865do			
0900	1000	vl	Zambia, National BC Corp	6165do	6265do		
0900	1000	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
0915	1000	vl	Ghana, Ghana BC Corp	6130do	4915do		
0915	1000	vl/as	Ghana, Ghana BC Corp	4915do	4915do		
0915	0930		Guam, Trans World Radio	15330as			
0915	1000	mtwhf	USA, WRMI Miami FL	9955am			
0920	0950	s	Monaco, Trans World Radio	9870eu			
0930	1000		Georgia, Georgian Radio	11910me			
0930	1000		Guam, Trans World Radio	9865as			
0930	1000		Netherlands, Radio	9795as	12065as	13710as	
0930	1000		UK, BBC World Service	6190af	6195as	9740as	11760me
				11940af	11945as	11955pa	12095eu	15190sa
				15310as	15400af	15485eu	15565eu	15575as
				17640eu	17760as	17790as	17830af	17885af
				21470af	21660as			
1000	1100		Anguilla, Caribbean Beacon	11775am			
1000	1100	vl	Australia, ABC/Alice Springs	2310do			
1000	1100	vl	Australia, ABC/Katherine	2485do			
1000	1100	vl	Australia, ABC/Tennant Creek	2325do			
1000	1100		Australia, Radio	11880va	13605pa	17750as	21820as
1000	1100	o	Bhutan, Bhutan BC Service	6035do			
1000	1100	vl	Botswana, Radio	7255do	9600do	7255do	
1000	1100	vl	Cameroon, RTV/Yaounde	4850do			
1000	1100		Canada, CFRX Toronto ON	6070do			
1000	1100		Canada, CFVP Calgary AB	6030do			
1000	1100		Canada, CKZN St John's NF	6160do			
1000	1100		Canada, CKZU Vancouver BC	6160do			
1000	1056		China China Radio International	11730pa	15210pa		
1000	1100		Costa Rica, R for Peace Intl	15050va	21815va		
1000	1100		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
1000	1100		Ecuador, HCJB	11755pa	21455usb		
1000	1100	mtwhf	Eqt Guinea, Radio Africa	15185af			
1000	1100	a-/vl	Eqt. Guinea, Radio East Africa	15185af			
1000	1100	a/monthly	Finland, Scandv Weekend Radio	11690va			
1000	1100		Germany, Deutsche Welle	6140eu			
1000	1100		Germany, Voice of Hope	5975eu	21590me		
1000	1100	vl	Ghana, Ghana BC Corp	6130do	4915do		
1000	1100	vl/as	Ghana, Ghana BC Corp	4915do	4915do		
1000	1100		Guam, Trans World Radio	9865as			
1000	1100		Guyana, Voice of	5949do			
1000	1100		India, All India Radio	11585as	13700au	15020as	17485au
				17840as	17895au		
1000	1100	vl/as	Italy, IRRS	7120va			
1000	1100		Japan, Radio	9695as	15590as	21570pa	
1000	1100		Kenya, Kenya BC Corp	4935do			
1000	1100	vl	Lesotho, Radio	4800do			
1000	1100	vl	Liberia, ELWA	4760do			
1000	1100	vl	Liberia, R Liberia International	6100do			
1000	1100		Malaysia, Radio	7295do			
1000	1100		N Marianas, KHBI Saipan	11870as			
1000	1100		Namibia, Namibian BC Corp	7165af	7215af		
1000	1030		Netherlands, Radio	9795as	12065as	13710as	
1000	1100		New Zealand, R New Zealond Int	15175pa			
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	Nigeria, Voice of	7255af	15120af		
1000	1100		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
1000	1100	vl	Papua New Guinea, NBC	4890do	9675do		
1000	1100		Serrra Leone, Sierra Leone BS	5980do			
1000	1100		Singapore R Corp of Singapore	6150do			
1000	1030		Singapore, RTE Radio	11740au			
1000	1100	v	Solomon Islands, SIBC	5020do			
1000	1030		Sri Lanka, Sri Lanka BC Corp	4940do			
1000	1100		Uganda, Radio	5026do	7110do	7196do	
1000	1100		UK, BBC World Service	5965na	6190af	6195va	9740as
				11760me	11940af	11955pa	12095eu
				15310as	15360as	15485eu	15565eu
				15575as	17640eu	17760as	17790as
				17885af	21470af	21660as	
1000	1100	as	UK, BBC World Service	15190sa	15400af	17830af	
1000	1100		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	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	6160as	9645as	9760as	9770pa
				15160as	15240as	15425as	
1000	1100		USA, WEWN Birmingham AL	7425na	15745eu		
1000	1100		USA, WHRI Noblesvil e IN	6040na	9495sa		
1000	1100		USA, WJCR Upton KY	7490va	13595as		
1000	1100	mtwhfa	USA, WRMI Miami FL	9955am			
1000	1100		USA, WSHB Cypress Crk SC	6095am	9455sa	11870as	
1000	1100		USA, WTJC Newport NC	9370na			
1000	1100		USA, WWCR Nashville TN	2390na	5070na	5935na	9475na
1000	1100		USA, WYFR Okeechobee FL	5950na			
1000	1100	vl	Vanuatu, Radio	3945do	4960do	7260do	
1000	1027		Vietnam, Voice of	9839as	12019as		
1000	1100		Zambia, Christian Voice	9865do			
1000	1100	vl	Zambia, National BC Corp	6165do	6265do		
1000	1100	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu		
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9705do	
1030	1100		Guam, Adventist World Radio	11795as			
1030	1100		Lithuania, Radio Vilnius	9710eu			
1030	1100		Malaysia, RTM Sarawak	7160do			
1030	1100		Mongolia, Voice of	12085au			
1030	1100		Netherlands, Radio	6045eu	9795as	9860eu	12065as
				13710as			
1030	1100		South Korea, R Korea Intl	11715na			
1030	1100		Sri Lanka, Sri Lanka BC Corp	4940do	11835as	15120as	17850as
1030	1100		UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu
1045	1100		Germany, Deutsche Welle	6160eu			

1100 UTC SHORTWAVE GUIDE

6:00 AM EST
5:00 AM CST
3:00 AM PST

Frequencies

1100	1200		Anguilla, Caribbean Beacon	11775am			
1100	1200	vl	Australia, ABC/Alice Springs	2310do			
1100	1200	vl	Australia, ABC/Katherine	2485do			
1100	1200	vl	Australia, ABC/Tennant Creek	2325do			
1100	1200		Australia, Radio	5995pa	6020pa	9580va	11650po
				13605po	21820os		
1100	1200	vl	Botswana, Radio	7255do	9600do	7255do	
1100	1200	vl	Cameroon, RTV/Yaounde	4850do			
1100	1200		Canada, CBC Northern Service	9625do			
1100	1200		Canada, CFRX Toronto ON	6070do			
1100	1200		Canada, CFVP Calgary AB	6030do			
1100	1200		Canada, CKZN St John's NF	6160do			
1100	1200		Canada, CKZU Vancouver BC	6160do			
1100	1200	mtwhf	Canada, R Canada International	9640na	13650na	17765na	17820na
1100	1200		Costa Rica, R for Peace Intl	15050va	21815va		
1100	1200		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
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	11690va			
1100	1145		Germany, Deutsche Welle	11785af	15410af	17680af	17860af
1100	1200		Germany, Voice of Hope	21590me			
1100	1200	vl	Ghana, Ghana BC Corp	6130do	4915do		
1100	1200	vl/as	Ghana, Ghana BC Corp	4915do	4915do		
1100	1200		Guyana, Voice of	5949do			
1100	1200		Iran, VOIRI	15385as	15430as	15585as	21470os
				21730os			
1100	1200	vl/os	Italy, IRRS	7120vo			
1100	1200		Japan, Radio	6120na	9695as	15590os	
1100	1200		Jordan, Radio	17680eu			
1100	1200		Kenya, Kenya BC Corp	4935do			
1100	1200	vl	Lesotho, Radio	4800do			
1100	1200	vl	Liberia, ELWA	4760do			
1100	1200	vl	Liberia, R Liberia International	6100do			
1100	1200		Malaysia, Radio	7295do			
1100	1200		Malaysio, TRM Sarawak	7160do			
1100	1200		N Marianas, KHBI Saipan	11870as			
1100	1200		Namibio, Namibian BC Corp	7165af	7215af		
1100	1130		Netherlands, Radio	6045eu	9795os	9860eu	12065as
				13710as			
1100	1200		New Zealand, R New Zealand Int	15175pa			
1100	1200		New Zealand, ZLXA	3935do			
1100	1200	vl	Nigeria, Radio/Enugu	6025do			
1100	1200	vl	Nigeria, Radio/Ibadan	6050do			
1100	1200	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1100	1200	vl	Nigeria, Radio/Logos	4990do	7285do		
1100	1104		Pakistan, Radio	9549do	17525eu	21460eu	
1100	1200		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840os
1100	1200	vl	Papua New Guinea, NBC	4890do	9675do		
1100	1200		Sierra Leone, Sierro Leone BS	5980do			
1100	1200		Singapore, R Singapore Intl	6150os	9590os		
1100	1130		Sri Lanko, Sri Lanka BC Corp	4940do	11835os	15210os	17850os
1100	1130		Switzerland, Swiss R Internationol	15315eu			
1100	1200		Switzerland, Swiss R Internationol	13735as	21770as		
1100	1200		Taiwan, Voice of Asia	7445as			
1100	1200		Ugondo, Radio	5026do	7110do	7196do	
1100	1130	mtwhf	UK, BBC Caribbean Report	6195co	15220co		
1100	1130as		UK, BBC World Service	5965na	6195as	9580as	9740as
				11760me	11955as	12095eu	15280os
				15220am	15310os	15400af	15485eu
				15565eu	15575as	17640as	17700as
				17790sa	17830af	17885af	21470af
1100	1200	mtwhfa	UK, BBC World Service	6190af	11940af		
1100	1130	as	UK, BBC World Service	6195na	15190sa	15220am	
1100	1200	a	UK, Flat Earth Radio/Merlin	21455me	21515af		
1100	1200	a	UK, Virgin Radio/Merlin	21455me	21515af		
1100	1200		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
1100	1200		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	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 Americo	6160as	9645as	9760as	9770pa
				15160os	15240os	15425as	
1100	1130	mtwhf	USA, Voice of America	13675af	15550af	17650af	17780af
				21600af			
1100	1200		USA, WEWN Birmingham AL	7425na	15745eu		
1100	1200		USA, WHRI Noblesville IN	6040na	9495sa		
1100	1200		USA, WJCR Upton KY	7490va	13595os		
1100	1130	mtwhfa	USA, WRMI Miami FL	9955am			
1100	1200		USA, WSHB Cypress Crk SC	6095am	11660am		
1100	1200		USA, WTJC Newport NC	9370na			
1100	1200		USA, WWCR Nashville TN	5070no	5935na	7435na	15685na
1100	1200		USA, WYFR Okeechobee FL	5850no	5950no		
1100	1200	vl/s	Vonuatu, Radio	3945do	4960do	7260do	
1100	1127		Vietnam, Voice of	7285as			
1100	1200		Zambia, Christian Voice	9865do			
1100	1200	vl	Zambia, National BC Corp	6165do	6265do		
1100	1200	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1110	1120		Greece, Voice of	9420va	15630vo		
1115	1145		Nepal, Radio	5005as	7165as		
1115	1115	mtwhf	Vaticon City, Voticon Radio	5880eu	9645eu	11740eu	15595eu
				21850eu			
1130	1157		Czech Rep, Radio Prague Intl	6055eu	21745os		
1130	1200		Israel, Kol Israel	15650va	17535va		
1130	1200		Netherlands, Radio	6045eu	9860eu		
1130	1200		South Korea, R Korea Intl	9650no			
1130	1200		Sri Lanka, Sri Lanka BC Corp	4940do			
1130	1200		Sweden, Radio	18960no			
1130	1200		USA, WRMI Miami FL	9955am			
1130	1200	f	Vatican City, Voticon Radio	15595va	17515va		
1145	1200	vl	Libya, Voice of Africa	11815af	17725af		

Selected Programs

Daily

1130 Israel, Kol Israel: News
1130 South Korea, R. Korea Intl.: News

Sundays

1100 USA, WEWN Birmingham AL: Super Saints (lives of the saints)
1100 USA, WHRI Noblesville IN: New Harvest
1100 USA, WWCR Nashville TN (1): Door Ways
1100 USA, WWCR Nashville TN (3): News
1105 USA, WWCR Nashville TN (3): New Life
1110 USA, WWCR Nashville TN (3): View from Europe (political)
1115 USA, WWCR Nashville TN (1): Ask WWCR (listener letters)
1115 USA, WWCR Nashville TN (3): Kingdom Principles
1130 USA, WEWN Birmingham AL: Gift of the Church
1130 USA, WWCR Nashville TN (1): A Call to Worship (religious)
1130 USA, WWCR Nashville TN (3): Musical Memories (nostalgia)
1140 South Korea, R. Korea Intl.: Multiwave Feedback

Mondays

1130 USA, WEWN Birmingham AL: Life is Worth Living (teachings of late Archbishop Fulton J. Sheen)
1145 South Korea, R. Korea Intl.: Exploring the New Millennium

Mondays-Fridays

1100 USA, WEWN Birmingham AL: Catholic World Today
1100 USA, WHRI Noblesville IN (2): Ever Increasing Faith
1100 USA, WWCR Nashville TN (1): The Overcomer (Brother R.L. Stair)
1100 USA, WWCR Nashville TN (3): The Overcomer (Brother R.G. Stair)
1130 USA, WHRI Noblesville IN (2): Lester Sumrall Teachings (lectures)
1140 South Korea, R. Korea Intl.: News Commentary

Mondays-Saturdays

1100 USA, WHRI Noblesville IN (1): News
1100 USA, WHRI Noblesville IN (1): Music (Christian contemporary)

Tuesdays

1130 USA, WEWN Birmingham AL: EWTN Bookmark (book reviews)
1145 South Korea, R. Korea Intl.: Cultural Promenade (arts/culture)

Wednesdays

1130 USA, WEWN Birmingham AL: Feminism and Femininity (Catholic Church's views on women's societal role)
1145 South Korea, R. Korea Intl.: Economic Radar (the Korean economy)

Thursdays

1130 USA, WEWN Birmingham AL: Catholic History in the US
1145 South Korea, R. Korea Intl.: Korea and its Splendors

Fridays

1130 USA, WEWN Birmingham AL: 2000, The Great Jubilee
1145 South Korea, R. Korea Intl.: Notes of Nostalgia (traditional Korean music)

Saturdays

1100 USA, WEWN Birmingham AL: Our Father's Plan
1100 USA, WHRI Noblesville IN (1): For the People (American populist phone-in w/Chuck Harder)[to 1300]
1115 USA, WHRI Noblesville IN (1): Voice of Power
1130 USA, WWCR Nashville TN (1): The Way of Truth (evangelical Christian program)
1140 South Korea, R. Korea Intl.: From Us to You (letters/questions from listeners)

Frequencies

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	9580va	11650pa
				21820as			
1200	1300	mtwhf	Bhutan, Bhutan BC Service	5030do			
1200	1300	vl	Botswana, Radio	7255do	9600do	7255do	
1200	1300		Brazil, Radio Nacional Bras	15445am			
1200	1300		Bulgaria, Radio	15700eu	17500eu		
1200	1300	vl	Cameroon, RTV/Yaounde	4850do			
1200	1300	vl	Canada, CBC Northern Service	9625do			
1200	1300		Canada, CFRX Toronto ON	6070do			
1200	1300		Canada, CFVP Calgary AB	6030do			
1200	1300		Canada, CKZN St John's NF	6160do			
1200	1300		Canada, CKZU Vancouver BC	6160do			
1200	1230		Canada, R Canada International	9640na	9660as	13650na	15195as
				17765na	17820na		
1200	1256		China China Radio International	9715as	9760pa	11675pa	11980as
				15415as			
1200	1300		Costa Rica, R for Peace Intl	15050va	21815va		
1200	1300		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
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	11690va			
1200	1300		France, R France International	15195af	15195af	15540af	
1200	1245		Germany, Deutsche Welle	6140eu			
1200	1300		Germany, Voice of Hope	21460me			
1200	1300	vl	Ghana, Ghana BC Corp	4915do	6130do		
1200	1300		Guyana, Voice of	5949do			
1200	1230		Iran, VOIRI	15385as	15430as	15585as	21470as
				21730as			
1200	1300	vl/as	Italy, IRRS	7120va			
1200	1300		Jordan, Radio	17680eu			
1200	1220	fa	Kazakhstan, Radio Almaty	11840eu			
1200	1300		Kenya, Kenya BC Corp	4935do			
1200	1300	vl	Lesotho, Radio	4800do			
1200	1300	vl	Liberia, ELWA	4760do			
1200	1300	vl	Liberia, R Liberia International	6100do			
1200	1300		Malaysia, Radio	7295do			
1200	1225	mtwtf	Moldova, Radio Moldova Intl	15315na			
1200	1300		N Marianas, KHBI Saipan	9875as	17635as		
1200	1300		Namibia, Namibian BC Corp	7165af	7215af		
1200	1230		Netherlands, Radio	6045eu	9860eu		
1200	1205		New Zealand, R New Zealand Int	15175pa			
1200	1300		New Zealand, ZLXA	3935do			
1200	1300	vl	Nigeria, Radio/Enugu	6025do			
1200	1300	vl	Nigeria, Radio/Ibadan	6050do			
1200	1300	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1200	1300	vl	Nigeria, Radio/Lagos	4990do	7285do		
1200	1256		North Korea, R Pyongyang	3560va	9640va	9850va	9975va
				11335va	13650va		
1200	1300		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1200	1300	vl	Papua New Guinea, NBC	4890do	9675do		
1200	1300		Sierra Leone, Sierra Leone BS	5980do			
1200	1300		Singapore, R Singapore Intl	6150as	9590as		
1200	1215		Somalia, Radio Galkayo	6985va			
1200	1230		Sri Lanka, Sri Lanka BC Corp	4940do			
1200	1300		Taiwan, R Taiwan International	7130as	9610au		
1200	1300		Uganda, Radio	5026do	7110do	7196do	
1200	1300		UK, BBC World Service	5965na	6190af	6195as	9515na
				9580as	9740as	11760me	11940af
				11955as	12095eu	15280as	15310as
				15485eu	15565eu	15575me	17640eu
				17700as	17830af	17885af	21470af
1200	1220os		UK, BBC World Service	6195na	15220am		
1200	1300	o	UK, Flat Earth Radio/Merlin	9430na	21515af		
1200	1300	a	UK, Virgin Radio/Merlin	21455me	21515af		
1200	1300		Ukraine, R Ukraine International	21520	au		
1200	1300		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	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	mtwhf	USA, WGTG McCaysville GA	9400va	12172am		
1200	1300		USA, WHRI Noblesville IN	6040na	9495sa		
1200	1300		USA, WICR Upton KY	7490va	13595as		
1200	1300		USA, WRMI Miami FL	9955am			
1200	1300		USA, WSHB Cypress Crk SC	6095am	9875as	11660am	
1200	1300		USA, WTJC Newport NC	9370na			
1200	1300		USA, WWCR Nashville TN	5070na	7435na	13845na	15685na
1200	1245		USA, WYFR Okeechobee FL	5850na	5950na	17750na	
1200	1230		Uzbekistan, Radio Tashkent	7285as	9715as	15295as	17775as
1200	1300	vl/s	Vanuatu, Radio	3945do	4960do	7260do	
1200	1300		Zambia, Christian Voice	9865do			
1200	1300	vl	Zambia, National BC Corp	6165do	6265do		
1200	1300	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1204	1220	mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1205	1300	occsnl	New Zealand, R New Zealand Int	6095pa			
1215	1300		Egypt, Radio Cairo	17595as			
1220	1240	w	Kazakhstan, Radio Almaty	9620eu	11840eu		
1220	1300	mtwhf	UK, BBC World Service	15220am			
1230	1300		Austria, R Austria International	6155eu	13730va		
1230	1300		Bangladesh, Bangla Betar	7184as	9558as		
1230	1256		Belgium, Radio Vlaanderen Intl	9865as	9925eu		
1230	1259		Canada, R Canada International	9640na	13650na	17765na	17820na
1230	1300		Guam, Adventist World Radio	15330va			
1230	1300		Italy, Adventist World Radio	9610eu			
1230	1300		Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as
				15425as			
1230	1300		Sweden, Radio	17505as	18960na	21810as	
1230	1300		Thailand, Radio	9655as	9885as	11905as	
1230	1300	a	UK, Wales Radio Intl/Merlin	17650au			
1230	1257		Vietnam, Voice of	9839as	12019as		
1240	1300	t	Kazakhstan, Radio Almaty	9620eu	11840eu		
1245	1300		Germany, Deutsche Welle	6140eu			
1245	1300	f	Seychelles, FEBA Radio	15535me			
1255	1300	mtwhfa	Taiwan, CBS	6180as	7250as	9630as	11725as
				11775as			
1300	1400		Anguilla, Caribbean Beacon	11775am			

Selected Programs

Sundays

1200 Canada, CBC Northern Sce.: CBC News
1200 USA, WEWN Birmingham AL: Off the Shelf (Catholic authors)
1200 USA, WHRI Noblesville IN (1): Breakthrough
1200 USA, WWCR Nashville TN (1): Words of Hope (evangelical)
1200 USA, WWCR Nashville TN (3): News
1202 USA, WWCR Nashville TN (3): Inspirations Across America
1206 Canada, CBC Northern Sce.: Fresh Air (Ontario Sunday breakfast)
1215 USA, WWCR Nashville TN (1): Wonderful Words of Life
1230 Sweden, R. Sweden: In Touch with Stockholm
1230 Sweden, R. Sweden: Sounds Nordic (Swedish pop/rock)
1230 USA, WEWN Birmingham AL: The Catholic Broadcast
1230 USA, WWCR Nashville TN (1): Staff of Life (evangelical)
1245 USA, WWCR Nashville TN (1): Sonshine

Mondays

1200 USA, WEWN Birmingham AL: To Tell the Truth
1200 USA, WWCR Nashville TN (1): Voice of the Past
1215 USA, WWCR Nashville TN (1): Ask WWCR (listener letters)
1230 USA, WWCR Nashville TN (1): Day of Challenge
1245 Sweden, R. Sweden: Sportscan (reports/scores of events)
1245 USA, WWCR Nashville TN (1): Bible Life

Mondays-Fridays

1200 Canada, R. Canada Intl.: World Report (news network)
1200 USA, WHRI Noblesville IN (1): Ever Increasing Faith
1200 USA, WWCR Nashville TN (3): Newswatch Magazine (news events)
1205 Canada, R. Canada Intl.: Ontario Morning (provincial breakfast)
1215 USA, WHR Noblesville IN (1): Truth, Light and Life (religious)
1230 Sweden, R Sweden: 60 Degrees North (Nordic news magazine)
1230 USA, WEWN Birmingham AL: Morning Prayer
1230 USA, WHR Noblesville IN (1): Music (Christian contemporary)

Tuesdays

1200 USA, WEWN Birmingham AL: Mission of the Messiah
1200 USA, WWCR Nashville TN (1): World of Radio (shortwave radio)
1230 USA, WWCR Nashville TN (1): Christ is the Answer (evangelical)
1245 Sweden, R Sweden: Mediascan (communications report)
1245 USA, WWCR Nashville TN (1): Wind of the Spirit (evangelical)

Wednesdays

1200 USA, WEWN Birmingham AL: Two Shall Be One (Catholic teachings)
1200 USA, WWCR Nashville TN (1): Communications World
1230 USA, WWCR Nashville TN (1): Roberta Reads the Word (Scripture)
1245 Sweden, R Sweden: Money Matters (economics-finance/business)
1245 USA, WWCR Nashville TN (1): His Love Ministries

Thursdays

1200 USA, WEWN Birmingham AL: Crisis Magazine (current issues)
1200 USA, WWCR Nashville TN (1): We Believe
1230 USA, WWCR Nashville TN (1): Willingheart (evangelical)
1245 Sweden, R Sweden: Greenscan (environment issues)[2nd Thu.]
1245 Sweden, R Sweden: HeartBeat (health/medicine)[3rd wk.]
1245 Sweden, R Sweden: Horizon (science in Sweden)[4th Thu.]
1245 Sweden, R. Sweden: Nordic Report [1st Thu.]

Fridays

1200 USA, WEWN Birmingham AL: Answering Common Objections
1200 USA, WWCR Nashville TN (1): Big Backyard (country music)
1230 USA, WWCR Nashville TN (1): Day of Challenge (religious)
1245 USA, WWCR Nashville TN (1): Walking with the Word

Saturdays

1200 Canada, CBC Northern Sce.: World Report (morning newscast)
1200 USA, WEWN Birmingham AL: Faith for Today (religious)
1200 USA, WHRI Noblesville IN (1): News
1205 USA, WHRI Noblesville IN (1): Music (Christian contemporary)
1200 USA, WWCR Nashville TN (1): Profiles
1200 USA, WWCR Nashville TN (3): News
1202 USA, WWCR Nashville TN (3): This Week in America (political)
1205 USA, WWCR Nashville TN (1): World Outreach Ministries
1210 USA, WWCR Nashville TN (1): A View from Europe (political)
1211 Canada, CBC Northern Sce.: All in a Weekend (regional)
1215 USA, WWCR Nashville TN (1): Eco Watch (environmental)
1230 Sweden, R. Sweden: Spectrum [3rd/4th Sat.]
1230 Sweden, R. Sweden: Sweden Today (documentaries)
1230 Sweden, R. Sweden: Weekend [1st Sat.]
1230 USA, WEWN Birmingham AL: Kids Sing Along
1230 USA, WHRI Noblesville IN (1): DXing with Cumbre (SWL news w/Marie Lamb)
1230 USA, WWCR Nashville TN (1): World of Radio (news of shortwave radio w/Glenn Hauser)

Frequencies

1300	1400	vl	Australia, ABC/Alice Springs	2310da			
1300	1400	vl	Australia, ABC/Katherine	2485da			
1300	1400	vl	Australia, ABC/Tennant Creek	2325do			
1300	1400		Australia, Radio	5995pa	6020pa	9580va	11650pa
				21820as			
1300	1400	vl	Botswana, Radio	7255do	9600da	7255da	
1300	1320		Brazil, Radio Nacional Bras	15445am			
1300	1400	vl	Cameroon, RTV/Yaounde	4850da			
1300	1400	vl	Canada, CBC Northern Service	9625do			
1300	1400		Canada, CFRX Toronto ON	6070do			
1300	1400		Canada, CFVP Calgary AB	6030da			
1300	1400		Canada, CKZN St John's NF	6160do			
1300	1400		Canada, CKZU Vancouver BC	6160do			
1300	1400	smtwhf	Canada, R Canada International	13650na			
1300	1400	s	Canada, R Canada International	17800na			
1300	1400	mtwhf	Canada, R Canada International	9640na	11795na	17820na	
1300	1356		China China Radio International	7405na	9570na	11675pa	11900pa
				11980as	15180as	17880as	
1300	1400		Costa Rica, R for Peace Intl	15050va	21815va		
1300	1400		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
1300	1329		Czech Rep, Radio Prague Intl	13580eu	17485as		
1300	1400		Ecuador, HCJB	12005am	15115am	21455usb	
1300	1330		Egypt, Radio Cairo	17595as			
1300	1400	as/vl	Eqt. Guinea, Radio East Africa	15185af			
1300	1315	a/monthly	Finland, Scandv Weekend Radio	11690va			
1300	1400		France, R France International	11670eu	15155eu		
1300	1400		Germany, Deutsche Welle	6140eu			
1300	1400		Germany, Overcomer Ministries	6110eu			
1300	1330	s	Germany, Universal Life	9710eu	9955na		
1300	1330		Germnay, Voice of Hope	21460me			
1300	1400	vl	Ghana, Ghana BC Corp	4915do	6130da		
1300	1400		Guyana, Voice of	5949do			
1300	1400	vl/as	Italy, IRRS	7120va			
1300	1400		Jordan, Radio	11690eu			
1300	1400		Kenya, Kenya BC Corp	4935do			
1300	1400	vl	Lesotho, Radio	4800da			
1300	1400	vl	Liberia, ELWA	4760do			
1300	1400	vl	Liberia, R Liberia International	6100da			
1300	1400		Malaysia, Radio	7295da			
1300	1400		N Marianas, KHBI Saipan	9940as			
1300	1400		Namibia, Namibian BC Corp	7165af	7215af		
1300	1400		New Zealand, ZLXA	3935do			
1300	1400	vl	Nigeria, Radio/Enugu	6025do			
1300	1400	vl	Nigeria, Radio/Kaduna	4770do	6090da	7275da	9570da
1300	1400	vl	Nigeria, Radio/Lagos	4990do	7285da		
1300	1400		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1300	1400	vl	Papua New Guinea, NBC	4890da	9675da		
1300	1355		Poland, Radio Polonia	6095eu	7270eu	9525eu	11820eu
1300	1356		Romania, R Romania International		15250na	15390eu	17770eu
				17790na			
1300	1400	as	S Africa, Channel Africa	11720af	17780af	21725af	
1300	1400		Sierra Leone, Sierra Leone BS	5980da			
1300	1400		Singapore, R Singapore Intl	6150as	9590as		
1300	1400		Sauth Karea, R Karea Intl	9570as	9640am	13670as	
1300	1400		Sri Lanka, Sri Lanka BC Corp	4940da	6005as	6075as	9770as
				15425as			
1300	1330		Switzerland, Swiss R International	15315eu			
1300	1400		Uganda, Radio	4976da	5026da		
1300	1400		UK, BBC World Service	5965na	5990as	6190af	6195va
				9515na	9740as	11760me	11865na
				11940af	12095eu	15220am	15310as
				15420af	15485eu	15565eu	15575me
				17640eu	17700as	17830af	17885af
				21470af			
1300	1400	a	UK, Flat Earth Radio/Merlin	9430na	21455me	21515af	
1300	1400	a	UK, Global Kitchen/Merlin	9750eu	12005eu	15235eu	
1300	1400	a	UK, Virgin Radio/Merlin	21455me	21515af		
1300	1400		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
1300	1400		USA, KAIJ Dallas TX	13815va			
1300	1400		USA, KJES Vado NM	11715na			
1300	1400		USA, KNLS Anchor Point AK	9615as			
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		USA, WEWN Birmingham AL	11875na	15745eu		
1300	1400	mtwhf	USA, WGTG McCaysville GA	9400va	12172am		
1300	1400		USA, WHRI Noblesville IN	6040na	15105sa		
1300	1400		USA, WJCR Upton KY	7490va	13595as		
1300	1315	smtwhf	USA, WRMI Miami FL	9955am			
1300	1400		USA, WSHB Cypress Crk SC	9430am	9455na	9940as	
1300	1400		USA, WTJC Newport NC	9370na			
1300	1400		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1300	1400		USA, WYFR Okeechobee FL	11550as	11830na	11970na	17750na
1300	1400		Zambia, Christian Voice	9865do			
1300	1400	vl	Zambia, National BC Corp	6165do	6265do		
1300	1400	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1305	1310		Croatia, Croatian Radio	6165eu	9830eu	13830eu	
1306	1400	occsnal	New Zealand, R New Zealand Int	6095pa			
1315	1400	a/monthly	Finland, Scandv Weekend Radio	11720va			
1315	1400	s	USA, WRMI Miami FL	9955am			
1330	1400		Australia, Radio	5995pa	6020pa	9475as	9580va
				11650pa	11660va	21820as	
1330	1400		Canada, R Canada International	9535as	17795as		
1330	1400		Germany, Voice of Hope	15715as	21460me		
1330	1400		Guam, Adventist World Radio	11705as	11750as		
1330	1400		India, All India Radio	9710as	11620as	13710as	
1330	1400		Sweden, Radio	17505va	18960na	21810as	
1330	1400		Turkey, Voice of	17830as	21540eu		
1330	1400		UAE, Radio Dubai	13675eu	15395eu	21605eu	
1330	1400		Uzbekistan, Radio Tashkent	7285as	9715as	15295as	17775as
1330	1357		Vietnam, Voice of	9730eu	13740eu		
1345	1400		Vatican City, Vatican Radio	17515au	21620au		

Selected Programs

Daily

1300 USA, WEWN Birmingham AL: The Mass (Catholic religious)
1330 Austria, R. Austria Intl.: Report from Austria (reports on Austria/Europe/world)

Sundays

1300 USA, WHRI Noblesville IN (1): Call to Worship
1300 USA, WWCR Nashville TN (1): News
1300 USA, WWCR Nashville TN (3): News
1302 USA, WWCR Nashville TN (3): Inspirations Across America (inspirational phone-in){cont'd from 1202}
1302 USA, WWCR Nashville TN (1): The Sower
1309 Canada, R. Canada Intl.: Quirks and Quarks (what's new & next in science)
1330 USA, WHRI Noblesville IN (1): Joe 2K
1330 USA, WWCR Nashville TN (1): Words of Hope (evangelical Christian program)
1335 Austria, R. Austria Intl.: Week in Review
1345 Austria, R. Austria Intl.: Profile of Austria (Austrian people and places)
1345 USA, WWCR Nashville TN (1): Wonderful Words of Life (hymns)

Mondays

1300 USA, WWCR Nashville TN (1): Roberta Reads the Word (Scriptural readings)
1315 USA, WWCR Nashville TN (1): His Grace, My Freedom
1330 USA, WWCR Nashville TN (1): Shower of Power (religious program){1st/3rd/5th Mon.}
1330 USA, WWCR Nashville TN (1): Victory Baptist Church (evangelical Christian program){2nd/4th Mon.}
1345 USA, WWCR Nashville TN (1): Eco Watch (environmental report)

Mondays-Fridays

1300 Canada, R. Canada Intl.: RCI News
1300 USA, WHRI Noblesville IN (1): News
1300 USA, WWCR Nashville TN (3): Newswatch Magazine (news events and Bible prophecy){cont'd from 1200}
1305 Canada, R. Canada Intl.: Ontario Morning (pravincial breakfast program){cont'd from 1205}
1305 USA, WHRI Noblesville IN (1): Music (Christian contemporary & country/southern gospel)

Tuesdays

1300 USA, WWCR Nashville TN (1): The King is Coming (evangelical)
1315 USA, WWCR Nashville TN (1): Nation to Nation
1330 USA, WWCR Nashville TN (1): Afterglow (religious program)

Wednesdays

1300 USA, WWCR Nashville TN (1): Hope through Truth (evangelical)
1315 USA, WWCR Nashville TN (1): Faith Revival Ministries (evangelical)
1330 USA, WWCR Nashville TN (1): GEF Reconciliation Time

Thursdays

1300 USA, WWCR Nashville TN (1): Abounding Grace (evangelical)
1315 USA, WWCR Nashville TN (1): God's Miracle Hour
1330 USA, WWCR Nashville TN (1): Woman to Woman

Fridays

1300 USA, WWCR Nashville TN (1): Roberta Reads the Word (Scriptural readings)
1315 USA, WWCR Nashville TN (1): Day of Challenge
1330 USA, WWCR Nashville TN (1): Battle Cry Sounding (program of the Aggressive Christianity Missions Training Corps)

Saturdays

1300 USA, WHRI Noblesville IN (1): Sound Doctrine
1300 USA, WWCR Nashville TN (1): Country Crossroads (Southern Baptist program)
1300 USA, WWCR Nashville TN (3): News
1302 USA, WWCR Nashville TN (3): Rock the Universe (Christian alternative rock music)
1309 Canada, R. Canada Intl.: The House (the week in Canadian politics)
1330 USA, WWCR Nashville TN (1): Battle Cry Sounding (program of the Aggressive Christianity Missions Training Corps)
1335 Austria, R. Austria Intl.: Listeners' Letters
1345 Austria, R. Austria Intl.: Music from Austria (Austrian artists/performances)

Saturdays/Sundays

1300 Canada, CBC Northern Sce.: World Report
1300 Canada, R. Canada Intl.: World Report (comprehensive news from domestic network)
1330 USA, WHRI Noblesville IN (1): DXing with Cumbre (SWL news w/Marie Lamb)

Frequencies

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	5995as	6080va	9475as	9580va
				11650pa	11660as		
1400	1500	vl	Botswana, Radio	7255do	9600do	7255do	
1400	1500	vl	Cameroon, RTV/Yaounde	4850do			
1400	1500	vl	Canada, CBC Northern Service	9625do			
1400	1500		Canada, CFRX Toronto ON	6070do			
1400	1500		Canada, CFVP Calgary AB	6030do			
1400	1500		Canada, CKZN St John's NF	6160do			
1400	1500		Canada, CKZU Vancouver BC	6160do			
1400	1500	s	Canada, R Canada International	13650na	17800na		
1400	1456		China China Radio International	7405no	9700as	11675as	11825as
				13685af	15110as	15125af	
1400	1500		Costa Rica, R for Peace Intl	15050va	21815va		
1400	1500		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
1400	1500		Ecuador, HCJB	12005am	15115am	21455usa	
1400	1500	as/vl	Eqt. Guinea, Radio East Africa	15185af			
1400	1500	a/monthly	Finland, Scandv Weekend Radio	11690va			
1400	1500	a/monthly	Finland, Scandv Weekend Radio	11720va			
1400	1500		France, R France International	11610as	17620va	17680as	
1400	1500		Germany, Deutsche Welle	6140eu			
1400	1500		Germany, Overcomer Ministries	6110eu			
1400	1500		Germany, Voice of Hope	15715as	21460me		
1400	1500	vl	Ghana, Ghana BC Corp	4915do	6130do		
1400	1500		Guyana, Voice of	5949do			
1400	1500		India, All India Radio	9710as	11620as	13710as	
1400	1500	vl/as	Italy, IRRS	7120va			
1400	1500		Japan, Radio	9505na	9860as	11730as	11880me
1400	1500		Jordan, Radio	11690eu			
1400	1500		Kenya, Kenya BC Corp	4935do			
1400	1500	vl	Lesotho, Radio	4800do			
1400	1500	vl	Liberia, ELWA	4760do			
1400	1500	vl	Liberia, R Liberia International	6100do			
1400	1500		Malaysia, Radio	7295do			
1400	1500		Malaysia, RTM Sarawak	7160do			
1400	1500		Namibia, Namibian BC Corp	7165af	7215af		
1400	1500	occsnal	New Zealand, R New Zealand Int	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	9955as	9985as	13840as	
1400	1455	as	S Africa, Channel Africa	11720af	17780af	21725af	
1400	1500		Sierra Leone, Sierra Leone BS	5980do			
1400	1500		Singapore R Corp of Singapore	6150do			
1400	1500		Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as
				15425os			
1400	1500		Switzerland, Swiss R International	9575as	17670as		
1400	1500		Taiwan, R Taiwan International	15125as			
1400	1430		Thailand, Radio	9655as	9830as	11905as	
1400	1430		Turkey, Voice of	17830as	21540eu		
1400	1500		Uganda, Radio	4976do	5026do		
1400	1500		UK, BBC World Service	5990as	6190af	6195as	9515na
				9740as	11865na	11940af	12095eu
				15220na	15310as	15485eu	15565eu
				15575me	17640eu	17700as	17830af
				17840am	21470af	21660af	
1400	1500	a	UK, Flat Earth Radio/Merlin	15665na	21455me	21515af	
1400	1500	a	UK, Global Kitcher/Merlin	9750eu	12005eu	15235eu	
1400	1500	a	UK, Virgin Radio/Merlin	21455	me	21515af	
1400	1500		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
1400	1500		USA, KAII Dallas TX	13815va			
1400	1500		USA, KJES Vado NM	11715na			
1400	1500		USA, KTBN Salt Lake City UT	7510na			
1400	1500		USA, KWHR Naalehu HI	9930as	11565as		
1400	1430	s	USA, Voice of America	18275va			
1400	1500		USA, Voice of America	6160as	7125as	9645as	9760as
				15160as	15255va	15425as	
1400	1500		USA, WEWN Birmingham AL	11875na	15745eu		
1400	1500		USA, WGTG McCaysville GA	12172am			
1400	1500		USA, WHRI Noblesville IN	6040na	15105sa		
1400	1500		USA, WJCR Upton KY	7490va	13595as		
1400	1500	s	USA, WRMI Miami FL	9955am			
1400	1500		USA, WTJC Newport NC	9370na			
1400	1500		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1400	1500		USA, WYFR Okeechobee FL	11550os	11830na	11970na	17750na
1400	1405		Vatican City, Vatican Radio	17515au	21620ou		
1400	1500		Zambia, Christian Voice	9865do			
1400	1500	vl	Zambia, National BC Corp	6165do	6265do		
1400	1500	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1415	1420		Nepal, Radio	5005as	7165as		
1430	1500		Guam, Adventist World Radio	9355as			
1430	1500		Guam, Trans World Radio	15330as			
1430	1500		Malaysia, RTM Kota Kinabalu	5980do			
1430	1500		Myanmar Radio	5985do			
1430	1500		Netherlands, Radio	9890as	12065as	15590as	
1430	1500		Slovakia, Adventist World Radio	17525as			
1445	1500	mtwhf	USA, WINB, Red Lion PA	13570am			

Selected Programs

Sundays

1400 Canada, R Canada Intl.: World Report (comprehensive news from domestic network)
1400 USA, WHRI Noblesville IN (1): Light of Faith Broadcast
1400 USA, WWCR Nashville TN (1): Wings of Healing (evangelical Christian program)
1400 USA, WWCR Nashville TN (3): Answers for Life (evangelical Christian program)
1411 Canada, CBC Northern Sce.: The Sunday Edition (discussion/interviews/documentaries)[to 1700]
1411 Canada, R Canada Intl.: The Sunday Edition (discussion/interviews/documentaries)[to 1700]
1415 USA, WHRI Noblesville IN (1): Music (Christian contemporary & country/southern gospel)
1430 Sweden, R Sweden: In Touch with Stockholm (listener contact)[1st Sun.]
1430 Sweden, R Sweden: Sounds Nordic (Swedish pop/rock music)[exc. 1st wk.]
1430 USA, WHRI Noblesville IN (1): Faith Mountain Ministries
1430 USA, WWCR Nashville TN (1): Woman to Woman

Mondays-Fridays

1400 Canada, CBC Northern Sce.: CBC News
1400 Canada, R Canada Intl.: RCI News
1400 USA, WEWN Birmingham AL: Reparations, Reflections, Devotions
1400 USA, WHRI Noblesville IN (1): New Harvest
1400 USA, WWCR Nashville TN (1): News
1400 USA, WWCR Nashville TN (3): News
1405 Canada, R Canada Intl.: This Morning (interviews/documentaries/discussion)
1405 USA, WWCR Nashville TN (1): Bible Pathways
1405 USA, WWCR Nashville TN (3): America's Hope (political discussion)
1410 USA, WWCR Nashville TN (1): Travelling Farr (Jamie Farr of "M*A*S*H")
1412 USA, WWCR Nashville TN (1): Bog Frog/Travel Notes
1415 USA, WWCR Nashville TN (1): Joni and Friends
1420 USA, WWCR Nashville TN (1): Messianic Minutes
1425 USA, WWCR Nashville TN (1): Life Issues
1430 Sweden, R. Sweden: 60 Degrees North (Nordic news magazine/Friweek review)
1430 USA, WWCR Nashville TN (1): News
1432 USA, WWCR Nashville TN (1): Creation Moment.
1435 USA, WWCR Nashville TN (1): Bright Spot Hour

Thursdays

1445 Sweden, R. Sweden: Greenscan (Scandinavian environment issues)[2nd Thu.]
1445 Sweden, R. Sweden: HeartBeat (health/medicine)[3rd wk.]
1445 Sweden, R. Sweden: Horizon (science in Sweden)[4th Thu.]
1445 Sweden, R. Sweden: Nordic Report (jointly produced by Scandinavian broadcasters)[1st Thu.]

Saturdays

1400 USA, WEWN Birmingham AL: EWTN Bookmark (book reviews)
1400 USA, WHRI Noblesville IN (1): Listen to Jesus (religious program)
1400 USA, WWCR Nashville TN (1): The World Tomorrow
1400 USA, WWCR Nashville TN (3): Lyon Gold and Silver (investment advice for survivalists/commercial program)
1411 Canada, CBC Northern Sce.: The House (Canadian Parliament and politics)
1415 USA, WWCR Nashville TN (1): Ask WWCR (listener letters)
1430 Sweden, R. Sweden: Spectrum (the arts in Sweden)[3rd/4th Sat.]
1430 Sweden, R. Sweden: Sweden Today (documentaries about Swedish life)[2nd Sat.]
1430 Sweden, R. Sweden: Weekend (magazine co-produced by European broadcasters)[1st Sat.]
1430 USA, WHRI Noblesville IN (1): Eternal Good News (religious program)
1430 USA, WWCR Nashville TN (1): Hour of Reasoning (evangelical Christian programming)
1445 USA, WHRI Noblesville IN (1): Calvary Connection

Saturdays/Sundays

1400 Canada, CBC Northern Sce.: World Report (comprehensive CBC morning newscast)

Frequencies

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		Australia, Radio	5995as	6080va	9475as	9580va
				11650pa	11660as		
1500	1530		Austria, R Austria International	17865na			
1500	1600	vl	Botswana, Radio	7255do	9600do	7255do	
1500	1600	vl	Cameroon, RTV/Yaounde	4850do			
1500	1600	vl	Canada, CBC Northern Service	9625do			
1500	1600		Canada, CFRX Toronto ON	6070do			
1500	1600		Canada, CFVP Calgary AB	6030do			
1500	1600		Canada, CKZN St John's NF	6160do			
1500	1600		Canada, CKZU Voncouver BC	6160do			
1500	1559	s	Canada, R Canada International	13650na	17800na		
1500	1556		China China Radio International	7160as	7405na	9785as	13685af
				15125af			
1500	1600		Costa Rica, R for Peace Intl	15050va	21815va		
1500	1600		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
1500	1530		Ecuador, HCJB	12005am	15115am	21455usb	
1500	1600	as/vl	Eqt. Guinea, Radio East Africa	15185af			
1500	1600	a/monthly	Finland, Scondv Weekend Radio	11720va			
1500	1600		Germany, Deutsche Welle	6140eu			
1500	1600		Germany, Overcomer Ministries	6110eu	13810af		
1500	1600		Germany, Voice of Hope	15715as	21460me		
1500	1600	vl	Ghana, Ghana BC Corp	4915do	6130do		
1500	1600		Guam, Trans World Radio	15330as			
1500	1600		Guyana, Voice of	5949do			
1500	1530		Israel, Kol Israel	15650va	17535va		
1500	1600		Japan, Radio	9750as	9860as	11730as	
1500	1600		Jordan, Radio	11690eu			
1500	1600		Kenya, Kenya BC Corp	4935do			
1500	1600	vl	Lesotho, Radio	4800do			
1500	1600	vl	Liberia, ELWA	4760do			
1500	1600	vl	Liberia, R Liberia International	6100do			
1500	1600		Malaysia, Radio	7295do			
1500	1600		Malaysia, RTM Kota Kinabalu	5980do			
1500	1600		Malaysia, RTM Sarawak	7160do			
1500	1530		Mexico, R Mexico International	5985am	9705am		
1500	1530		Mongolia, Voice of	12015as	12085as		
1500	1600		Myanmar, Radio	5985do			
1500	1600		Namibia, Namibian BC Corp	7165af	7215af		
1500	1600		Netherlands, Radio	9890as	12065as	15590as	
1500	1600	occsnal	New Zealand, R New Zealand Int	6095pa			
1500	1600		New Zealand, ZLXA	3935do			
1500	1600	vl	Nigeria, Radio/Enugu	6025da			
1500	1600	vl	Nigeria, Radio/Ibadan	6050do			
1500	1600	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1500	1600	vl	Nigeria, Radio/Lagos	4990do	7285do		
1500	1600	vl	Nigeria, Voice of	7255af	15120af		
1500	1556		North Korea, R Pyongyang	4405va	6574na	9335na	11710na
				13760na			
1500	1600		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1500	1600		Russia, Voice of Russia WS	11695as	11720as	12055me	
1500	1530		S Africa, Channel Africa	17770af			
1500	1600		Seychelles, FEBA Radio	11600as			
1500	1600		Sierra Leone, Sierra Leone BS	5980do			
1500	1600		Singapore R Corp of Singapore	6150do			
1500	1600		Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as
				15425as			
1500	1600		Uganda, Radio	4976do	5026do		
1500	1600		UK, BBC World Service	5975as	5990as	6190af	6195as
				9515na	9740as	11860af	11865na
				11940af	12095eu	15220na	15310as
				15400af	15420af	15485eu	15575eu
				17700as	17830af	17840am	21470af
				21490af	21660af		
1500	1600	a	UK, Flat Earth Radio/Merlin	15665na	21455me	21515af	
1500	1600	a	UK, Global Kitchen/Merlin	9750eu	11785eu	15235eu	
1500	1600	a	UK, Virgin Radio/Merlin	21455me	21515af		
1500	1600		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
1500	1600		USA, KAIJ Dallas TX	13815va			
1500	1600		USA, KJES Vado NM	11715na			
1500	1600		USA, KTBN Salt Lake City UT	15590na			
1500	1600		USA, KWHR Naalehu HI	9930as	11565pa		
1500	1600		USA, VOA Special English	6160as	9760as	9845as	12040as
				15235as			
1500	1600		USA, Voice of America	7125as	9645as	9700me	9780as
				15205va	15255va		
1500	1600		USA, WEWN Birmingham AL	11875na	15745eu		
1500	1600		USA, WGTG McCaysville GA	9400am	12172am		
1500	1600		USA, WHRA Greenbush ME	17650af			
1500	1600		USA, WHRI Noblesville IN	13760na	15105sa		
1500	1600		USA, WINB Red Lion PA	13570am			
1500	1600		USA, WJCR Upton KY	7490va	13595as		
1500	1600	s	USA, WRMI Miami FL	9955am			
1500	1600		USA, WTJC Newport NC	9370na			
1500	1600		USA, WWCR Nashville TN	9475na	12160na	13845no	15685na
1500	1600		USA, WYFR Okeechobee FL	11830na	17750na		
1500	1600		Zambia, Christian Voice	4965do			
1500	1600	vl	Zambia, National BC Corp	6165do	6265do		
1500	1600	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1515	1600	vl	Malawi, Malawi BC Corp	3380do			
1530	1545		Afghanistan, Voice of Shari'ah	7002do	7073do	7085as	
1530	1545		Bangladesh, Bangla Betar	4882as	15520as		
1530	1600	vl	Botswana, Radio	3356do	4820do	7255do	
1530	1600		Ecuador, HCJB	12005am	15115am		
1530	1600		Iran, VOIRI	7115as	9635as	11775na	
1530	1600		S Africa, World Beacon	6145af			
1545	1600	sh	Bangladesh, Bangla Betar	4882as	15520as		
1550	1600		Voticon City, Vatican Radio	12065au	13765au	17730au	

Selected Programs

Daily

1500 Israel, Kol Israel: Israel News Magazine (news/correspondents/features)

Sundays

1500 Canada, R. Canada Intl.: CBC News
1500 USA, WEWN Birmingham AL: Top of the Week
1500 USA, WHRI Noblesville IN (1): Jesus for the Nations
1500 USA, WWCR Nashville TN (1): Foursquare Gospel Tidings (evangelical Christian program)
1500 USA, WWCR Nashville TN (3): Church of the Harvest (Christian evangelical program)
1505 Canada, CBC Northern Sce.: The Sunday Edition (interviews/documentories/ discussion) [cont'd from 1411]
1505 Canada, R. Canada Intl.: The Sunday Edition (interviews/documentories/discussion) [cont'd from 1411]
1530 USA, WHRI Noblesville IN (1): Music (Christian contemporary & country/southern gospel)
1530 USA, WWCR Nashville TN (1): A Temple of Jesus Christ (evangelical Christian program)

Mondays

1500 USA, WEWN Birmingham AL: Teachings of Jesus (religious)

Mondays-Fridays

1500 USA, WWCR Nashville TN (1): Grace Hour (evangelical)
1500 USA, WHRI Noblesville IN (1): News
1500 USA, WWCR Nashville TN (3): Larry Nichols (political discussion/phone- in)[live to 1700]
1505 USA, WHRI Noblesville IN (1): Music (Christian contemporary & country/southern gospel)

Tuesdays

1500 USA, WEWN Birmingham AL: Truth Talks (religious program)

Wednesdays

1500 USA, WEWN Birmingham AL: The Journey Home (conversations with Catholics returning to the Church)

Thursdays

1500 USA, WEWN Birmingham AL: Web of Faith (religious)

Fridays

1500 USA, WEWN Birmingham AL: Right Here, Right Now)

Saturdays

1500 USA, WEWN Birmingham AL: Retreat Teachings (Catholic)
1500 USA, WHRI Noblesville IN (1): New Harvest (evangelical)
1500 USA, WWCR Nashville TN (3): News
1505 Canada, CBC Northern Sce.: Basic Black (humor/music with Arthur Black)
1500 USA, WWCR Nashville TN (1): Infallible Truth (Christian evangelical program)
1530 USA, WWCR Nashville TN (1): Unshackled (drama w/religious theme)

Saturdays/Sundays

1500 Canada, CBC Northern Sce.: CBC News

Hauser's Highlights

FINLAND: YLE R. Finland

B-00 500 kW beams toward NAm from Pori:

9655 0100-0330	310
9715 0500-0600	325
120350100-0330	310
154001300-1400	310
154001500-1600	325
176601300-1400	310

The 0100 broadcast starts an hour later Mon-Fri, at 0200-0330 (via Arto Mujunen, Finland)

Analysing this, though no languages are specified here, it appears the one-hour weekly English suspended for the summer are included, such as to NAm 0100-0200 Sunday on new 9655 and 12035 (gh)

Frequencies

1600	1700		Algeria, R Algiers International	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	5995as	6080va	9475as	9580va
				11650pa	11660as		
1600	1700	vl	Botswana, Radio	3356do	4820do	7255do	
1600	1700	vl	Cameroon, RTV/Yaounde	4850do			
1600	1700	vl	Canada, CBC Northern Service	9625do			
1600	1700		Canada, CFRX Toronto ON	6070do			
1600	1700		Canada, CFVP Calgary AB	6030do			
1600	1700		Canada, CKZN St John's NF	6160do			
1600	1700		Canada, CKZU Vancouver BC	6160do			
1600	1656		China China Radio International	7190af	9565af	9870af	
1600	1700		Costa Rica, R for Peace Intl	15050va	21815va		
1600	1700		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
1600	1627		Czech Rep, Radio Prague Intl	5930eu	21745af		
1600	1630		Ecuador, HCJB	12005am	15115am		
1600	1700		Ethiopia, Radio	7165af	9560af		
1600	1700	o/monthly	Finland, Scandv Weekend Radio	11720va			
1600	1700		France, R France International	11615af	11995af	12015af	15210af
				17605af	17850af		
1600	1700		Germany, Deutsche Welle	6140eu			
1600	1645		Germany, Deutsche Welle	6170as	7225as	9735af	11665af
				17595as	21775af		
1600	1700	a	Germany, Good News World R	15105af			
1600	1700		Germany, Overcomer Ministries	6110eu	13810af		
1600	1630	s	Germany, Universal Life	15105af			
1600	1630		Germany, Voice of Hope	15715as	21460me		
1600	1700	vl	Ghana, Ghana BC Corp	4915do	6130do		
1600	1700	a	Greece, Voice of	9420va	15455va	15630va	
1600	1700		Guam, Adventist World Radio	9355as			
1600	1630	as	Guam, Trans World Radio	15330as			
1600	1700		Guyana, Voice of	5949do			
1600	1630		Iran, VOIRI	9635as	11775as		
1600	1700		Jordan, Radio	11690eu			
1600	1700		Kenya, Kenya BC Corp	4935do			
1600	1700	vl	Lesotho, Radio	4800do			
1600	1700	vl	Liberia, ELWA	4760do			
1600	1700	vl	Liberia, R Liberia International	6100do			
1600	1700	vl	Malawi, Malawi BC Corp	3380do			
1600	1700		Malaysia, Radio	7295do			
1600	1630	twhfa	Mexico, R Mexico International	5985am	9705am		
1600	1700		Namibia, Namibian BC Corp	7165af	7215af		
1600	1630		Netherlands, Radio	9890as	12065as	15590as	
1600	1650	occsna	New Zealand, R New Zealand Int	6095va			
1600	1700		New Zealand, ZLXA	3935do			
1600	1700	vl	Nigeria, Radio/Enugu	6025do			
1600	1700	vl	Nigeria, Radio/Ibadan	6050do			
1600	1700	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1600	1700	vl	Nigeria, Radio/Lagos	3326do	4990do		
1600	1700	vl	Nigeria, Voice of	7255af	15120af		
1600	1656		North Korea, R Pyongyang	3560va	6520va	9600va	9975va
1600	1615		Pakistan, Radio	11570me	15100af	15725af	17510me
				17720af			
1600	1700		Palau, KHBN/Voice of Hope	9955as	9965as		
1600	1700		Russia, Voice of Russia WS	4940me	4965me	4975me	7325me
				9730eu	11500as	11985me	
1600	1630		S Africa, Channel Africa	9525af			
1600	1700		S Africa, World Beacon	6145af			
1600	1700		Sierra Leone, Sierra Leone BS	5980do			
1600	1700		South Korea, R Korea Intl	5975am	9515af	9870af	
1600	1700		Sri Lanka, Sri Lanka BC Corp	4940do			
1600	1615		Switzerland, Swiss R International	9575va	17670as		
1600	1640		UAE, Radio Dubai	13675eu	15395eu	21605eu	
1600	1700		Uganda, Radio	4976do	5026do		
1600	1700		UK, BBC World Service	3195as	5975as	6190af	6195af
				7160as	9515na	9740as	11940af
				12095eu	15310as	15400af	15485eu
				15575eu	17700as	17830am	17840am
				21470af	21660af		
1600	1700	a	UK, Flat Earth Radio/Merlin	15525eu	15665na	21515af	
1600	1700	a	UK, Global Kitchen/Merlin	9750eu	11785eu	15235eu	
1600	1700		UK, World Beacon	15455eu			
1600	1700		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
1600	1700		USA, KAIJ Dallas TX	13815va			
1600	1700		USA, KTBN Salt Lake City UT	15590na			
1600	1700		USA, KWHR Noalehu HI	9930as			
1600	1700		USA, VOA Special English	13600af	15445af	17895af	
1600	1700		USA, Voice of America	6035af	6160as	7125as	9645as
				9700me	9760as	13710af	15205va
				15225af	15255va	15410af	
1600	1700		USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600	1700		USA, WGTG McCaysville GA	9400am	12172am		
1600	1700		USA, WHRA Greenbush ME	17650af			
1600	1700		USA, WHRI Noblesville IN	13760na	15105sa		
1600	1700		USA, WINB Red Lion PA	13570eu			
1600	1700		USA, WJCR Upton KY	7490va	13595as		
1600	1700	mtwhf	USA, WMLK Bethel PA	9465eu			
1600	1700	s	USA, WRMI Miami FL	9955am			
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, WYFR Okeechobee FL	11830na	15600na	17750na	18980na
				21455eu	21525af		
1600	1610		Vatican City, Vatican Radio	12065au	13765au	17540au	
1600	1700		Zambia, Christian Voice	4965do			
1600	1700	vl	Zambia, National BC Corp	6165do	6265do		
1600	1630	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1615	1630	as	UK, BBC World Service	11860af	15420af	21490af	
1625	1640		Armenia, Trans World Radio	5895me			
1630	1700		Austria, R Austria International	6155eu	13730va	15240me	17765as
1630	1657		Canada, R Canada International	6140as	7150as		
1630	1700		Egypt, Radio Cairo	15255af			
1630	1700		Georgia, Georgian Radio	6180me			
1630	1700	s	Seychelles, FEBA Radio	11605as			
1630	1700	as	UK, BBC World Service	11860af	21490af		
1630	1700	mtwhf	UK, Mer in Network One	12065as			
1630	1657		Vietnam, Voice of	9730eu	13740eu		
1630	1700	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
1650	1700	mtwhf	New Zealand, R New Zealand Int	15120pa			

Selected Programs

Daily

1600 Austria, R. Austria Intl.: Report from Austria (reports on Austria/Europe/world)

Sundays

1600 Canada, R. Canada Intl.: CBC News
1600 USA, WEWN Birmingham AL: Not By Faith Alone
1600 USA, WHRI Noblesville IN (1): DXing with Cumbre
1600 USA, WWCR Nashville TN (1): Prophetic Word Program
1600 USA, WWCR Nashville TN (3): The Whole Truth (evangelical)
1605 Austria, R. Austria Intl.: Week in Review
1605 Canada, CBC Northern Sce.: The Sunday Edition
1605 Canada, R. Canada Intl.: The Sunday Edition
1615 Austria, R. Austria Intl.: Profile of Austria (people and places)
1630 USA, WEWN Birmingham AL: A Eucharistic Journey (religious)
1630 USA, WHRI Noblesville IN (1): Storming the Gates
1630 USA, WWCR Nashville TN (1): Crossroads Baptist Church
1645 USA, WHRI Noblesville IN (1): Miracle Revival Hour

Mondays

1600 USA, WEWN Birmingham AL: Best of 'The Journey Home' (Catholics returning to the Church)

Mondays-Fridays

1600 USA, WWCR Nashville TN (1): News
1600 USA, WWCR Nashville TN (3): Larry Nichols (political)
1605 USA, WHRI Noblesville IN (1): Bible Pathway (evangelical)
1605 USA, WWCR Nashville TN (1): Pro-Life Perspective
1610 USA, WHRI Noblesville IN (1): Inside Pitch (evangelical program)
1610 USA, WWCR Nashville TN (1): The Bible on Cassette
1615 USA, WHRI Noblesville IN (1): Life in the Word (evangelical)
1615 USA, WWCR Nashville TN (1): Living Waters (evangelical)
1630 USA, WHRI Noblesville IN (1): Music (Christian contemporary)
1630 USA, WWCR Nashville TN (1): Time of Deliverance (evangelical)
1645 USA, WHRI Noblesville IN (1): Miracle Revival Hour (evangelical)
1645 USA, WWCR Nashville TN (1): The Sower (evangelical)

Saturdays

1600 USA, WEWN Birmingham AL: The Catholic Broadcast
1600 USA, WWCR Nashville TN (1): Let the Bible Speak (evangelical)
1600 USA, WWCR Nashville TN (3): News
1602 USA, WWCR Nashville TN (3): Bible's Greatest Heroes
1605 Austria, R. Austria Intl.: Listeners' Letters
1605 Canada, CBC Northern Sce.: Basic Black (humor/music)
1602 USA, WHRI Noblesville IN (1): 20 The Countdown Magazine
1615 Austria, R. Austria Intl.: Music from Austria (artists/performances)
1615 USA, WWCR Nashville TN (1): American Catholic
1630 USA, WEWN Birmingham AL: Kids Sing Along
1630 USA, WWCR Nashville TN (1): Showers of Blessings
1633 Canada, CBC Northern Sce.: Madly Off In All Directions (comedy program)
1645 USA, WWCR Nashville TN (1): Words of Hope (evangelical Christian program)

Saturdays/Sundays

1600 Canada, CBC Northern Sce.: CBC News [This Morning continues from 1411/Basic Black from 1505]

Hauser's Highlights

NEW ZEALAND: RNZI

Initial RNZI summer schedule effective Oct 1, hoping to maintain until Feb:

1650-1850	15120	Mon-Fri	NE Pacific, Samoa, Cook Islands
1850-0705	17675	Mon-Fri	All Pacific
1855-0705	17675	Sat-Sun	All Pacific
0705-0900	15175	Daily	All Pacific
0900-1205	15175	Daily	NW Pacific, Asia
1205-1650	6095	Occasional Use	

(Adrian Sainsbury, RNZI Technical Manager)

FREQUENCIES

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	2325do			
1700	1800		Australia, Radio	5995as	6080va	9475as	9580va
				9815pa	11880va		
1700	1800	vl	Botswana, Radio	3356do	4820do	7255do	
1700	1800	vl	Cameroon, RTV/Yaounde	4850do			
1700	1800	vl	Canada, CBC Northern Service	9625do			
1700	1800		Canada, CFRX Toronto ON	6070do			
1700	1800		Canada, CFVP Calgary AB	6030do			
1700	1800		Canada, CKZN St John's NF	6160do			
1700	1800		Canada, CKZU Vancouver BC	6160do			
1700	1756		China China Radio International	5220af	9570af	9670af	9695af
				11910af	13700af		
1700	1800		Costa Rica, R for Peace Intl	15050va	21815va		
1700	1800		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
1700	1727		Czech Rep, Radio Prague Intl	5930eu	21745af		
1700	1800		Egypt, Radio Cairo	15255af			
1700	1800	mtwhf	Eqt Guinea, Radio Africa	15185af			
1700	1800	a/monthly	Finland, Scandv Weekend Radio	11720va			
1700	1730		France, R France International	15210af	17605af		
1700	1800	a	Germany, Good News World R	11795me			
1700	1800		Germany, Overcamer Ministries	13810me			
1700	1800		Germany, Voice of Hope	13810va			
1700	1800	vl	Ghana, Ghana BC Corp	3366do	4915do		
1700	1800		Guyana, Voice of	5949do			
1700	1800	irreg	Iraq, Radio Iraq International	7070va			
1700	1800	vl	Italy, IRRS	3980va	3985		
1700	1800		Japan, Radio	9505na	12000eu	15355af	
1700	1730		Jordan, Radio	11690eu			
1700	1800		Kenya, Kenya BC Corp	4935do			
1700	1800	vl	Lesotho, Radio	4800do			
1700	1800	vl	Liberia, ELWA	4760do			
1700	1800	vl	Liberia, R Liberia International	6100do			
1700	1800	vl	Malawi, Malawi BC Corp	3380do			
1700	1800		Malaysia, Radio	7295do			
1700	1800		Namibia, Namibian BC Corp	3270af	3289af		
1700	1800	mtwhf	New Zealand, R New Zealand Int	15120pa			
1700	1800		New Zealand, ZLXA	3935do			
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		Palau, KHBN/Voice of Hope	9955as	9965as		
1700	1756		Romania, R Romania International	15250eu	15390eu	17720eu	17735eu
				17805eu			
1700	1800		Russia, Voice of Russia WS	9730eu	9875as	12015me	12025as
				12055me			
1700	1730		S Africa, Channel Africa	17860af			
1700	1800		S Africa, World Beacon	6145af			
1700	1800		Sierra Leone, Sierra Leone BS	5980do			
1700	1715		Somalia, Radio Galkayo	6985va			
1700	1800	irreg	Sri Lanka, Sri Lanka BC Corp	4940do			
1700	1800	vl	Sudan, Radio Omdurman	7199do	9200do	9505do	
1700	1800		Uganda, Radio	4976do	5026do		
1700	1800		UK, BBC World Service	3255af	3915af	5975as	6035af
				6190af	7160as	9510as	9630af
				9740as	12095eu	15400af	15420af
				15485eu	15575me	17830af	17840na
1700	1730	a	UK, Flat Earth Radio/Merlin	15525eu	15665na	21515af	
1700	1730	mtwhf	UK, Merlin Network One	12065as			
1700	1800		UK, World Beacon	15455eu			
1700	1800		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	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			
1700	1800		USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700	1800		USA, WGTG McCaysville GA	9400am	12172am		
1700	1800		USA, WHRA Greenbush ME	17650af			
1700	1800		USA, WHRI Noblesville IN	9495sa	13760na		
1700	1800		USA, WINB Red Lion PA	13570eu			
1700	1800		USA, WJCR Upton KY	7490va	13595as		
1700	1800	mtwhf	USA, WMLK Bethel PA	9465eu			
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, WYFR Okeechobee FL	18980eu	21455eu		
1700	1727		Vietnam, Voice of	12070eu			
1700	1800		Zambia, Christian Voice	4965do			
1700	1800	vl	Zambia, National BC Corp	6165do	6265do		
1700	1800	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
1715	1730		Vatican City, Vatican Radio	4005eu	5880eu	7250eu	9645eu
				15595eu			
1725	1740		Monaco, Trans World Radio	6145me			
1730	1800		Guam, Adventist World Radio	11560va	11965va	11965as	
1730	1745	vl	Libya, Voice of Africa	11815af	17725af		
1730	1800		Netherlands, Radio	6020af	7120af	11655af	
1730	1800		Philippines, Radio Filipinas	11720me	15190me	17720me	
1730	1800		S Africa, Adventist World Radio	12130va			
1730	1800		Slovakia, R Slovakia International	5920eu	6055eu	7345eu	
1730	1800		Swaziland, Trans World Radio	9500af			
1730	1745	mtwhf	Swaziland, Trans World Radio	3200af			
1730	1800	mtwhfa	Sweden, Radio	6065eu			
1730	1800	s	Sweden, Radio	13800eu			
1730	1800	s	UK, BBC World Service	9750as	12045as	15310as	
1730	1800	mtwhf	UK, Merlin Network One	12065as	15560as		
1730	1745		United Nations, UN Radio	6125af	15265af	17710af	
1730	1800		Vatican City, Vatican Radio	13765af	15570af	17515af	
1735	1745	vl/th	Paraguay, Radio Nacional	9739sa			
1745	1800		Bangladesh, Bangla Betar	7184eu	7462eu	9550eu	15520eu
1745	1800		Germany, Deutsche Welle	6140eu			
1745	1800		India, All India Radio	7410eu	9950eu	11620eu	11935af
				13750af	15200af	17670af	
1745	1800	as	Swaziland, Trans World Radio	3200af	9500af		

1800	1900		Anguilla, Caribbean Beacon	11775am			
1800	1900	mtwhf	Argentina, RAE	15345eu			
1800	1900	vl	Australia, ABC/Alice Springs	2310do			
1800	1900	vl	Australia, ABC/Katherine	2485do			
1800	1900	vl	Australia, ABC/Tennant Creek	2325do			
1800	1900		Australia, Radio	6080pa	7240pa	9475as	9580va
				9815pa	11880va		
1800	1830		Azerbaijan, Voice of	6110eu			
1800	1900		Bangladesh, Bangla Betar	7184eu	7462eu	9550eu	15520eu
1800	1900	vl	Botswana, Radio	3356do	4820do		
1800	1900	vl	Cameroon, RTV/Yaounde	4850do			
1800	1900		Canada, CFRX Toronto ON	6070do			
1800	1900		Canada, CFVP Calgary AB	6030do			
1800	1900		Canada, CKZN St John's NF	6160do			
1800	1900		Canada, CKZU Vancouver BC	6160do			
1800	1900		Costa Rica, R for Peace Intl	15050va	21815va		
1800	1900		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
1800	1830		Egypt, Radio Cairo	15255af			
1800	1900	mtwhf	Eqt Guinea, Radio Africa	15185af			
1800	1900	a/monthly	Finland, Scandv Weekend Radio	11720va			
1800	1830		Georgia, Georgian Radio	11910eu			
1800	1900		Germany, Deutsche Welle	6140eu			
1800	1900		Germnay, Voice of Hope	13810va			
1800	1900	vl	Ghana, Ghana BC Corp	3366do	4915do		
1800	1900		Guyana, Voice of	5949do			
1800	1900		India, All India Radio	7410eu	9950eu	11620eu	11935af
				13750af	15200af	17670af	
1800	1900	vl	Italy, IRRS	3980va	3985		
1800	1900		Kenya, Kenya BC Corp	4935do			
1800	1900		Kuwait, Radio	11990va	15230as		
1800	1900	vl	Lesotho, Radio	4800do			
1800	1900	vl	Liberia, ELWA	4760do			
1800	1900	vl	Liberia, R Liberia International	5100do			
1800	1900	vl	Malawi, Malawi BC Corp	3380do			
1800	1900		Malaysia, Radio	7295do			
1800	1900		Namibia, Namibian BC Corp	3270af	3289af		
1800	1830		Netherlands, Radio	6020af	7120af	11655af	
1800	1850	mtwhf	New Zealand, R New Zealand Int	15120pa			
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		Palau, KHBN/Voice of Hope	9965as			
1800	1900		Philippines, Radio Filipinas	11720me	15190me	17720me	
1800	1855		Poland, Radio Polonia	6000eu	7285eu		
1800	1900	sm wh a	Russia, Voice of Russia WS	9820eu			
1800	1900		Russia, Voice of Russia WS	9480eu	9775eu	9890eu	11510af
				11675eu	12015af	12055	me
1800	1830		S Africa, Adventist World Radio	5960af	6100af		
1800	1900	m	S Africa, Amateur Radio League	3215af			
1800	1830		S Africa, Channel Africa	17870af			
1800	1900		S Africa, World Beacon	3230af	11640af		
1800	1900		Sierra Leone, Sierra Leone BS	5980do			
1800	1900	irreg	Sri Lanka, Sri Lanka BC Corp	4940do			
1800	1900		Swaziland, Trans World Radio	3200af			
1800	1900		Taiwan, R Taiwan International	3955eu			
1800	1900		Uganda, Radio	4976do	5026do		
1800	1830		UK, BBC World Service	3255af	5975as	6190af	9410eu
				9510as	9740pa	12095eu	15400af
				15420af	15575as	17830af	
1800	1900	a	UK, BBC World Service	17840na			
1800	1900	mtwhf	UK, Merlin Network One	6130af	12065as		
1800	1830		UK, RTE Radio	15315	me		
1800	1900		UK, World Beacon	15585af	17665af		
1800	1900		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
1800	1900		USA, KAIJ Dallas TX	13815va			
1800	1900		USA, KTBN Salt Lake City UT	15590na			
1800	1900		USA, KWHR Naalehu HI	17510as			
1800	1900		USA, Voice of America	6035af	7415af	9760af	9770me
				11975af	15410af	15580af	17895af
1800	1900		USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1800	1900		USA, WGTG McCaysville GA	9400am	12172am		
1800	1900		USA, WHRA Greenbush ME	17650af			
1800	1900		USA, WHRI Noblesville IN	9495	sa	13760na	
1800	1900		USA, WINB Red Lion PA	13570eu			
1800	1900		USA, WJCR Upton KY	7490va	13595as		
1800	1900	mtwhf	USA, WMLK Bethel PA	9465eu			
1800	1900		USA, WSHB Cypress Crk SC	15665eu	18910af		
1800	1900		USA, WTJC Newport NC	9370na			
1800	1900		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1800	1900		USA, WYFR Okeechobee FL	17555eu			
1800	1827		Vietnam, Voice of	7440eu	9730eu	13740eu	
1800	1900		Yemen, Rep of Yemen Radio	9779me			
1800	1900		Zambia, Christian Voice	4965do			
1800	1900	vl	Zambia, National BC Corp	6165do	6265do		
1800	1900	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
1810	1900	s	Greece, Voice of	9420eu	15630af	17705na	
1830	1900		Ascension Is, RTE Radio	21630af			
1830	1900		Austria, R Austria International	13730af			
1830	1756		Belgium, Radio Vlaanderen Intl	5910eu	9925eu	13710eu	17590af
1830	1900		Canada, RTE Radio	13725na			
1830	1900	as	Georgia, Georgian Radio	6080eu			
1830	1840	s	Greece, Voice of	7475eu	9420eu	15630af	17705na
1830	1900		Netherlands, Radio	6020af	7120af	9895af	11655af
				13700af	17605af	21590af	
1830	1900		Switzerland, Swiss R International	6165eu			
1830	1900		UK, BBC World Service	3255af	6005af	6190af	9410eu
				9630af	9740pa	12095eu	15400af
				15420af	15575as	17830af	
1830	1900	as	USA, Voice of America	7170af	11940af	15525af	
1845	1900		Congo, RTV Congolaise	5985do			
1855	1900	as	New Zealand, R New Zealand Int	17675pa			

Frequencies

1900	2000		Anguilla, Caribbean Beacon	11775am			
1900	2000	vl	Australia, ABC/Katherine	2485da			
1900	2000	vl	Australia, ABC/Tennant Creek	2325da			
1900	2000		Australia, Radio	6080pa	7240pa	9500as	9580va
				9815pa	11880va		
1900	2000	vl	Botswana, Radio	3356da	4820da		
1900	2000		Bulgaria, Radio	9400na	11700eu		
1900	2000	vl	Cameroon, RTV/Yaounde	4850da			
1900	2000		Canada, CFRX Taranto ON	6070do			
1900	2000		Canada, CFVP Calgary AB	6030da			
1900	2000		Canada, CKZN St John's NF	6160do			
1900	2000		Canada, CKZU Vancouver BC	6160do			
1900	1956		China China Radio International	9440af	11750af	13790af	
1900	1915		Congo, RTV Congolaise	5985do			
1900	2000		Costa Rica, R for Peace Intl	15050va	21815va		
1900	2000		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
1900	2000		Ecuador, HCJB	17660eu			
1900	2000	mtwhf	Eqt Guinea, Radio Africa	15185af			
1900	2000	a/monthly	Finland, Scandv Weekend Radio	11720va			
1900	1945		Germany, Deutsche Welle	11765af	11965af	13720af	15390af
				17810af			
1900	2000		Germany, Voice of Hope	13810va			
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do		
1900	1945		India, All India Radio	7410eu	9950eu	11620eu	11935af
				13750af	15200af	17670af	
1900	2000	vl	Italy, IRRS	3980va	3985		
1900	2000		Kenya, Kenya BC Corp	4935do			
1900	2000		Kuwait, Radio	11990va	15230as		
1900	2000	vl	Lesotho, Radio	4800do			
1900	2000	vl	Liberia, ELWA	4760do			
1900	2000	vl	Liberia, R Liberia International	5100do			
1900	2000	vl	Malawi, Malawi BC Corp	3380do			
1900	2000		Malaysia, Radio	7295do			
1900	2000		Namibia, Namibian BC Corp	3270af	3289af		
1900	2000		Netherlands, Radio	6020af	7120af	11655af	13700af
				17605af	21590af		
1900	2000		New Zealand, R New Zealand In	17675pa			
1900	2000		New Zealand, ZLXA	3935da			
1900	2000	vl	Nigeria, Radio/Enugu	6025do			
1900	2000	vl	Nigeria, Radio/Ibadan	6050do			
1900	2000	vl	Nigeria, Radio/Kaduna	4770da	6090do	7275do	9570do
1900	2000	vl	Nigeria, Radio/Lagos	3326da	4990do		
1900	2000	vl	Nigeria, Voice of	7255af	15120af		
1900	2000		North Korea, R Pyongyang	4405va	6574na	9335na	11710na
				13760na			
1900	1930		Philippines, Radio Filipinas	11720me	15190me	17720pa	
1900	2000		Russia, Voice of Russia WS	7300eu	9480eu	9720eu	9775eu
				9820eu	9890eu	11510af	11675eu
				11695af	12015af		
1900	2000		Russia, World Beacon	7360eu			
1900	2000		S Africa, World Beacon	3230af	11640af		
1900	2000		Sierra Leone, Sierra Leone BS	3316do			
1900	2000	vl	Solomon Islands, SIBC	5020do			
1900	2000		South Korea, R Korea Intl	5975om	7275eu		
1900	2000	irreg	Sri Lanka, Sri Lanka BC Corp	4940do			
1900	2000	a	Sri Lanka, Sri Lanka BC Corp	6010eu			
1900	2000		Swaziland, Trans World Radio	3200af			
1900	2000		Switzerland, Swiss R International	6165eu			
1900	2000		Thailand, Radio	7195eu	9655eu	11905eu	
1900	2000		Uganda, Radio	4976da	5026da		
1900	2000		UK, BBC World Service	3255af	6005af	6190af	6190eu
				9410eu	9630af	9740pa	12095eu
				15400af	15575me	17830af	
1900	2000	a	UK, BBC World Service	17840na			
1900	2000	hf	UK, Merlin Network One	6130af			
1900	2000		UK, World Beacon	9675eu	15585eu		
1900	2000		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
1900	2000		USA, KAIJ Dallas TX	13815va			
1900	2000		USA, KJES Vado NM	15385na			
1900	2000		USA, KTBN Salt Lake City UT	15590na			
1900	2000		USA, KWHR Naalehu HI	17510as			
1900	2000		USA, VOA Special English	6160me	9680me	13690me	
1900	1930		USA, Voice of America	7260me	9525pa	9760af	9770af
				11870pa	15180pa		
1900	1930	as	USA, Voice of America	6035af	7375af	7415af	11975af
				15410af	15445af	15580af	
1900	2000		USA, Voice of America	9565eu	9840as	11780me	11805as
				11970as	12015as	13725me	15235as
1900	1930	a	USA, Voice of America	4950af			
1900	2000		USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1900	2000		USA, WGTG McCaysville GA	9400am	12172am		
1900	2000		USA, WHRA Greenbush ME	17650af			
1900	2000		USA, WHRI Noblesville IN	9495sa	13760na		
1900	2000		USA, WINB Red Lion PA	13570eu			
1900	2000		USA, WJCR Upton KY	7490va	13595as		
1900	2000	mtwhf	USA, WMLK Bethel PA	9465eu			
1900	2000	as	USA, WRMI Miami FL	9955am			
1900	2000		USA, WSHB Cypress Crk SC	15665eu	18910af		
1900	2000		USA, WTJC Newpart NC	9370na			
1900	2000		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1900	2000		USA, WYFR Okeechobee FL	17555eu			
1900	1927		Vietnam, Voice of	9730eu	13740eu		
1900	2000		Zambia, Christian Voice	4965do			
1900	2000	vl	Zambia, National BC Corp	6165do	6265do		
1900	2000	vl	Zimbabwe, Zimbabwe BC Corp	4828da	6045do		
1905	1930		Croatia, Croatian Radio	6165eu	13830eu		
1915	1925		Rwanda, Radio	6055da			
1930	1945		Albania, R Tirana International	7180eu	9510eu		
1930	1945		Finland, YLE/R Finland	6110eu			
1930	2000		Georgia, Georgian Radio	11760eu			
1930	2000		Iran, VOIRI	9022eu	9575eu	11670eu	
1930	2000	vl	Papua New Guinea, NBC	4890do			
1930	2000		Slovakia, R Slovakia International	5920eu	6055eu	7345eu	
1930	2000		Sweden, Radio	6065eu			
1930	2000		Turkey, Voice of	9785as	11765as		
1930	2000		USA, Voice of America	4950af	6035af	7260me	7375af
				7415af	9525pa	9760af	9770af
				11870pa	15180pa	15410af	15445af
				15580af			
1935	1955		Italy, RAI International	5970eu	7290eu	9750eu	
1955	2000	mtwhfa	Armenia, Voice of	4810eu	9965eu		
2000	2100		Algeria, R Algiers Internatianal	11715eu	15160eu		
2000	2100		Angola, R. Nacianal de Angola	3374va	7245va		
2000	2100		Anguilla, Caribbean Beacan	11775am			
2000	2015	mtwhfa	Armenia, Voice af	4810eu	9965eu		
2000	2100	v	Australia, ABC/Alice Saringa	2310da			
2000	2100	v	Australia, ABC/Katherine	2485da			
2000	2100	v	Australia, ABC/Tennant Creek	2325da			
2000	2100		Australia, Radia	9500as	9580va	9815pa	11880va
				12080va			
2000	2100	v	Botswana, Radia	3356da	4820da		
2000	2100	vl	Cameroon, RTV/Yaounde	4850da			
2000	2100		Canada, CFRX Toronto ON	6070do			
2000	2100		Canada, CFVP Calgary AB	6030do			
2000	2100		Canada, CKZN St John's NF	6160do			
2000	2100		Canada, CKZU Vancouver BC	6160do			
2000	2100		Canada, R Canada International	5995va	11690va	13650va	13670va
				15325va	15470va	17820va	17870va
2000	2059		China China Radio International	7335eu	7390eu	9440af	11735af
				11790eu	13640af	17790eu	
2000	2100		Costa Rica, R for Peace Intl	15050va	21815va		
2000	2100		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
2000	2027		Czech Rep, Radia Prague Intl	5930eu	11600as		
2000	2100		Ecuador, HCJB	17660eu			
2000	2100	mtwhf	Eqt Guinea, Radio Africa	15185af			
2000	2100	a/monthly	Finland, Scandv Weekend Radia	11720va			
2000	2100		Germany, Voice of Hope	13810va			
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do		
2000	2030		Hungary, Radio Budapest	6025eu	7130eu		
2000	2100		Indonesia, Voice of	9525va	11785va	15149va	
2000	2030		Iran, VOIRI	9022eu	9575eu	11670eu	
2000	2030		Israel, Kal Israel	11605af	15640va	15650af	17535va
2000	2100	vl	Italy, IRRS	3980va	3985		
2000	2100		Kenya, Kenya BC Corp	4935do			
2000	2100		Kuwait, Radio	11990va	15230as		
2000	2100	v	Lesotho, Radio	4800do			
2000	2100	v	Liberia, ELWA	4760do			
2000	2100	v	Liberia, R Liberia International	5100do			
2000	2100	v	Malawi, Malawi BC Corp	3380do			
2000	2100		Malaysia, Radio	7295da			
2000	2100	mtwhfa	Malta, Voice of Mediterranean	12060eu			
2000	2030		Mongalia, Voice of	12015eu	12085eu		
2000	2100	namibia,	Namibian BC Corp	3270af	3289af		
2000	2030		Netherlands, Radia	6020af	7120af	11655af	13700af
				17605af	21590af		
2000	2100		New Zealand, R New Zealand Int	17675pa			
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	4770do	6090do	7275do	9570do
2000	2100	vl	Nigeria, Radio/Lagos	3326do	4990do		
2000	2100	vl	Nigeria, Voice of	7255af	15120af		
2000	2100	vl	Papua New Guinea, NBC	4890do			
2000	2100		Russia, Voice of Russia WS	9480eu	9775eu	9820eu	9890eu
				11675eu	12070eu		
2000	2100		Russia, World Beacan	7360eu			
2000	2100		S Africa, World Beacon	3230af	11640af		
2000	2100		Sierra Leone, Sierra Leane BS	3316do			
2000	2100	v	Soloman Islands, SIBC	5020da			
2000	2100	mtwhf	Spain, R Exterior Espana	9595af	15285af		
2000	2100	irreg	Sri Lanka, Sri Lanka BC Corp	4940da			
2000	2015		Swaziland, Trans World Radio	3200af			
2000	2030		Switzerland, Swiss R International	6110eu	6165eu	13710af	13770af
				15220af	17580af		
2000	2100	vl	Syria, Radia Damascus	12085eu	13610eu		
2000	2030		Turkey, Voice af	9785as	11765as		
2000	2100		Uganda, Radio	4976do	5026do		
2000	2100		UK, BBC World Service	3255af	5975pa	6005af	6190af
				6195eu	9410eu	9630af	9740pa
				11835eu	12095eu	15400af	17830af
2000	2100		UK, World Beacan	9675af			
2000	2100		USA, Armed Farces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				12579va	12689va	13362va	16847va
2000	2100		USA, KAIJ Dallas TX	13815va			
2000	2100		USA, KJES Vada NM	15385au			
2000	2100		USA, KTBN Salt Lake City UT	15590na			
2000	2100		USA, KWHR Naalehu HI	17510as			
2000	2030		USA, Voice of America	4950af	6035af	6095me	7375af
				7415af	9760af	9770af	11855af
				15410af	15445af	15580af	17725af
2000	2100		USA, WBCQ Manticello ME	7415na			
2000	2100		USA, WEWN Birmingham AL	11875na	13615na	15745eu	
2000	2100		USA, WGTG McCaysville GA	9400am	12172am		
2000	2100		USA, WHRA Greenbush ME	17650af			
2000	2100		USA, WHRI Noblesville IN	5745sa	9495sa		
2000	2100		USA, WINB Red Lion PA	13570eu			
2000	2100		USA, WJCR Upton KY	7490va	13595as		
2000	2100	mtwhf	USA, WMLK Bethel PA	9465eu			
2000	2100	s	USA, WRMI Miami FL	9955am			
2000	2100	a	USA, WRMI Miami FL	7385na			
2000	2100		USA, WSHB Cypress Crk SC	15665eu	18910af		
2000	2100		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
2000	2100		USA, WYFR Okeechobee FL	17555eu	17845af		
2000	2100	wl	Vanuatu, Radio	3945do	4960do	7260do	
2000	2010		Vatican City, Vatican Radio	9660af	11625af	13765af	
2000	2100		Zambia, Christian Voice	4965do			
2000	2100	wl	Zambia, National BC Corp	6165do	6265da		
2000	2100	wl	Zimbabwe, Zimbabwe BC Corp	4828do	6045da		
2010	2030		Vatican City, Vatican Radio	9660af	11625af	13765af	
2025	2045		Italy, RAI International	7125af	9710af	11880af	
2030	2100	t h	Belarus, R Belarus International	7105eu	7210as		
2030	2056		Belgium, Radia Vlaanderen Intl	5960eu			
2030	2100		Cuba, Radio Havana	13660eu	13750eu		
2030	2100		Egypt, Radio Cairo	15375af			
2030	2100		Germany, Adventist World Radia	15560af			
2030	2045	vl	Libya, Voice of Africa	11815af	17725af		
2030	2055	mtwhf	Moldova, Radio Moldova Intl	7520eu			
2030	2100		Poland, Radia Polonia	6035eu	7185eu	7265eu	9540eu
2030	2100		S Africa, Adventist World Radia	9745af			
2030	2045		Thailand, Radio	9655eu	9680eu	11905eu	
2030	2100	f	UK, Wales Radio Intl/Merlin	7325eu			
2030	2100	es	USA, Voice of America	4950af			
2030	2100		USA, WTJC Newpart NC	9370na			
2030	2100		Uzbekistan, Radia Tashkent	9540eu	9545eu		
2030	2057		Vietnam, Voice af	9730eu	13740eu		
2040	2050	n	Vatican City, Vatican Radio	9660eu			
2045	2100		India, All India Radio	7150va	7410eu	9650eu	9910au
				9950eu	11620au	11715me	
2050	2100		Vatican City, Vatican Radio	4005eu	5880eu	7250eu	9645eu
2050	2100	n	Vatican City, Vatican Radio	9660eu			

Frequencies

2100	2200		Anguilla, Caribbean Beacon	11775am			
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, Radio	7240pa	9500as	9580va	9660pa
				11880va	12080va	17715pa	21740va
2100	2200	vl	Botswana, Radio	3356da	4820da		
2100	2200	vl	Cameroon, RTV/Yaounde	4850da			
2100	2200	vl	Canada, CBC Northern Service	9625da			
2100	2200		Canada, CFRX Toronto ON	6070da			
2100	2200		Canada, CFVP Calgary AB	6030da			
2100	2200		Canada, CKZN St John's NF	6160da			
2100	2200		Canada, CKZU Vancouver BC	6160da			
2100	2200		Canada, R Canada International	7235va	11690va	13650va	13670va
				15325va	17820va	17870va	
2100	2159		China China Radio International	7335eu	7390eu	9440af	11735af
				11790eu	13640af	17790eu	
2100	2200		Costa Rica, R for Peace Intl	15050va	21815va		
2100	2200		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
2100	2130		Cuba, Radio Havana	13660eu	13750eu		
2100	2200		Ecuador, HCJB	17660eu			
2100	2200		Egypt, Radio Cairo	15375af			
2100	2200	mtwhf	Eqt Guinea, Radio Africa	15185af			
2100	2200	f/monthly	Finland, Scandv Weekend Radio	11690va			
2100	2145		Germany, Deutsche Welle	7130eu	9670as	9765as	9875af
				11865af	11915as	15135va	
2100	2200	vl	Ghana, Ghana BC Corp	3366da	4915da		
2100	2200		India, All India Radio	7150va	7410eu	9650eu	9910au
				9950eu	11620au	11715me	
2100	2200	irreg	Iraq, Radio Iraq International	9684va	11787va		
2100	2200	vl	Italy, IRRS	3980va	3985		
2100	2200		Japan, Radio	6035pa	9725eu	11850pa	11855af
				17825na	21670pa		
2100	2110		Kenya, Kenya BC Corp	4935da			
2100	2200	vl	Lesotho, Radio	4800da			
2100	2200	vl	Liberia, ELWA	4760da			
2100	2200	vl	Liberia, R Liberia International	5100da			
2100	2200	vl	Malawi, Malawi BC Corp	3380da			
2100	2200		Malaysia, Radio	7295da			
2100	2200		Namibia, Namibian BC Corp	3270af	3289af		
2100	2200		New Zealand, R New Zealand Int	17675pa			
2100	2200		New Zealand, ZLXA	3935da			
2100	2200	vl	Nigeria, Radio/Enugu	6025da			
2100	2200	vl	Nigeria, Radio/Ibadan	6050da			
2100	2200	vl	Nigeria, Radio/Kaduna	4770do	6090da	7275da	9570da
2100	2200	vl	Nigeria, Radio/Lagos	3326do	4990do		
2100	2156		North Korea, R Pyongyang	6574va	9335va		
2100	2200		Palau, KHBN/Voice of Hope	9985as			
2100	2200	vl	Papua New Guinea, NBC	4890da			
2100	2105		Poland, Radio Polonia	6035eu	7185eu	7265eu	9525eu
2100	2156		Romania, R Romania International	11740eu	11940eu	15105eu	15180eu
2100	2200		Russia, Voice of Russia WS	9775eu	9775eu	9820eu	9890eu
				11675eu	15485eu		
2100	2200		Russia, World Beacon	7360eu			
2100	2200		S Africa, World Beacon	3230af	11640af		
2100	2200		Sierra Leone, Sierra Leone BS	3316do			
2100	2200	vl	Solomon Islands, SIBC	5020do	9545da		
2100	2130		South Korea, R Korea Intl	3970eu	6480eu		
2100	2200		South Korea, R Korea Intl	15575eu			
2100	2200	s	Spain, R Exterior Espana	9595af	9840eu		
2100	2200	irreg	Sri Lanka, Sri Lanka BC Corp	4940da			
2100	2200	vl	Syria, Radio Damascus	12085eu	13610eu		
2100	2200		UK, BBC World Service	3255af	3915as	5965as	5975va
			6005af	6190af	6195va	9410eu	9740pa
			11835af	11945as	12095sa	15400af	
2100	2115	mtwhf	UK, BBC World Service	11675ca			
2100	2200	fa	UK, Global Kitchen/Merlin	3955eu	7325eu		
2100	2200		UK, World Beacon	9675af			
2100	2200		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
			6350va	6458va	6847va	10320va	10940va
			12579va	12689va	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	2130		USA, Voice of America	6035af	6040me	6095me	7375af
			7415af	9535af	9705pa	9760eu	11870pa
			11975af	15185as	15410af	15445af	15580af
			17725af	17735as	17820as		
2100	2200		USA, WBCQ Monticello ME	7415na			
2100	2200	mtwhf	USA, WBCQ Monticello ME	9330na			
2100	2200		USA, WEWN Birmingham AL	11875na	13615na	15745eu	
2100	2200		USA, WGTG McCaysville GA	9400am	12172am		
2100	2200		USA, WHRA Greenbush ME	17650af			
2100	2200		USA, WHRI Noblesville IN	5745na	9495sa		
2100	2200		USA, WINB Red Lion PA	13570eu			
2100	2200		USA, WJCR Upton KY	7490va	13595as		
2100	2200	s	USA, WRMI Miami FL	9955am			
2100	2200	a	USA, WRMI Miami FL	7385na			
2100	2200		USA, WSHB Cypress Crk SC	15665eu	18910af		
2100	2200		USA, WTJC Newport NC	9370na			
2100	2200		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
2100	2145		USA, WYFR Okeechobee FL	15120af	17555eu	17845af	
2100	2200	vl	Vanuatu, Radio	3945da	4960do	7260do	
2100	2200		Zambia, Christian Voice	4965da			
2100	2200	vl	Zambia, National BC Corp	6165da	6265do		
2100	2200	vl	Zimbabwe, Zimbabwe BC Corp	4828da	6045do		
2110	2130		Vatican City, Vatican Radio	4005eu	5880eu	7250eu	9645eu
2115	2200		Egypt, Radio Cairo	9990eu			
2115	2130	mtwhf	UK, BBC Caribbean Report	5975ca	11675ca	15390ca	
2115	2130	as	UK, BBC World Service	5975ca			
2120	2200	s	Greece, Voice of	9425au	15650au		
2130	2200	vl	Australia, ABC/Alice Springs	4835do			
2130	2200	vl	Australia, ABC/Katherine	5025do			
2130	2200	vl	Australia, ABC/Tennant Creek	4910do			
2130	2200		Australia, Radio	7240pa	9660pa	11880va	12080va
				17715pa	21740va		
2130	2200		Australia, Radio	7240pa	9660pa	11880va	12080va
				17715pa	21740va		
2130	2200		Austria, R Austria International	5945eu	6155eu	13730af	
2130	2200	th	Belarus, R Belarus International	7105eu	7210as		
2130	2200		Croatia, Croatian Radio	9430al	11805af		
2130	2157		Czech Rep, Radio Prague Intl	11600as	15545af		
2130	2200		Guam, Adventist World Radio	11980as	15550as		
2130	2200		Iran, VOIRI	11740as	13745as		
2130	2200		Sweden, Radio	6065eu	9435eu	15255as	
2130	2200		Turkey, Voice of	9525eu			
2130	2145	tf	UK, BBC Calling Falklands	11680sa			
2130	2200		USA, Voice of America	6040me	6095me	9535af	9705as
				9760eu	11870pa	15185as	17785as
				17820as			
2130	2200	smtwhf	USA, Voice of America	6035af	7375af	7415af	11975af
				15410af	15445af	15580af	17785af
2130	2200		Uzbekistan, Radio Tashkent	9540eu	9545eu		
2145	2200		USA, WYFR Okeechobee FL	15120af	17845af		

2200

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, Radio	11715pa	17795va	21740va	
2200	2300		Bulgaria, Radio	9400eu	11700eu		
2200	2300	vl	Cameroon, RTV/Yaounde	4850da			
2200	2300		Canada, CBC Northern Service	9625da			
2200	2300		Canada, CFRX Toronto ON	6070da			
2200	2300		Canada, CFVP Calgary AB	6030da			
2200	2300		Canada, CKZN St John's NF	6160da			
2200	2300		Canada, CKZU Vancouver BC	6160da			
2200	2230		Canada, R Canada International	5960am	9755am	13670am	15305am
				17695am	17835as		
2200	2256		China China Radio International	7170eu	9880eu		
2200	2300		Costa Rica, R for Peace Intl	15050va	21815va		
2200	2300		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
2200	2245		Egypt, Radio Cairo	9990eu			
2200	2300	mtwhf	Eqt Guinea, Radio Africa	15185af			
2200	2300	f/monthly	Finland, Scandv Weekend Radio	11690va			
2200	2300		Germany, Overcomer Ministries	3965eu			
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do		
2200	2220	s	Greece, Voice of	9425au	15650au		
2200	2230		Hungary, Radio Budapest	6025eu			
2200	2230		India, All India Radio	7150va	7410eu	9650eu	9910au
				9950eu	11620au	11715me	
2200	2225		Iran, VOIRI	11740as	13745as		
2200	2225		Italy, RAI International	9675as	11900as	15240as	
2200	2300	vl	Liberia, R Liberia International	5100do			
2200	2210	vl	Malawi, Malawi BC Corp	3380do			
2200	2300		Malaysia, Radio	7295do			
2200	2300		Namibia, Namibian BC Corp	3270af	3289af		
2200	2300		New Zealand, R New Zealand Int	17675pa			
2200	2300		New Zealand, ZLXA	3935da			
2200	2300	vl	Nigeria, Radio/Enugu	6025da			
2200	2300	vl	Nigeria, Radio/Ibadan	6050da			
2200	2300	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
2200	2300	vl	Nigeria, Radio/Lagos	3326do	4990do		
2200	2300		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	
2200	2230	vl	Papua New Guinea, NBC	4890do			
2200	2300		Sierra Leone, Sierra Leone BS	3316da			
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do		
2200	2300	irreg	Sri Lanka, Sri Lanka BC Corp	4940da			
2200	2300		Taiwan, R Taiwan International	11565eu	15600eu		
2200	2230		Turkey, Voice of	9525as			
2200	2300		UK, BBC World Service	5965as	5975na	6175na	6195va
				7110as	9590na	9660as	11835af
				11955as	12080pa	12095sa	15400af
2200	2300	as	UK, Global Kitchen/Merlin	3955eu	6140eu	7325eu	
2200	2300		Ukraine, R Ukraine International	5905eu	6020eu	9640eu	11950eu
				15530eu			
2200	2300		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
2200	2300		USA, KAIJ Dallas TX	13815va			
2200	2300		USA, KTBN Salt Lake City UT	15590na			
2200	2300		USA, KWHR Naalehu HI	17510as			
2200	2230		USA, Voice of America	7215as	9705as	9770as	11760as
				15185as	15290as	15305as	17785as
				17820as			
2200	2230	mtwhf	USA, Voice of America	6035af	7340af	7375af	7415af
				11975af			
2200	2300		USA, WBCQ Monticello ME	7415na			
2200	2300	mtwhf	USA, WBCQ Monticello ME	9330na			
2200	2300		USA, WEWN Birmingham AL	9385na	9975eu	13615na	
2200	2300		USA, WGTG McCaysville GA	9320am	12172am		
2200	2300		USA, WHRA Greenbush ME	7580af			
2200	2300		USA, WHRI Noblesville IN	5745na	9495sa		
2200	2359		USA, WINB Red Lion PA	13570eu			
2200	2300		USA, WJCR Upton KY	7490va	13595as		
2200	2300	s	USA, WRMI Miami FL	9955am			
2200	2245	a	USA, WRMI Miami FL	7385na			
2200	2300		USA, WSHB Cypress Crk SC	13770eu	15285sa		
2200	2300		USA, WTJC Newport NC	9370na			
2200	2300		USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
2200	2245		USA, WYFR Okeechobee FL	11740na	15120af	17845af	
2200	2300	vl	Vanuatu, Radio	3945do	4960da	7260do	
2200	2300		Zambia, Christian Voice	4965do			
2200	2210	vl	Zambia, National BC Corp	6165do	6265do		
2230	2300		Albania, R Tirana International	7130eu	9540eu		
2230	2300		Canada, R Canada International	5960na	9755na	13670na	
2230	2300		Cuba, Radio Havana	9550am			
2230	2257		Czech Rep, Radio Prague Intl	11600na	15545na		
2230	2300		Hungary, Radio Budapest	3975eu			
2230	2300	vl/as	Solomon Islands, SIBC	5020do			
2230	2300	vl/a	Solomon Islands, SIBC	9545do			
2230	2300		UK, BBC World Service	5965as	5975na	6175na	6195va
				7110as	9590na	9660as	11835af
				11955as	12080pa	12095sa	15400af
2245	2300		India, All India Radio	7410as	9705as	9950as	11620as
				13625as			
2245	2300	smtwhf	USA, WRMI Miami FL	9955am			
2245	2300	a	USA, WRMI Miami FL	7385na			
2245	2300		USA, WYFR Okeechobee FL	11740na			
2245	2300		Vatican City, Vatican Radio	9600as	11830as		

Frequencies

2300	0000		Anguilla, Caribbean Beacon	6090am			
2300	0000	vl	Australia, ABC/Alice Springs	4835do			
2300	0000	vl	Australia, ABC/Katherine	5025do			
2300	0000	vl	Australia, ABC/Tennant Creek	4910do			
2300	0000		Australia, Radio	9660pa	12080va	17715pa	17795va
				21740va			
2300	0000	vl	Cameroon, RTV/Yaounde	4850do			
2300	0000		Canada, CBC Northern Service	9625do			
2300	0000		Canada, CFRX Toronto ON	6070do			
2300	0000		Canada, CFVP Calgary AB	6030do			
2300	0000		Canada, CKZN St John's NF	6160do			
2300	0000		Canada, CKZU Vancouver BC	6160do			
2300	2330		Canada, R Canada International	5960am	9755am	11895an	13670am
				15305am	17695am		
2300	2356		China, China Radio International	5990na			
2300	0000		Costa Rica, R for Peace Intl	15050va	21815va		
2300	0000		Costa Rica, University Network	5030am	6150va	7375na	9725na
				11870va	13749af		
2300	2330		Cuba, Radio Havana	9550am			
2300	0000		Egypt, Radio Cairo	9900am			
2300	0000	f/monthly	Finland, Scandv Weekend Radio	11690va			
2300	2345		Germany, Deutsche Welle	9815as	12055as	13610as	21790as
2300	0000	vl	Ghana, Ghana BC Corp	3366da	4915da		
2300	0000		India, All India Radio	7410as	9705as	9950as	11620as
				13625as			
2300	0000	vl	Liberia, R Liberia International	5100da			
2300	0000		Malaysia, Radio	7295do			
2300	0000		Malaysia, RTM Kota Kinabalu	5980da			
2300	2330		Mexico, R Mexico International	5985am	9705am		
2300	0000		Namibia, Namibian BC Corp	3270af	3289af		
2300	2359		New Zealand, R New Zealand Int	17675pa			
2300	0000		New Zealand, ZLXA	3935do			
2300	2305	vl	Nigeria, Radio/Enugu	6025do			
2300	2305	vl	Nigeria, Radio/Ibadan	6050do			
2300	2305	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570da
2300	2305	vl	Nigeria, Radio/Lagos	3326do	4990do		
2300	0000		Palau, KHBN/Voice of Hope	9965as	9955as	9985as	
2300	2359		Romania, R Romania International	9690eu	11775na	11830eu	15105na
2300	0000		Sierra Leone, Sierra Leone BS	3316do			
2300	0000	vl/as	Solomon Islands, SIBC	5020do			
2300	0000	vl/a	Solomon Islands, SIBC	9545da			
2300	0000		Sri Lanka, Sri Lanka BC Corp	4940da			
2300	0000		Turkey, Voice of	7190eu	13640va		
2300	0000		UK, BBC World Service	3915as	5965as	5975na	6035as
				6175na	6195as	7110as	9590na
				11945as	11955as	12095	sa
				15280as			
2300	0000	as	UK, Global Kitchen/Merlin	3955eu	6140eu	7325eu	
2300	0000		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
2300	0000		USA, KAIJ Dallas TX	13815va			
2300	0000		USA, KTBN Salt Lake City UT	15590na			
2300	0000		USA, KWHR Naalehu HI	17510as			
2300	2330		USA, VOA Special English	7190as	7200as	9545as	9795as
				11925as			
2300	0000		USA, Voice of America	7215as	9770as	11760as	15185as
				15290as	15305as	17735as	17820as
2300	0000		USA, WBCQ Monticello ME	7415na			
2300	0000	mtwhf	USA, WBCQ Monticello ME	9330na			
2300	0000		USA, WEWN Birmingham AL	9385na	9975eu	13615na	
2300	0000		USA, WGTG McCaysville GA	9320am	12172am		
2300	0000		USA, WHRA Greenbush ME	7580na			
2300	0000		USA, WHRI Noblesville N	5745na	9495a		
2300	0000		USA, WINB Red Lion PA	13570am			
2300	0000		USA, WJCR Upton KY	7490va	13595as		
2300	0000	a	USA, WRMI Miami FL	9955am			
2300	0000		USA, WSHB Cypress Crk SC	13770eu	15285sa		
2300	2359		USA, WTJC Newport NC	9370na			
2300	0000		USA, WWCR Nashville TN	7435na	7435na	9475na	13845na
2300	2345		USA, WYFR Okeechobee FL	11740na			
2300	0000	vl	Vanuatu, Radio	3945da	4960da	7260do	
2300	2315		Vatican City, Vatican Radio	9600as	11830as		
2300	0000		Zambia, Christian Voice	4965do			
2330	2356		Belgium, Radio Vlaanderen Intl	15565na			
2330	2359		Canada, R Canada International	5960am	9755am	13670am	
2330	0000	as	Canada, R Canada International	11895am	15305am	17695am	
2330	2345	vl	Libya, Voice of Africa	11815af	17725af		
2330	0000		Malaysia, RTM Sarawak	7160da			
2330	0000		Netherlands, Radio	6165na	9845na		
2330	0000		USA, VOA Special English	6060as	7190as	7200as	7225as
				7260as	9545as	9795as	11805as
				11925as	13735as	15205as	
2330	2357		Vietnam, Voice of	9840as	12019as		

Selected Programs

Daily

2300 Turkey, V. of Turkey: News
2310 Turkey, V. of Turkey: Press Review (Turkish periodicals)
2330 New Zealand, R. NZ Intl.: NZ Long Range Weather Forecast

Sundays

2300 USA, WEWN Birmingham AL: Life on the Rock (Catholic teens)
2300 USA, WHRI Noblesville IN: News
2300 USA, WWCR Nashville TN (1): A Visit with Mrs. G (religious)
2305 USA, WHRI Noblesville IN: Music (Christian contemporary)
2315 USA, WWCR Nashville TN (1): The Illuminated Word (religious)
2315 Turkey, V. of Turkey: Blue Voyage (Turkey and the sea)
2325 Turkey, V. of Turkey: Turkish Music
2330 Canada, R. Canada Intl.: Madly Off In All Directions
2330 USA, WHRI Noblesville IN (1): Sword of the Spirit
2330 USA, WWCR Nashville TN (1): Church of the Lord Jesus Christ
2340 Turkey, V. of Turkey: Yesterday and Today (Turkish history)

Sundays-Thursdays

2300 New Zealand, R. NZ Intl.: Midday Report (news/sports/finance)
2315 New Zealand, R. NZ Intl.: Business News
2325 New Zealand, R. NZ Intl.: Sport (brief round-up)
2335 New Zealand, R. NZ Intl.: Rural News
2340 New Zealand, R. NZ Intl.: Worldwatch (international news)

Mondays

2315 Turkey, V. of Turkey: Last Week (week in review in Turkey)
2325 Turkey, V. of Turkey: Wonders of Turkey (spectacular sites)
2340 Turkey, V. of Turkey: Hues and Colors of Anatolia (touring Turkey)

Mondays-Fridays

2300 Canada, R. Canada Intl.: The World at Six (evening newscast)
2300 USA, WEWN Birmingham AL: Catholic Answers Live (phone-in)
2300 USA, WHRI Noblesville IN (1): Lester Sumrall Teaching (sermons)
2300 USA, WWCR Nashville TN (1): American Sovereign
2330 Canada, R. Canada Intl.: As It Happens (interviews)
2330 USA, WHRI Noblesville IN (1): Music (Christian contemporary)

Tuesdays

2315 Turkey, V. of Turkey: Turkey-A Haven for Tourists (places to visit)
2325 Turkey, V. of Turkey: Memoirs and Writings of Ataturk
2340 Turkey, V. of Turkey: The Chosen Land

Wednesdays

2315 Turkey, V. of Turkey: Review of the Foreign Media (what the foreign media says about Turkey)
2325 Turkey, V. of Turkey: Letter-Box (letters from listeners)
2340 Turkey, V. of Turkey: Power Balances in Mideast & Turkey

Thursdays

2315 Turkey, V. of Turkey: Impressions of Turkey (foreign visitors' views)
2325 Turkey, V. of Turkey: Anatolia Project (touring Turkey's religious sites)
2340 Turkey, V. of Turkey: Turkish Influence in Western Painting

Fridays

2310 New Zealand, R. NZ Intl.: Focus on Politics (New Zealand politics)
2315 Turkey, V. of Turkey: Diary of Istanbul (a tourist's view of the city)
2325 Turkey, V. of Turkey: Gone but not Forgotten (historical figures)
2335 New Zealand, R. NZ Intl.: Music Feature (changing programs)
2340 Turkey, V. of Turkey: Festivals & Fairs in Turkey

Saturdays

2300 USA, WEWN Birmingham AL: Our Father's Plan (religious)
2300 USA, WHRI Noblesville IN: Joe 2K
2310 New Zealand, R. NZ Intl.: This Week in Parliament
2315 Turkey, V. of Turkey: Outlook (Turkish international relations)
2320 Turkey, V. of Turkey: DX Corner (for radio hobbyists)[fortnightly]
2320 Turkey, V. of Turkey: Turkish Album (cultural current events in Turkey/music)[fortnightly]
2330 Canada, R. Canada Intl.: Mystery Project (radio drama serials)
2330 USA, WHRI Noblesville IN (1): DXing with Cumbre (SWL news w/Marie Lamb)
2330 USA, WWCR Nashville TN (1): British Israel World Federation
2335 New Zealand, R. NZ Intl.: Spectrum (NZ people/places/events)
2340 Turkey, V. of Turkey: Turkey On-Line (technology in Turkey)
2345 USA, WWCR Nashville TN (1): Calvary Radio Hour (religious program)

Saturdays/Sundays

2300 Canada, R. Canada Intl.: The World This Weekend (weekend news magazine)
2300 USA, WHRI Noblesville IN (1): News
2305 USA, WHRI Noblesville IN (1): Music (Christian contemporary & country/southern gospel)

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Adrian Sainsbury, Radio New Zealand; Glenn Hauser, Enid, OK/*World of Radio, DX Report*; Hans Johnson, WY/Ulis Fleming, MD /*Cumbre DX/DXing With Cumbre*; Michael Murray, UK; David Weronka, Benson, NC; George Woods/*Media Scan*; BBCM; *BBC On-Air;* Harold Sellers, *DX Ontario; Hard Core DX* ; Radio Sweden/*Media Scan*; Usenet Newsgroups; *Worldwide DX Club;*

PROPAGATION CONDITIONS, U.S.

OPTIMIZE YOUR MONITORING

Jacques d'Avignon
monitor@rac.ca

How To Use This Table

The *Monitoring Times* propagation table is set up to cover three main areas of the continental US and similar circuits are calculated for each area. If you live in Canada or along the 49th parallel, and have access to the Internet, you can check the following sites for similar tables for the Canadian and northern US users at **http://www.odxa.on.ca/rac2txt99.htm**.

In the *MT* tables and on the Canadian web site, the OWF (Optimum Working Frequency) frequency for a particular circuit is displayed. This frequency should give you the best chance, 90% of the time, to hear a station located at the other end of the circuit. If you feel adventurous, look up higher than the OWF for possible signals.

The tabulated OWF is approximately equivalent to 80% of the MUF (Maximum Usable Frequency) so you could still go up in frequency in your search for a signal. For example, if the tabulated OWF is 8.0 MHz, the MUF would be 10 MHz, so you could go lurking in the upper reaches up to 10 MHz. When you reach the MUF, your chances of hearing a good signal have now decreased to about 10%. When the solar activity is high you might find some of the MUF in the 35 to 45 MHz area; you never know what you can find "up there."

The OWF can, at times, have a calculated value of "0". This value is replaced by an asterisk (*) and the cells are shaded in the *Monitoring Times* chart and on the Web pages. When you see this, do not despair; keep on looking in the vicinity of the last frequency listed for that circuit. The reason why the OWF can have a calculated value of "0" is simply that the ALF (Absorption Frequency) on this circuit, at that particular time of day, is higher than the OWF and, in theory, communication at the OWF should be impossible. But I have been in the radio field long enough to know that theory and practice do not always agree!

As it is relatively safe to assume reciprocity in the forecasts most of the time, the *MT* circuits are labeled "TO/FROM." There are some technical arguments against this assumption, but we know that the *MT* forecasts have been used with success by overseas listeners to listen to North American broadcasts.

A "P" after the name of a circuit indicates that the signal on that particular circuit can be influenced by auroral zone disturbances while traveling over the pole.

Enjoy DXing and use the propagation charts to help you locate unusual signals.

OPTIMUM WORKING FREQUENCIES (MHz)

For November 2000 Flux=183 SSN=144

Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
CARIBBEAN	20	18	16	14	13	11	11	10	10	9	9	9	9	10	16	24	28	29	28	27	27	27	27	24
SOUTH AMERICA	19	18	19	18	16	14	12	11	11	11	10	10			21	28	27	26	26	25	24	24	22	20
WESTERN EUROPE	9	9	9	9	9	9	9	10	10	10	10	10	10	10	12	17	23	23	20	16	14	12	11	10
EASTERN EUROPE (P)	9	9	9	10	10	10	12	11	10	10	10	10	10	10	11	16	21	17	14	12	11			10
NORTH AFRICA	15	14	14	14	13	13	13	12	12	12					14	21	27	26	23	21	19	16	15	15
CENTRAL AFRICA	26	24	19	15	13	14	12	12	*	*					15	22	27	31	32	33	34	32	29	27
SOUTH AFRICA	23	22	21	18	15	14	13	*							19	27	28	27	26	26	27	28	28	25
MIDDLE EAST (P)	12	12	12	14	16	14	12	*						10	11	15	21	18	16	14	13	14	13	13
CENTRAL ASIA (P)	12	17	25	22	18	14	13			10	10	10	10	10	10	12	14	13	13	13	12	12	12	12
INDIA (P)	14	23	27	23	18	15					10	9	9	9	11	17	17	15	15	14	12	12	12	
THAILAND	29	32	29	24	20	15				10	10	9	10	10	11	15	23	21	18	16	14	13	16	
AUSTRALIA	26	27	29	27	23	19	16	14	13	12	12	12	11	11	11	12	20	20	28	19	19	23	26	26
CHINA	27	32	29	24	20	15	12	11	10	10	10	9	9	9	10	11	13	13	13	13	13	13	13	17
JAPAN	30	28	26	21	18	14	11	10	9	9	9	9	9	9	9	10	11	10	10	10	12	21	29	31
SOUTH PACIFIC	25	25	24	23	18	16	14	13	12	11	11	10	9	9	9	14	16	20	25	26	25	25	26	26
TO/FROM US MIDWEST																								
CARIBBEAN	21	18	16	14	12	11	11	11	10	9	9	9	13	21	28	30	30	31	30	30	29	28	27	25
SOUTH AMERICA	25	22	20	18	17	15	15	14	13	12	12	11	15	26	33	32	32	31	30	29	29	28	27	26
WESTERN EUROPE	11	11	11	11	11	11	11	11	13	13	12	12	13	18	24	28	30	27	23	20	17	15	13	12
EASTERN EUROPE (P)	8	8	8	8	9	9	12	12	12	12	11	11	11	14	20	24	22	18	15	12	11	10	9	9
NORTH AFRICA	15	15	14	14	13	12	14	14	13	13			13	18	24	28	31	26	23	21	19	17	16	15
CENTRAL AFRICA	27	24	20	17	14	14	15	15	14	14			17	24	30	33	35	37	36	35	35	34	31	29
SOUTH AFRICA	23	22	19	17	15	15	15	14					17	25	28	28	28	27	26	26	27	28	28	25
MIDDLE EAST	13	13	13	13	16	15	14	14	13	13	13	12	13	16	23	25	22	20	17	15	14	14	14	13
CENTRAL ASIA (P)	12	14	19	17	16	14	13	13	12	12	12	12	12	13	17	17	15	13	13	13	13	12	12	12
INDIA	12	18	20	17	16	14						11	11	12	16	23	20	17	16	15	14	13	12	12
THAILAND	26	26	22	18	16	14				11	11	11	11	11	13	20	22	20	19	16	14	13	12	14
AUSTRALIA	26	27	25	21	17				12	12	11	11	11	11	13	21	22	20	28	19	19	23	26	26
CHINA (P)	23	25	22	18	16	14	12	12	11	11	11	11	11	11	13	14	13	13	13	13	13	13	13	15
JAPAN	29	27	23	19	16	13	12	11	11	10	10	10	10	10	11	11	11	11			13	21	29	31
SOUTH PACIFIC	28	27	24	20	17	14	13	12	12	11	11	10	10	11	16	17	18	23	28	29	28	28	28	28
TO/FROM US EAST COAST																								
CARIBBEAN	14	12	11	10	9	9	8	7	7	6	6	8	16	20	22	22	22	21	21	20	20	20	19	17
SOUTH AMERICA	21	19	18	17	15	15	14	12	11	10	10	14	25	29	29	29	27	27	26	25	25	25	23	21
WESTERN EUROPE	12	12	12	11	11	11	10	11	13	12	12	15	23	29	33	32	31	28	24	20	18	15	14	12
EASTERN EUROPE	9	9	9	8	8	9	12	12	12	11	11	12	20	26	27	25	21	19	15	12	11	10	9	9
NORTH AFRICA	15	15	14	14	13	12	13	13	12	12		16	24	30	31	31	30	27	24	21	20	18	17	16
CENTRAL AFRICA	21	19	17	16	13	14	14	14	13			20	28	33	35	36	36	35	33	31	31	30	28	24
SOUTH AFRICA	22	19	18	16	15	15	14	13				22	28	28	28	28	28	27	26	26	27	27	27	25
MIDDLE EAST	14	13	13	13	16	15	15	14	14	13	12	15	23	30	30	27	23	22	20	17	16	15	15	14
CENTRAL ASIA (P)	12	13	18	18	16	15	15	15	14	14	13	14	18	25	22	18	16	14	13	13	13	12	12	12
INDIA (P)	13	15	18	17	15	14	14	14	13	13	12	13	18	25	28	26	22	18	16	15	15	14	13	12
THAILAND (P)	20	21	19	17	15	15	14	14	13	13	12	12	15	21	27	25	21	19	18	17	15	13	12	12
AUSTRALIA	26	24	21	18	16			13	12	12	12	12	12	16	24	23	22	20	20	19	19	23	26	26
CHINA (P)	19	21	19	17	15	15	14	14	13	13	12	12	14	18	15	13	13	13	13	12	13	12	12	13
JAPAN	28	24	21	18	16	15	14	14	13	13	13	12	12	12	12	12	12			12	13	21	30	30
SOUTH PACIFIC	28	24	21	17	16	14	13	13	12	12	11	11	12	19	20	18	21	26	31	31	30	31	31	31

Unfavorable conditions: Search around the last listed frequency for activity.

(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

John Figliozzi
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Ruminations of a Blocked Writer

Most of the time, it is wonderful having the opportunity to write a column such as this. *MT* gives me a great deal of latitude in choosing my topics, imparting information and expressing opinions on a broad spectrum of items related to shortwave programming and international broadcasting.

Of course, it is wonderful only if I find I have something to say. That monthly deadline date usually serves as a great source of discipline, forcing me to focus my thoughts and attention on getting words to paper and then paper to editor. I've had the pleasure of doing this column for a few years now and, for nearly every month, a topic has leapt to the fore either due to fortuitous timing or because some of you might've written in requesting my attention to a particular subject.

Then, there are months like this one. (Maybe the keen reader will even perceive that I appear to be stalling...)

There ARE a few matters that I've wanted to write about for quite some time, but these have never proven to have enough substance to warrant an entire column on their own. Given that, for this month at least, I appear to be suffering from a chronic and particularly persistent case of writer's block, maybe this is right time to get these topics off my chest. For want a better turn of phrase, let's just call these things, "Pet Peeves." (Parenthetically, let me say at the outset that these are small matters in the scheme of things; but that doesn't make them any less annoying!)

1. Memo to BBC: A Little Respect Please?

Why can't the World Service open up just one shortwave frequency for its loyal (though admittedly small) North American audience for special events? The live broadcasts of Last Night of the Proms, the Olympic coverage, the European Cup soccer finals – there are a load of other examples...Is this really too much to ask?

While we're on the subject of shortwave, why can't Auntie tell us that a frequency is about to leave the air rather than just have it go off without warning? The VOA makes it a point to provide this information and does it very well. Radio Australia always tells us when and where to switch to continue hearing its programs. In fact, nearly every service I can think of affords its listeners this little courtesy. Why not the BBC?

Can't the program continuity department and the Merlin transmission folks act a little more like a team? Why does the BBC consider it acceptable practice to have its frequencies going off the air in mid-program mid-sentence (and – again – without warning) as 9515 kHz does every day (except Saturday)? Heaven help the listener who has invested his or her time in *Eurcpe Today*, only to have an interesting report end in mid-story. Or pity the poor unsuspecting North American listener who tunes in to *Off the Shelf* before bedtime, only to have the last two or three sentences of nearly every nights' reading lost when 6175 kHz. has an untimely transmitter change. All I ask is a modicum of professionalism here. Either delay the transmitter shift ten seconds or have the reading end ten seconcs earlier. In the case of *Europe Today*, either broadcast the entire program or leave the air before it starts. Is this really so difficult to accomplish?

And one more thing: Why haven't the producers of *Write On* thought these to be suitable topics for discussion on any of the five occasions I've written to the program about them?

2. Memo to VOA: For Gosh Sake, Find Yourself!

It's all well and good to broadcast the news all day, but how about telling the world a little about us – our culture, our ways of life, our mosaic of peoples, our problems, our successes and, yes, our failures. The American ideal and our quest to reach it is a damn interesting story which can't only be told in a news format or in sound-bite proportions. *News Now* is all right as far as it goes, but how about a little imagination? Perhaps VOA could showcase the best of American radio – drama, documentaries, maybe even *This American Life*? Is *Music Mix* the most imaginative we can be, especially when American pop music blankets the globe already as it is?

One further memo to Congress: Stop (1) micromanaging US international broadcasting; and (2) preventing US citizens from knowing what the VOA – and the BBG for that matter – are doing. Foreign listeners are not stupid; they can smell the stench of propaganda and deal with it accordingly. US citizens have a right – and even a responsibility – to know what the stations they support with their tax money are telling the world. When it comes to broadcasting, trust the professionals. When it comes to US international broadcasting, stop blocking our view!

3. Memo to Stations: E-Mail – Answer it or Drop it.

How many times have you written to a station that touts its e-mail address, only to have not even acknowledge that your message has been received. Heck, there are easily installed, no cost automated scripts that can do this! Of course, this assumes that the stations in question actually respect their listeners and want their feedback.

The fact is, I've written – sometimes more than once – to people at stations who have personally given me their e-mail address and business card. The result? No answer – even when I offer free publicity for their programs in the several forums to which I contribute. It's a curious thing. Simple courtesy would appear to dictate a response of some kind to be in order even it it were to be "Thanks, but no thanks." I mean, you did ask us to write didn't you?

And don't give me the "shortage of resources and personnel" excuse. As I said, the computer could generate a reply on its own. Bottom line: If you're not going to reply, drop the pretense and get rid of the e-mail address. (While you're at it, update the web site now and then, too, or get rid of that as well.)

There now, I feel much better. That awful case of writer's block is melting away. I should be back in top form by next month's deadline. So, until December, good listening!

Audio Subcarrier Guide

Audio frequencies in MHz. All satellite/transponder coordinates are C-band unless otherwise noted.
DS-Discrete Stereo

By Robert Smathers, roberts@nmia.com

CLASSICAL MUSIC

WCPE-FM (89.7) Raleigh/Durham/ Chapel Hill, NC	G5, 7	5.58/6.12 (DS)
WFMT-FM (98.7) Chicago, IL - Fine Arts	G5, 7	6.30/6.48 (DS)

SATELLITE COMPUTER SERVICES

Superguide	G5, 7	5.48

CONTEMPORARY MUSIC

WPHZ-FM (96.9) Bremen, IN (South Bend market)	G4R, 15	6.48, 7.30 (DS)

COUNTRY MUSIC

WSM-AM (650) Nashville, TN	C4, 24	7.38/7.56 (DS)

EASY LISTENING MUSIC

FCC mandated safe-harbor program audio- easy listening music	G5, 2	6.80
United Video - easy listening music	C4, 8	5.895 (N)

FOREIGN LANGUAGE PROGRAMMING

La Cadeno CNN Radio Noticias (CNN Radio News in Spanish)	G5, 17	7.56
Radio Tropical	G11, 12	7.60
SRC AM Network	E2, 1	7.38
SRC FM Network	E2, 1	5.41/5.58 (DS)

JAZZ MUSIC

KLON-FM (88.1) Long Beach, CA., ID-Jazz-88	G5, 2	5.58/5.76 (DS)

NEWS AND INFORMATION PROGRAMMING

Broadcast News	E2, 1	5.78
Cable Radio Network	G5, 2	8.30
	G11, 6	7.30
	C1, 7	8.10
CNN Headline News	G5, 22	7.58
CNN Radio News	G5, 5	7.58
	G5, 5	6.30
	G5, 22	6.30

RELIGIOUS PROGRAMMING

Brother Staire Radio	G5, 6	6.48
Heaven Radio	G1R, 17	7.92
KHCB-FM (105.7) Houston, TX	GE1, 9	7.28
KMUS-AM (1380), Muskogee, OK	GE4, 9	5.96
LDS Radio Network	C1, 6	5.58
Trinity Broadcasting radio service	G5, 3	5.58/5.78 (DS)
Truth Net	G9, 2	5.80

SHORTWAVE BROADCASTERS VIA SATELLITE

C-SPAN Audio 1: Various shortwave broadcasters	C3, 7	5.20
C-SPAN Audio 2: British Broadcasting Corporation (BBC)	C3, 7	5.41
Deutsche Welle Radio 1 (German Language)	GE1, 22	7.38, 7.56 (DS)
Deutsche Welle Radio 2 (English Language)	GE1, 22	7.74
Deutsche Welle Radio 7 (Various Languages)	GE1, 22	7.92
RAI Satelradio Italy (Italian)	G11, 14	7.38
WEWN - Worldwide Catholic Radio, Vandiver, AL (English), 5.58 (Spanish)	G1R, 11	5.40, 7.38
WHRA Africa/Middle East - World Harvest Radio, South Bend, IN	G4R, 15	7.82
WHRI Americas - World Harvest Radio, South Bend, IN	G4R, 15	7.46
WHRI Europe - World Harvest Radio, South Bend, IN	G4R, 15	7.55
KWHR Asia - World Harvest Radio, South Bend, IN	G4R, 15	7.64
KWHR South Pacific - World Harvest Radio, South Bend, IN	G4R, 15	7.73
World Radio Network: WRN1 North America	G5, 6	6.80
World Radio Network: WRN2 North America (Multi-lingual)	G5, 6	6.20

SPECIALITY FORMATS

Colorado Talking Book Network	C1,3	5.60
Weather Channel - background music	C3, 13	7.78
Wisdom Radio Network	GE1, 12	7.10
	GE1, 12	7.92
Yesterday USA - nostalgia radio	G5, 7	6.80

TALK PROGRAMMING

American Freedom radio network	GE4, 19	5.80
Christian Media Network	G9, 2	7.78
Genesis Communications Radio Network	G1R, 17	5.58
Genesis Communications Radio Network	G9, 2	7.28
Heritage Broadcosting System	G11, 14	7.70
Skybird Radio / Friday Night Live	C3, 24	7.50
Talk America Radio Network #1 - talk programs	GE3, 9	6.80
Talk America Radio Network #2 - talk programs	GE3, 9	5.41
Talk Radio Network (TRN)	C1, 14	5.80
Truth Radio Network	G9, 2	5.40
United Broadcasting Network	C1, 2	7.50
WWTN-FM (99.7) Manchester, TN - news and talk	G5, 18	7.38, 7.56

VARIETY PROGRAMMING

CBC Radio	E2, 1	6.12
West Virginia Public Radio	GE1, 12	7.74

FM SQUARED (FM²) AUDIO GUIDE

Galaxy 3R Transponder 3 (Ku-band)

Blank Audio Carriers	2.06
Data transmissions	.06, .62, 2.93, 3.07 and 3.15 MHz
AP Network News	3.53 MHz
In-Store audio network ads (various companies)	.62, .71, .81, .88, 1.05, 1.15, 1.26, 3.25, 3.44, 3.62, 3.70, 3.80, 3.88, 3.97 and 4.20 MHz
Muzak Services	.15, .27, .39, .51, .98, 1.36, 1.48, 1.60, 1.72, 1.84, 1.96, 2.19, 2.31, 2.44, 2.56, 2.68, 2.80, 3.34, 4.08, 4.34, and 4.45 MHz

Galaxy 3R Transponder 16 (Ku-band)

Data transmissions	.06, .47, .64, 1.95, 2.18, 2.45, 2.52, 2.82, 2.92, 3.20, 3.38, 3.47, 3.73, 3.97, 4.14, and 4.24 MHz
In-Store audio networks	.15, .27, .39, .99, 1.11, 1.59, 1.71, and 1.83 MHz

Telstar 5 Transponder 28 (Ku-band)

Data Transmissions	.06, .15, .23, .30, .35, .38 .47, .65, .89, .93, .96, 1.05, 1.12, 1.22, 1.35 MHz

SATELLITE LOADING REPORT OF THE MONTH:

Solidaridad-2 at 113 degrees West longitude

C-band

1	Data Transmissions
2	Data Transmissions
3	Data Transmissions
4	Data Transmissions
5	Multivision DBS (digital)
6	Data Transmissions
7	Data Transmissions
8	Data Transmissions
9	(none)
10	Data Transmissions
11	Data Transmissions
12	(none)
13	(none)
14	Data Transmissions
15	Data Transmissions
16	Data Transmissions
17	Multivision DBS (digital)
18	Data Transmissions
19	Data Transmissions
20	Data Transmissions
21	(none)
22	Mexican Government Channel
23	Data Transmissions
24	Data Transmissions

Ku-band

Tr(Pol)	Freq	Service
1(H)	11730	Sky Mexico DBS (digital)
2(H)	11791	Sky Mexico DBS (digital)
3(H)	11852	Sky Mexico DBS (digital)
4(H)	11913	Sky Mexico DBS (digital)
5(H)	11974	Data Transmissions
6(H)	12035	Sky Mexico DBS (digital)
7(H)	12096	Sky Mexico DBS (digital)
8(H)	12157	Sky Mexico DBS (digital)
9(V)	11743	Sky Mexico DBS (digital)
10(V)	11804	Sky Mexico DBS (digital)
11(V)	11865	Data Transmissions
12(V)	11926	Data Transmissions
13(V)	11987	Data Transmissions
14(V)	12048	Sky Mexico DBS (digital)
15(V)	12109	Sky Mexico DBS (digital)
16(V)	12170	Sky Mexico DBS (digital)

SatMex 5 at 116.8 degrees West longitude

C-band

1	Data Transmissions
2	Data Transmissions
3	Data Transmissions
4	Data Transmissions
5	Data Transmissions
6	Data Transmissions
7	Data Transmissions
8	Data Transmissions
9	Data Transmissions
10	Data Transmissions
11	Data Transmissions
12	Data Transmissions
13	TV Azteca (digital)
14	Data Transmissions
15	Wideband data transmissions
16	Data Transmissions
17	Data Transmissions
18	Data Transmissions
19	Wideband data transmissions
20	Data Transmissions
21	Multivision DBS (digital)
22	Data Transmissions
23	Data Transmissions
24	Edusat / XHIMT-TV 22 (digital)

Ku-band

Tr(Pol)	Freq	Service
1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	Data Transmissions
4(V)	11780	(none)
5(H)	11800	(none)
6(V)	11820	Data Transmissions
7(H)	11840	Data Transmissions
8(V)	11860	(none)
9(H)	11880	Data Transmissions
10(V)	11900	(none)
11(H)	11920	Data Transmissions
12(V)	11940	(none)
13(H)	11960	Data Transmissions
14(V)	11980	Data Transmissions
15(H)	12000	Data Transmissions
16(V)	12020	Data Transmissions
17(H)	12040	Data Transmissions
18(V)	12060	Data Transmissions
19(H)	12080	Data Transmissions
20(V)	12100	Data Transmissions
21(H)	12120	Data Transmissions
22(V)	12140	Data Transmissions
23(H)	12160	Data Transmissions
24(V)	12180	Data Transmissions

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International TV Viewing and Your Q&As

All the way around the Earth's equator, at a height of roughly 23,000 miles, travel the world's broadcast satellites. They appear to be stationary but they're actually traveling quite fast in order to keep up with the Earth's rotation. And, while the bulk of each region's satellites are generally clustered around the countries of intended reception, there's quite of bit of overlap. If you live in an area with an unobstructed view of the eastern and western horizons you may be able to see quite a few international satellites which serve as a broadcast transmission bridge between continents.

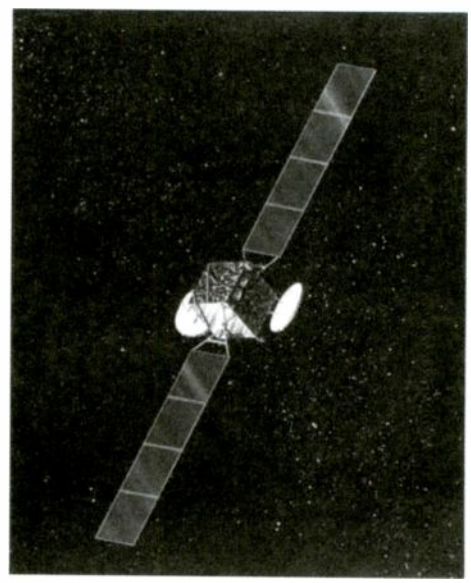
❖ What You'll Need

Tuning into international broadcasts requires some special equipment, but, if you're really interested in what's happening in other countries and hemispheres you'll find it's well worth the investment. The first thing you'll need is at least a 10 foot diameter dish with the ability to "see" beyond our own domestic satellites. Big dish satellite systems have electric motors (called actuators) which position the dish for reception of the various satellites above your location. These actuators have arms which attach from the actuator motor to the dish and typically have an extension of 18 or 24 inches. Longer arms from 32 to 52 inches are available.

Systems with 18-inch actuator arms will not be able to reach much beyond our own slice of the Clarke Belt. Twenty-four-inch arms will be able to see more, but you really need 36 inches in order to get the full scope of international viewing. Another type of dish mover is the "horizon-to-horizon" mount which does exactly that, moves the dish from extreme western to extreme eastern horizons. Prices vary widely. Expect to pay $250 for a 36-inch actuator and $450 for a horizon-to-horizon mount.

The second thing you'll need is an international feed horn capable of tuning in circularly polarized signals which are found on NSS806 (40.5 degrees West), the most active international broadcast satellite over the Atlantic. All transponders are either Left Hand Circular (LHC) or Right Hand Circular (RHC) polarized. This means that traditional Vertical/Horizontal (linear) polarity feeds will have difficulty receiving the channels properly. If you're just setting up a big dish system, think about starting off with a 36-inch actuator motor arm and an international C/Ku feed horn.

The third thing you'll need is a Digital Video Broadcast (DVB) satellite receiver. I'll refer you to the October issue of *MT* where, in this column, I review the ST6600 receiver. There are other receivers available and I encourage you to check them all out.



International TV broadcasts can be seen on the new Panamsat 9 which replaced Panamsat 5 at 58 degrees West. Courtesy Panamsat Corp.

As with our own domestic satellites, transmissions are made in the C and Ku-bands. However, most transmissions are not analog, but digital, using the DVB standard. Very few analog transmissions will be seen. One great exception is ATC, the national television channel from Buenos Aires, Argentina. It is found on channel 23 of NSS806, along with two national radio networks, and it provides an excellent target for finding this satellite. This transmission is in the PAL format and will show up on NTSC standard TV sets as black and white and the picture will be rolling. Many TV sets will allow the rolling to be stopped by adjusting the vertical hold.

Incidently, to turn those PAL signals into NTSC pictures you may be interested in a new product from Emerson call the World Signal Converter. It changes PAL and SECAM signals into NTSC or NTSC into PAL. It costs just under $200 and is available from Skyvision.

❖ What You'll See (and Hear)

NSS806 is a C-band only satellite with 24 transponders, typical of all C-band birds. Except for ATC, all transmissions are in DVB digital but you'll find it's well worth the effort to check out this satellite. On video you can watch Canal Sur (a mix of taped programming from around Latin America), Syrian Television, Fashion TV (direct from Paris!), MCM Europe (all Europe all Rock!), Video Italia (Italian pop videos), Kuwait TV, Bolivian TV, and USIA's WorldNet Europe, Latin America and Africa.

In addition to the many video channels on NSS806, you'll also hear dozens of radio services including Radio France International in several languages and Voice of America's *Music Mix* and *News Now* programs in English and Spanish. From South America you'll hear FM broadcasters from Venezuela, Peru, Bolivia, Argentina, and Columbia. You'll also hear Syrian Radio, Radio Italia, and, strangely enough, Metropolitan Opera and the U.S. Naval Observatory Master Clock!

On Panamsat 9 (formerly Panamsat 5 and located at 58 degrees West) you'll be able to see programming from China (CCTV 3, 4, & 9), India (Zee TV), Germany (Deutsche Welle TV), Portugal (RTP International), Japan (NHK World) and Colombia (Caracol TV) as well as news feeds from Britain, The Weather Channel Latin America, and Cubavision Internacional.

Find out what's on for just a few bucks Courtesy Satelllite Entertainment Guide.

On the radio side of PAS9 you can hear China Radio International, Catholic Radio EWTN (Spanish and English), Deutsche

Welle 1, 2 and 7 (German, French and English transmissions), RDP Antena 1 (Portugal), Radio Timor (Portuguese), and RAI International (Italy).

Hispasat 1A/1B is a combination of 2 Ku-band only satellites transmitting video and audio from Spain to the former colonies in the Americas. It's a good test of the capabilities of your Ku-band dish because, at 30 degrees West, it's very low on the horizon. While most services are encrypted, there are enough radio channels to make this target worth looking for. Radio channels featuring news, talk, pop, and classical music can be heard here.

❖ How Low Can You Go?

It's difficult to say how far west of the Mississippi the signals from these satellites can be received. One would certainly need a much bigger dish, say a 12 or 15 foot dish to compensate for the loss of signal. Even at my location on the Eastern seaboard a 10 foot dish is looking very low on the Eastern horizon to pick up Hispasat 1A/B. Don't expect miracles, but, if you have a 10 foot dish and clear view to the eastern horizon you should give these satellites a shot. Put your system to the test and let me know how far way you can pick up these satellites.

Don't forget the folks on the West coast! Indications are that *MT* readers with big dishes in Alaska, Hawaii, California and Canada's West coast should try for Panamsat 2 at 169 degrees East. This satellite serves primarily the Asian countries, but does have some signal for the West.

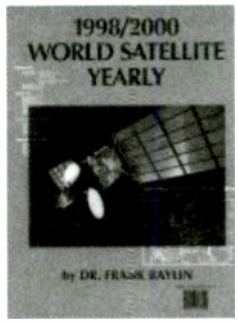
Again, you'll need all the help you can get and your dish will be pointed just about dead on the horizon.

❖ Back to the Mailbag

Many more questions came in as a result of the Q & A session held in the September issue of *MT* in this column, so I'm compelled to once again submit to your queries.

Q. Nisar Ahmad of New York City has been enjoying The Launching Pad and is doing some satellite TV DXing from his location. He writes: "...could you recommend any reference book on satellite technology. I need to understand some satellite broadcast terms (like polarity, etc). [Also] is there any difference between DVB and the mode DirecTv and Dish Network use to broadcast?"

A. The best source for information on the subject of satellite TV is Frank Baylin's *World Satellite Yearly*. This massive book, over 500 pages, is packed with everything you need to know about this subject and I refer to it often. The *Yearly* has a 240 page technical section detailing everything about the subject and an equally large section featuring every broadcast satellite in the Clarke Belt complete with foot print maps and satellite/launch data.



The best source of technical information on broadcast satellites. Courtesy Baylin Publications

It's not cheap ($90 plus shipping), but, for the serious TVRO enthusiast, it's indispensable. The *Yearly* is available from Baylin Publications 1905 Mariposa Boulder, CO 80302 303-449-4551 web site: **http://www.baylin.com**.

As for your other question, DVB, DirecTv and Dish Network all use the same MPEGII video broadcast standard. All use encryption techniques in the data stream to keep their systems from being compatible.

Q. John Dewey says he picked up an Echostar 510 receiver and dish at a hamfest, he writes, "...my simple question is...are there any free things out there that this can still receive and is it worth hooking up? All I want is a bit of audio and whatever video might be there."

A. You can take a look at the channels available and the audio services on all the satellites by going to your local bookstore and looking for *Satellite Entertainment Guide, Orbit*, or *Satellite TV Week*. These are monthly or weekly guides and will give you a good idea of what's happening. A decent bookstore will have at least one on the racks. The 510, while an older receiver is probably a good one. Echostar (which is behind the Dish network) was always known for the quality of their receivers.

Q. Barney Anderson from Austin, TX says, "...I have a big dish system with C/Ku capabilities. I would be interested in where I could buy a new or used MPEGII receiver. Also, can it be hooked up with only a splitter or does it need some kind of isolation...?"

A. There are several sources for MPEGII receivers: Global Communications **http://www.globalcm.net**, Smallear **http://smallear.com**, Skyvision 800-500-9275 **http://www.skyvision.com**, Taylor Enterprises 606-356-9666. Most MPEGII receivers have a "loop-through" on the back which allows you to run the coax from the dish into the MPEGII receiver and back out to your analog receiver. You can take the video out from the MPEGII receiver via the yellow RCA plug and put it into your VCR's yellow Aux plug. Now when you want to switch to the MPEGII receiver simply press the button on the remote control to tune in the Aux.

Q. Hugh Montgomery from Ohio and Lloyd Brooks among other former Primestar customers want to know if there's any way they can use their old Primestar systems.

A. While the Primestar receiver will not be useful for picking up any other signals, the Primestar dish and its LNB are capable of receiving any of the Ku-band satellites in our region of the Clarke Belt. You'll need to get an analog or MPEGII receiver to do the watching. There are plenty of analog receivers in the used market and you should be able to get one for under $50.

To set the dish up on a satellite you'll have to have the receiver, a TV set and some short pieces of coax all out at the dish site. By loosening the mount bolts and rotating the dish up/down and east/west you'll be able to find lots of Ku-band action. To find out what's available check out **http://www.lyngsat.com** and pay attention to the analog and MPEGII video services. The easiest satellite to find is GE-1 where there are about four or five analog feeds for NBC.

VIEW FROM ABOVE

WATCHING THE WEATHER SATELLITES

Lawrence Harris
Lawrence@itchycoo-park.freeserve.co.uk
http://www.itchycoo-park.freeserve.co.uk/wxsats.html

Readers Get the Picture!

Hopefully, by the time this appears, the latest weather satellite NOAA-L will be safely in orbit, renamed NOAA-16, and providing us with afternoon imagery. NOAA-15 has remained in a fault condition, with variable format imagery – mostly unusable, some OK. The Russian Meteors have had their problems as well – a busy few weeks!

❖ Operational WXSATS

The saga of NOAA-15 has been the event of summer 2000. On an early morning pass back in mid-July, I noticed data loss; after waiting for a further pass to confirm this, I reported it to the WXSAT list. There followed a series of operational tests by NOAA as they investigated the cause, during which time high resolution picture telemetry produced various strange image content due to lack of synchronization. On some occasions, the image would be good, showing just what we are missing from this morning satellite! In early September, I received a few days of good quality imagery.

When in operational status, NOAA-16 will be the afternoon WXSAT, probably transmitting APT on 137.62 MHz.

Meteor 3-5 had severe problems in late August when its imagery lost synchronization. Meteor 2-21 was commanded back on, but by early September Meteor 3-5 was operating normally once more.

❖ Pictures from readers

Summer brought a larger number of e-mails for the column than previous seasons. Most correspondence included images from readers, but August also saw inquiries about NOAA-15 and how to get WEFAX images.

David Brooks of Christ Church, Barbados, recorded tropical storm Debby – see figure 1 – from NOAA-14, as she approached the Leeward Islands at near hurricane strength. David has a fairly comprehensive receiving station in his West Indies home, according to the description he provided. He uses a TimeStep PROsat for Windows LC demodulator, fed by a Uniden Bearcat BC-145 XL, modified by Software Systems Consulting for APT/GOES WEFAX reception. His APT antenna is a home-built, crossed-dipole turnstile mounted on the corner of the boundary wall in his backyard.

David uses a standard outdoor TV/FM VFH/UHF preamplifier at the antenna – "a good one" he says, "but the input is 300 ohm so I've had to use a standard TV 75/300 ohm converter from RG-6 (75 ohm) to the preamp, and then output direct to RG-6." The cable run is about 40+ feet through to the indoor power injector for the preamp, and then to the receiver.

Before David installed the preamp at the antenna, he used an indoor preamp just prior to the receiver, but that only gave him a 10dB gain, where the outdoor one gave 25 dB. "The difference is not very much – but I can now briefly hear satellites at just 5° elevation; with the other arrangement it was closer to 10°. Otherwise, reception is good. I also use the same receiver for GOES reception, using an antenna switch when I want to do APT. I use a 3 foot dish for GOES reception and a down-converter. I am using Timestep's PROsat software. My PC is a AMD Athlon 700 with 128 MB PC-100 SDRAM and other standard peripherals – again homebuilt. I am using Windows 2000 Professional."

http://www.brohavwx.com/ David's web site.

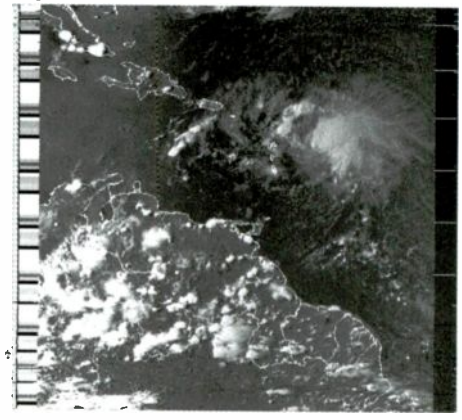


Fig 1: Tropical storm Debby. NOAA-14 image from David Brooks

Michael Capito has been a radio hobbyist since his Army days. Michael's kids call his receiving station "the radiation room," and he has three computers usually running: one for APT, the other predicting the next pass, and one for going on-line to view weather data coming from NOAA WXSATs. Well actually, Michael, I also admit to sometimes running three of my four computers at the same time. During clear night skies, I can have one computer displaying live WXSAT images, such as WEFAX animations of local cloud cover, while another is dedicated to controlling the pointing of my Meade LX200 telescope out in the yard, and the main computer controls the CCD camera and runs a planetarium program to help plan the next image session. WXSAT images are more than useful to me during a night's session at the telescope.

Michael's receiving station – see figure 2 – is called Osceola, Nebraska. On the left is a 450 MHz computer networked to a 100 MHz Hal9000 computer; Hal is connected to a TimeStep ProScan WXSAT receiver, above which is a Radio Shack Pro2044, general purpose utility receiver. A Grove Tune 4 is next to an ARO2800 wide range monitor, and to the left of that is a Palomar PA360; above that is a Grove Pre5, and next to that is a JPS NIR12 Dual DSP. We get the picture!

Other equipment includes a JPS ANC4 Noise Canceller, and a Grundig Sat 700. On the roof he has a 33m long wire, a trapped dipole, a Radio Shack Discone, and a crossed dipole. I wonder whether there is anything that Michael can-

Fig 2: receiving station Osceola – Michael Capito

not receive?

Joseph Gresham has been monitoring GOES-8 full disc images and sent this picture of tropical storm Lane recorded at 1745 UTC on Saturday September 9, 2000.

Fig 3: tropical storm Lane from GOES-8 image recorded by Joseph Gresham

Jose Luis Vila sent me an HRPT infrared image from his part of the world – Uruguay. Being winter, Jose commented that the visible-light images were not very good.

http://www.iem.fing.edu.uy/weather

Fig 4: HRPT from Jose Vila July 2, 2000

❖ NOAA weather satellites – a glimpse of the future (Part 2)

As begun in last month's column, Wayne Winston, Direct Readout Coordinator at NOAA/NESDIS, provides us with an insight into current discussions as follows:

In the 40 years of operating these satellites, we have discovered their capabilities in advancing the Earth sciences. Moving ahead will require complex sensors, with many more channels, producing greater quantities of data, at high sample rates. The transmission methods will also have to change to move these vast quantities of data. There is no rational justification to saying we will "dumb down" the instruments, science or transmission techniques to provide some very low cost, low content, simple transmission service. In fact there is no mission statement or requirement for NOAA to provide such a service that can be accessed by a $1,000, or $2,000 or some arbitrarily price-limited receiver, for some class or classes of users.

The hundreds of millions, or billions of dollars that will be spent on the NPOESS program will be for an environmental satellite system built primarily for one purpose – to meet requirements that have been laid out by NOAA and other U.S. Federal agencies. That other users around the world will have essentially unrestricted access to the data for operational and research use is a byproduct of the policy which NOAA continues to support. It's just that the required hardware to get access may well cost more than it has in the past. If you think about it in a rational, cool-headed manner for a while, that's still not a bad tradeoff. U.S. taxpayers buy a system that meets their requirements, and everybody else in the world can tag along for the cost of a receiver! Pretty much what we have done for the past 40 years.

That is the unofficial overview of the situation as it appears at this point in time.

This debate on who owns the data, who pays for its collection, how it should be distributed, free or otherwise, is not just limited to satellites. A similar data exchange has been going on since before the advent of the environmental satellites, with weather observation data. Generally, it has been freely exchanged among all nations – until the coming of the Internet and commercial, for-profit weather services.

Weather observations from every country are generally available to every other country over a complex, global weather telecommunications system. NOAA collects every weather observation available worldwide for input to analyses of present conditions and global numerical forecasts. Since we have it all in one place (and NOAA is not the only weather agency that compiles as complete as possible a global data set), NOAA has made all this observational data available at a central FTP site. After all, there are many potential users who might be interested in such data, but could not reasonably have the means to gather it.

As you might expect, that touched off a debate on who could get such data, and what it would be used for! Right now, most of the world's weather observation data (and that is a lot of data) can be downloaded from the NOAA FTP site without restriction. The remainder is available from a second NOAA site (still free, though) that must be accessed by username and password assigned after acknowledging an agreement concerning use of the data. You can find out more about this, and a list of countries or agencies that restrict use of weather data at **http://www.nws.noaa.gov/cgi-bin/res40notice**

I hope this provides some insight into where it looks like we go from here. It is probably best to consider this "unofficial," and as always, stay tuned. My grateful thanks to Wayne for this insight.

Frequencies

NOAA-12 transmits APT on 137.50 MHz
NOAA-14 transmits APT on 137.62 MHz
NOAA-15 transmits APT on 137.50 MHz
NOAA-16 should be operational on 137.62 MHz
NOAAs transmit beacon data on 137.77 or 136.77 MHz
Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
Meteor 2-21 may transmit APT on 137.40 MHz when in sunlight
Resurs 1-4 transmits APT on 137.85 MHz
GOES-8 and GOES-10 use 1691 MHz for WEFAX

See Swagur Enterprises' ad on page 103 for equipment to capture Weather Satellite Imagery

Larry Van Horn, N5FPW
email: larry@grove-ent.com

Scanning the Wild, Wild West

❖ Unidentified Houston Trunk Systems

Longtime reader Chris Parris recently monitored two unidentified federal trunk systems in the Houston area. The first system he listened to displays a Motorola system ID 7707. This is a five channel Motorola Type II ASTRO digital system. The channels he has identified with the Trunker software program are 408.100, 410.025, 410.450, 412.425 and 414.300 MHz. The system seems to come in better near the downtown Houston area, but definitely fades out in the Clear Lake / NASA area. All communications have been in ASTRO digital mode, nothing in the clear yet.

Chris has also monitored another Motorola data channel on 408.300 MHz, which came up as system ID 550A. He was not able to determine any other channels used in the system, and the data channel was just marginally readable in the Clear Lake area, so he is not sure where it might be located. Any help from any of our readers on these systems?

❖ Department of Energy (DOE) Idaho/ Washington

Brett from Seattle provides this column with information on the DOE trunk system at the Idaho National Engineering and Environmental Laboratory in Idaho. He reports that this Ericsson EDACS system uses inverted frequency pairs from what is normally assigned to government trunk systems in the 406-420 MHz band. Here are those frequencies: 416.750 415.150 418.350 417.975.

We have also received reports on the following frequencies being used: 406.350 407.150 407.950 408.750 409.550. More information on this system is requested.

Another trunk system from Brett's area is the Hanford Environmental Health Foundation, Washington. Brett says the following frequencies are used with that system: 406.350 406.750 407.150 407.350 407.950 408.150 408.750 408.950 409.550 409.750 409.950

We have no other details on this system; system type and additional information is requested.

❖ Miscellaneous Government Frequencies

Brett also sends in the following federal frequencies he monitored during a recent vacation trip.

Flagstaff, Arizona

150.075	Odd one here. Heard DES encryption around 6 p.m., then later about 11 p.m. heard what sounded like an ASTRO digital voice for a long period of time.

Meteor Crater, Arizona

464.775	Operations (Brett thought this was part of the federal park system, but it is privately run)

Petrified National Forest, Arizona

172.675	Operations
172.700	Forest Net

"Walt's Point" Mountain road in Inyo County, California

148.600	Engineering traffic
149.075	ID as "CLPD Tac-1" China Lake Naval Weapons Center
165.2375	Unknown, probably US Customs
169.875	Bureau of Land Management or US Forest Service fire operations
408.025	Telemetry
411.025	Telemetry

Colorado Springs, Colorado

171.100	Telemetry
407.150	Motorola analog voice trunk frequency
407.175	Motorola trunk control frequency
407.225	Motorola digital voice trunk frequency
407.275	Motorola analog voice trunk frequency
407.950	Motorola analog voice trunk frequency
408.000	Motorola analog voice trunk frequency
408.025	Motorola analog voice trunk frequency
408.150	Motorola trunk control frequency
409.025	Motorola analog voice trunk frequency
409.050	Motorola digital voice trunk frequency
409.100	Possible Motorola trunk control frequency (1x5)
409.125	Motorola analog voice trunk frequency
409.225	Possible Motorola trunk control frequency (1x5)
409.375	Motorola analog voice trunk frequency
409.500	Motorola analog voice trunk frequency
409.750	Motorola analog voice trunk frequency
409.775	Motorola analog voice trunk frequency
410.125	Possible Motorola trunk control frequency (1x5)

Brett believes the Motorola trunk system above may be a SmartZone system for the US Air Force Academy.

Denver, Colorado

406.750	Ericsson EDACS control frequency (tentative Rocky Flats)

Boise, Idaho

168.000	US Forest Service chat
168.650	Unknown chat frequency regarding forestry
409.675	Telemetry
410.200	Link to US Forest Service?
410.575	Link to 162.550 National Weather Service transmitter
415.325	Link to US Forest Service?
416.375	Link to 162.550 National Weather Service transmitter

Las Vegas, Nevada

163.4875	DES encryption (input to above?)
167.6375	DES encryption
173.5125	Sounded like surveillance, weak
406.550	Ericsson EDACS control frequency
406.750	Ericsson EDACS control frequency running at higher baud rate (?)
409.025	DES and analog voice mix, aircraft operations
409.175	Ericsson EDACS control frequency running at higher baud rate (?)
413.275	Unknown chat
413.600	Unknown chat

Near Beatty, Nevada (Probable Nellis AFB)

141.420	Telemetry
148.500	Fire Department traffic responding to aid civilian agencies in Nye County, Nevada
150.250	Telemetry
163.400	US Geologic Survey Seismographs
170.525	Telemetry
406.350	Ericsson EDACS control frequency
406.550	Ericsson EDACS control frequency
406.625	Ericsson EDACS control frequency
407.150	Ericsson EDACS digital voice traffic
407.275	Ericsson EDACS control frequency
407.525	Ericsson EDACS digital voice traffic
408.025	Telemetry
408.100	Ericsson EDACS digital voice traffic
409.125	Ericsson EDACS digital voice traffic
409.450	Ericsson EDACS digital voice traffic
409.775	Ericsson EDACS digital voice traffic
410.800	Heard CW ID only

Los Alamos National Laboratory, Santa Fe, New Mexico:

406.350	Ericsson EDACS control frequency
407.150	Ericsson EDACS analog voice frequency
407.350	Ericsson EDACS analog voice frequency
407.950	Ericsson EDACS analog voice frequency
408.550	Ericsson EDACS analog voice frequency
408.750	Ericsson EDACS analog voice frequency
408.950	Ericsson EDACS analog voice frequency
409.500	Ericsson EDACS analog voice frequency
410.150	Ericsson EDACS analog voice frequency

Note: the LCN listing in *Police Call* didn't include the two extra frequencies mentioned above, so Brett added them to his list on the end and this system seemed to track well.

Talkgroups:

02-041	Los Alamos Fire Tac-1
02-042	Los Alamos Fire Tac-2
02-141	Los Alamos Fire Tac-15 (used for HEARS-type info)
03-051	Called "Utilities-1"
03-071	Possible security?

Umatilla Army Depot/Hermiston, Oregon

164.750	Unknown chat
164.775	DPW traffic
412.875	Digital voice traffic
413.950	Unknown telemetry
415.575	Unknown chat, possible US Forest Service link?
416.975	Link to 162.425 WWH27 National Weather Service transmitter

Thanks to Brett and Chris Parris for their contributions this month. Now it is time to look at this month's federal spectrum scan. This starts our detailed look at the reorganized 406-420 MHz UHF federal land mobile service. Until next month, 73 and good hunting.

Table One: Federal UHF Land Mobile Service

Frequency	Ch/Paired Freq*	Agencies
406.0250		Coast Guard (Nationwide-EPIRB), Energy Department (Nationwide)
406.0500		NASA (Nationwide)
406.0750		(No reported activity)
406.1000		(No reported activity)
406.1125	1/415.1125	(No reported activity)
406.1250	2/415.1250	Hydrologic Channel (center frequency): US Government/Non-Government Agencies (paired with 415.125)
406.1375	3/415.1375	(No reported activity)
406.1500	4/415.1500	Agriculture Research Service, Bureau of Prisons, Bureau of Reclamation, Corps of Engineers, Energy Department, EPA (Nationwide), FEMA, Geologic Survey, Navy
406.1625	5/415.1625	(No reported activity)
406.1750	6/415.1750	Corps of Engineers, Hydro Data Channel (Nationwide-Civilian/Federal), National Weather Service, Soil Conservation Service
406.1875	7/415.1875	(No reported activity)
406.2000	8/415.2000	Department of Labor (Nationwide)
406.2125	9/415.2125	(No reported activity)
406.2250	10/415.2250	Air Force, Army, Bureau of Land Management, Department of Labor, Energy Department, EPA, NASA, Post Office
406.2375	11/415.2375	US Information Agency
406.2500	12/415.2500	Air Force, Army, Commerce Department, FAA, Justice Department, National Park Service, Navy, Post Office, Treasury Department
406.2625	13/415.2625	(No reported activity)
406.2656		Low power, non-voice 5 kHz bandwidth splinter frequency (406.265625) [until December 31, 2004]
406.2687		Low power, non-voice 5-10 kHz bandwidth splinter frequency (406.268750) [until December 31, 2004]
406.2718		Low power, non-voice 5 kHz bandwidth splinter frequency (406.271875) [until December 31, 2004]
406.2750	14/415.2750	Bureau of Land Management, Secret Service (Nationwide)
406.2781		Low power, non-voice 5 kHz bandwidth splinter frequency (406.278125) [until December 31, 2004]
406.2812		Low power, non-voice 5-10 kHz bandwidth splinter frequency (406.281250) [until December 31, 2004]
406.2843		Low power, non-voice 5 kHz bandwidth splinter frequency (406.284375) [until December 31, 2004]
406.2875	15/415.2875	(No reported activity)
406.3000	16/415.3000	Energy Department
406.3125	17/415.3125	(No reported activity)
406.3250	18/415.3250	Post Office, Social Security Administration, Veterans Administration
406.3375	19/415.3375	(No reported activity)
406.3500	20/415.3500	Federal Trunk Group 1 (paired with 415.1500): Air Force, Army, Bureau of Prisons, Energy Department, NASA, Navy, Post Office, Social Security Administration
406.3625	21/415.3625	(No reported activity)
406.3750	22/415.3750	Air Force, Army, Bureau of Land Management, Energy Department, Navy, Post Office, State Department, TVA
406.3875*	23/415.3875	National Security Agency
406.4000	24/415.4000	Post Office
406.4125	25/415.4125	(No reported activity)
406.4250	26/415.4250	Energy Department
406.4375	27/415.4375	(No reported activity)
406.4500	28/415.4500	White House Communications Agency, currently paired with 418.3500 (Nationwide)
406.4625	29/415.4625	(No reported activity)
406.4750	30/415.4750	Bureau of Indian Affairs, Bureau of Mines, Bureau of Reclamation, Geologic Survey, Interior Department (Nationwide), Mine Safety and Health Administration, National Park Service, Post Office, TVA
406.4875	31/415.4875	(No reported activity)
406.5000	32/415.5000	Air Force, Army, Coast Guard, Energy Department, National Science Foundation, Navy
406.5125	33/415.5125	(No reported activity)
406.5250	34/415.5250	Energy Department, Navy
406.5375	35/415.5375	Corps of Engineers, Energy Department
406.5500	36/415.5500	Federal Trunk Group 3 (paired with 415.3500): Air Force, Army, Bureau of Prisons, Corps of Engineers, Energy Department, NASA, National Gallery of Art, National Park Service, Navy, TVA
406.5625	37/415.5625	Coast Guard
406.5750	38/415.5750	Bureau of Reclamation, Coast Guard, Energy Department, US Information Agency
406.5875	39/415.5875	Energy Department
406.6000	40/415.6000	Army, Coast Guard, Energy Department, FAA
406.6125	41/415.6125	Energy Department
406.6250	42/415.6250	Corps of Engineers, Energy Department, Railroad Transportation Test Center, US Information Agency
406.6375	43/415.6375	(No reported activity)
406.6500	44/415.6500	Army, Energy Department
406.6625	45/415.6625	(No reported activity)
406.6750	46/415.6750	Army, Energy Department, Senate, US Information Agency
406.6875	47/415.6875	Corps of Engineers
406.7000	48/415.7000	Army, Energy Department
406.7125*	49/415.7125	National Security Agency
406.7250	50/415.7250	Army, FAA, Navy, US Information Agency
406.7375	51/415.7375	(No reported activity)
406.7500	52/415.7500	Federal Trunk Group 2 (paired with 414.7500): Air Force, Army, Bureau of Prisons, Energy Department, Navy, Social Security Administration
406.7625	53/415.7625	Navy
406.7750	54/415.7750	Army
406.7875	55/415.7875	Energy Department
406.8000	56/415.8000	Army, Bureau of Reclamation, Coast Guard, Energy Department, FAA, NASA (Nationwide), National Highway Transportation Safety Administration, National Park Service, Railroad Transportation Test Center, Senate
406.8125	57/415.8125	Coast Guard
406.8250	58/415.8250	Army, Energy Department, FEMA, Navy
406.8375	59/415 8375	Corps of Engineers
406.8500	60/415.8500	Army, Commerce Department, Energy Department, FAA
406.8625	61/415.8625	(No reported activity)
406.8750	62/415.8750	Energy Department
406.8875	63/415.8875	(No reported activity)
406.9000	64/415.9000	Energy Department
406.9125	65/415.9125	Energy Department
406.9250	66/415.9250	Army, Navy
406.9375	67/415.9375	Corps of Engineers
406.9500	68/415.9500	Federal Trunk Group 4 (paired with 414.9500): Air Force, Army, Bureau of Prisons, Energy Department, Navy, Railroad Transportation Test Center
406.9625	69/415.9625	(No reported activity)
406.9750	70/415.9750	Army, Coast Guard, Navy
406.9875	71/415.9875	(No reported activity)
407.0000	72/416.0000	Army, Energy Department, NASA
407.0125	73/416.0125	Forest Service
407.0250	74/416.0250	Army, Bureau of Reclamation, Energy Department
407.0375	75/416.0375	(No reported activity)
407.0500	76/416.0500	Energy Department
407.0625	77/416.0625	Energy Department
407.0750	78/416.0750	Army
407.0875	79/416.0875	(No reported activity)
407.1000	80/416.1000	Air Force, Energy Department
407.1125	81/416.1125	(No reported activity)
407.1250	82/416.1250	White House Communications Agency, currently paired with 418.2750 (Nationwide)
407.1375	83/416.1375	(No reported activity)
407.1500	84/416.1500	Federal Trunk Group 1 (paired with 415.9500): Air Force, Army, ATF (Nationwide), Bureau of Prisons, Energy Department, NASA, Navy, Post Office
407.1625	85/416.1625	(No reported activity)
407.1750	86/416.1750	Air Force, Army, Bureau of Reclamation, Energy Department, FAA, Forest Service, General Services, Administration, Labor Department, NASA, National Science Foundation, Navy, Post Office, US Information Agency, Veterans Administration
407.1875	87/416.1875	(No reported activity)
407.2000	88/416.2000	State Department (Nationwide, paired with 409.625)
407.2125	89/416.2125	(No reported activity)
407.2250	90/416.2250	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, NASA, Navy
407.2375	91/416.2375	Army, Corps of Engineers
407.2500	92/416.2500	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy
407.2625	93/416.2625	Army
407.2750	94/416.2750	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, FAA, Navy, Post Office
407.2875	95/416.2875	Corps of Engineers
407.3000	96/416.3000	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy
407.3125	97/416.3125	(No reported activity)
407.3250	98/416.3250	Air Force (Nationwide), Army (Nationwide), Navy
407.3375	99/416.3375	(No reported activity)
407.3500	100/416.3500	Federal Trunk Group 3 (paired with 416.1500): Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Energy Department, NASA, Navy
407.3625	101/416.3625	(No reported activity)
407.3750	102/416.3750	Air Force (Nationwide), Army (Nationwide)
407.3875	103/416.3875	(No reported activity)
407.4000	104/416.4000	Air Force (Nationwide), Army (Nationwide), Navy
407.4125	105/416.4125	(No reported activity)
407.4250	106/416.4250	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy
407.4375	107/416.4375	(No reported activity)
407.4500	108/416.4500	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy
407.4625	109/416.4625	(No reported activity)
407.4750	110/416.4750	Air Force (Nationwide), Army (Nationwide), FAA, Navy, Veterans Administration
407.4875	111/416.4875	(No reported activity)
407.5000	112/416.5000	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy
407.5125	113/416.5125	(No reported activity)
407.5250	114/416.5250	Government Itinerant: local area, common use repeater output (input 416.525)/simplex (Nationwide), also currently assigned to the Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy
407.5375	115/416.5375	(No reported activity)
407.5500	116/416.5500	Federal Trunk Group 2 (paired with 415.5500): Air Force (Nationwide), Army (Nationwide), Bureau of Prisons, Corps of Engineers, Energy Department, Navy, Post Office
407.5625	117/416.5625	Corps of Engineers
407.5750	118/416.5750	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy
407.5875	119/416.5875	(No reported activity)
407.6000	120/416.6000	Air Force, Army, Energy Department, State Department (Nationwide)
407.6125	121/416.6125	(No reported activity)
407.6250	122/416.6250	Army, Coast Guard (Nationwide), Energy Department, Treasury Department
407.6375	123/416.6375	(No reported activity)
407.6500	124/416.6500	Air Force, Customs Service (Nationwide), Post Office
407.6625	125/416.6625	(No reported activity)
407.6750	126/416.6750	Secret Service (Nationwide-White), White House Communications Agency (Nationwide-White paired with 415.675 Gold)
407.6875	127/416.6875	(No reported activity)
407.7000	128/416.7000	Bureau of the Mint, Customs Service (Nationwide), Federal law Enforcement Training Center, Health and Human Services
407.7125	129/416.7125	(No reported activity)
407.7250	130/416.7250	Postal Inspection Service (Nationwide)
407.7375	131/416.7375	(No reported activity)
407.7500	132/416.7500	Federal Trunk Group 4 (paired with 415.7500): Secret Service (Nationwide)
407.7625	133/416.7625	(No reported activity)
407.7750	134/416.7750	Postal Inspection Service (Nationwide)
407.7875	135/416.7875	(No reported activity)
407.8000	136/416.8000	Secret Service (Nationwide)
407.8125	137/416.8125	(No reported activity)
407.8250	138/416.8250	Treasury Department (Nationwide)
407.8375	139/416.8375	(No reported activity)
407.8500	140/416.8500	White House Communications Agency (Nationwide-Echo) [Echo/Foxtrot system no longer active, currently usage unknown]
407.8625	141/416.8625	(No reported activity)
407.8750	142/416.8750	Secret Service (Nationwide-Green pair with 415.750), Treasury Department (Nationwide)
407.8875	143/416.8875	(No reported activity)
407.9000	144/416.9000	Secret Service (Nationwide)
407.9125	145/416.9125	(No reported activity)
407.9250	146/416.9250	Coast Guard, Secret Service (Nationwide-India)
407.9375	147/416.9375	(No reported activity)
407.9500	148/416.9500	Federal Trunk Group 1 (paired with 416.7500): Air Force, Army, Bureau of Prisons, Energy Department, NASA, Navy
407.9625	149/416.9625	(No reported activity)
407.9750	150/416.9750	Air Force, Coast Guard (Nationwide), Energy Department, Social Security Administration
407.9875	151/416.9875	(No reported activity)

TRACKING THE TRUNKS

TECHNOLOGY EQUIPMENT, FREQUENCIES AND NEWS

Dan Veeneman
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Mailbag Miscellany

This month we look into the mailbag and share some letters from readers. We'll also try and answer some questions about current and upcoming trunk-tracking scanners.

❖ Allentown, Pennsylvania

First of all let me tell you that I really enjoy your column. Your information is right on the button and is presented very well. Keep up the fine work.

I live in the Lehigh Valley, in the West end of Allentown, PA. Recently (late August) I noticed that the City of Allentown main fire channels went dead. Their operating frequencies consisted of two UHF (440) channels.

After some digging I found out that the city was finally making its move to the trunked system that they obtained channels for. I loaded these into one of my non-trunking scanners and there they were. I don't have a trunking capable scanner that will track the system because it is an EDACS system but I do pretty well with what I have. The frequencies that are being used are as follows:

855.2125, 856.4375, 856.9375, 857.4375, 857.9375, 858.4375, 858.9375, 859.4375, 859.9375, 860.9375

Eventually all of the City of Allentown's communications (Fire, EMS, Police, etc.) will be shifted over to this new trunked system. I am hearing the fire department plus some other comms on these frequencies as of this writing. Hopefully, some of your other readers from this area will use this information and submit more on this system as it comes along.

Thanks for your time. I hope this information is of some use to you. Will look forward to hearing from you and reading your great column.

Regards,
Al B.

Thanks for the frequencies, Al, and keep them coming in! Hopefully other listeners in your area will also send in entries from their scanner logs, which I'll include in this column.

❖ Baltimore-Washington International Airport

During the Labor Day holiday, I noticed 'Redcoats' (whatever they might be - no, the British aren't invading again) able to get to Fleet IDs 700-2 and 700-3, so add them to the list.

So this is what we have for the ARINC system at Baltimore Washington Intl Airport:

700-1 US Airways Ticket Counter, Supervisors, 'Redcoat', 'PSS', Coordinators, Shift Mgrs, Customer Service, Metrojet Gate Agents
700-2 US Airways Skycaps, Ticket Counter, Gate Agents, 'Commuter Sar'?, 'Mainline Sar'?, Commuter coordinators, 'Redcoat'
700-3 US Airways Administration, Baggage Services, Skycaps, Jetway ops, Ramp Customer Service, 'Redcoat'
700-4 ? ?
700-5 ? ?
700-6 US Airways Mail and Freight channel
700-7 ? ?
700-8 US Airways Maintenance, Utilities
700-9 US Airways Coordinators, Catering,
Customer Service
700-10 US Airways Fuel Trucks
700-11 US Airways Maintenance Coordinators
700-12 US Airways Coordinators, Utilities, Baggage agents ("Makeup")
700-13 US Airways Catering, Fueling, Coordinators
700-14 ? ?
700-15 US Airways Utilities

Now you'll notice I put question marks for 700-4, 5, 7, 14. In truth all I have heard on these IDs (apart from the RARE voice stuff) are open carriers. So I can't be sure of who is using them or why these carriers are showing up like this. Anyone have an explanation?

Also, for the last day or so, I have been noticing a fleet ID of 206-01; this doesn't fit the pattern of all the BWI ARINC IDs starting with 600 or 700, so possibly this is a different company or user? Anyway, it seems this fleet ID can be reached by operations and is evidently used by maintenance personnel. I'm not sure for which company. At first I thought it was bogus, but after Radio Manager recorded it almost 2 dozen times in an hour and a half, I rather doubt it's bogus. Probably legit, but the question remains...who is this?

73s Mike

Any readers close enough to BWI to help answer Mike's questions?

❖ Sullivan County, Tennessee

I read your Tracking the Trunks column in Monitoring Times with great interest. It is one of my favorite to read each month. My question is this: my county and city here in Tennessee – Sullivan County (Bristol and Kingsport) is going to a new radio system. It is the Motorola 3.0 Smartzone system 800 MHz trunk system. Can this system be monitored with a trunktracker scanner? I have not heard the word digitial used. I know if it is digital it can not be monitored. What is your opinion on this system? Will there ever be any digital scanners coming on themarket soon?

Robert R.

All of the trunk-tracking scanners currently on the market will be able to follow the Motorola system you mention. If the voice transmissions are analog, you'll be able to hear them. If the voice transmissions are digital, you will still be able to see the talkgroup IDs but you'll hear an irritating buzzing noise (the digitized voice) when users are speaking.

Regarding digital scanners, there have been rumors for more than year about an add-on or plug-in board that would decode the APCO-25 signals on new digital trunked radio systems. No board has yet materialized, so this is still considered, as we call it in the software industry, "vaporware." The most recent rumor is that Greg Knox, the developer of the original TrunkTracker, is working on a board that would fit inside the Bearcat 895XLT or the yet-to-be-released 780XLT. No estimate on when it might be ready, although the price tag may be somewhere close to $1000.

❖ Galveston, Texas

Galveston County has gone to a trunking system and no one knows what the frequencies are. Do you have any info on this subject? From what I am told, the only one who knows is the person that programmed the radios.

Dale M.

The frequencies are a matter of public record, since the Federal Communications Commission (FCC) licenses them. Here's what I've dug up for Galveston County. It's a Motorola Smartnet system simulcasting from three sites with a system ID of 6F2E (callsign WPKN398).

Control channels are 868.5875, 868.6625, 868.8000, and 868.9125 MHz.

Traffic channels are 866.0625, 866.1625, 866.4125, 866.4375, 866.5875, 866.8125, 866.8375, 866.9625, 867.0875, 867.3125, 867.3375, 867.5625, 867.7125, 867.8375, 868.0625, 868.2125, 868.3375, and 868.4625 MHz.

However, the FCC doesn't control the assignment of talkgroups, so those have to worked out by scanner listeners. (Some enlightened public safety agencies actually publish their talkgroups, but they're few and far between.) I don't happen to have any talkgroups for this system – can any south Texas readers help out?

❖ Uniden Bearcat 780XLT

I would like to know if I buy a Uniden BC780XLT, can I receive Motorola trunked systems in Florida and Massachusetts ?

John S.

The Bearcat 780XLT is a new scanner being built by Uniden. At the Dayton HamVention in May it was expected to be available in July. That date was pushed back, and as of September Uniden is anticipating the 780XLT hitting the stores in December with a list price of $379.99.

The unit will be able to track all three of the most popular trunking formats in the United States, namely Motorola, EDACS, and LTR. This will be the first Uniden scanner capable of scanning LTR systems.

So yes, John, the 780XLT will receive Motorola trunked systems in Florida and Massachusetts, as well as other states.

The unit may be operated in a base station configuration or as a mobile, although some states and localities prohibit the use of scanners in vehicles.

The BC780XLT will have a two-line alphanumeric display, with 16 characters in each line. It will also have built-in CTCSS (Continuous Tone Controlled Squelch System) and DCS (Digital Coded Squelch) decoding, S.A.M.E. (Specific Area Message Encoding) Weather Alert, 500 channel memory, and nearly continuous tuning from 25 to 512 MHz and 806 to 1300 MHz. In addition, a computer interface for PC control as well as tape recorder output and control are built-in.

As required in the United States since 1994, cellular frequencies in the 800 MHz band are blocked. Uniden has even gone so far as to coat the printed circuit board with some kind of epoxy resin that would make replacement of the microprocessor very difficult.

❖ Radio Shack PRO-92

Early models of the PRO-92 had problems monitoring large Motorola trunked systems, which was largely due to the subaudible data method the radio uses to for trunk-tracking operations. There were also some bugs in the initial firmware, although Radio Shack would not officially acknowledge any problems the radio.

This summer Radio Shack introduced a new version of the PRO-92, dubbed the PRO-92A. The addendum to the original manual calls this the "Optional Enhancement Version." You can determine whether you're looking at a 92 or a 92A by the Radio Shack catalog number found printed on the FCC ID sticker on the back of the scanner. An original 92 has a catalog number of 200-522 and the new 92A has the letter A added to the end, 200-522A. These new units contain firmware version 3.25, which you can check by holding down the "3" button while turning on the unit.

The manufacturer, GRE of Japan, has made several changes to improve trunking performance. The original PRO-92 used the subaudible tones carried on each voice channel to determine the active talkgroup. The new PRO-92A now listens to the data on the control channel to determine active talkgroups and frequencies.

The PRO-92A also has slightly different squelch circuitry, which some users have reported tends to be "choppy," cutting out weak transmissions and making it difficult to listen to distant signals.

❖ Bearcat 245XLT

There is also a different version of firmware shipping with new Bearcat 245XLT scanners. To check the firmware version of your 245XLT, make sure the scanner is off, then hold down the 2, 4, and 9 buttons while simultaneously turning it on. My unit displays the version number 1.17 for three seconds, then shows a hexadecimal number that I suspect is the checksum of the firmware.

Original models with version 1.17 have a built-in five second trunk delay, which many scanner listeners dislike because it can cause the radio to miss user call backs that occur on a different frequency. Newer 245XLTs have a two-second delay. Strangely enough, the latest firmware version appears to be 1.04, even though it is a lower number than the earlier 1.17 and 1.19 versions.

That's all for this month. More information is available on my website at **http://www.signalharbor.com**, and I can be reached via electronic mail at dan @ signalharbor.com. Until next month, happy monitoring!

Larry Van Horn, N5FPW
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Channel Plan for 220-222 MHz

This month we are going to present the channel plan for the 220-222 MHz land mobile band. In 1988 the FCC reallocated 220-222 MHz to the Private Mobile Radio Services from the 220-225 band used by Amateur Radio. The principle requester was United Parcel Service which needed radios for its business.

Since then the 220-222 MHz band has gradually developed into spectrum devoted to narrowband voice (bandwidth less than 4 kHz). This band has 200 channel pairs; 60 pairs are for nationwide use and 140 pairs are for shared local use. Of the 60 nationwide pairs, 10 are for exclusive government use and 50 are for exclusive non-government use. Of the 140 shared local-use channel pairs, 100 are available for trunk or other operations of equivalent or greater efficiency, 10 are available for public safety/mutual aid, 20 are indefinitely reserved until further FCC action and not available for assignment, and the remaining 10 channel pairs have no restrictions on use.

Frequencies are assigned in pairs with base station frequencies taken from the 220-221 MHz band, corresponding mobile frequencies being 1-MHz higher, taken from the 221-222 MHz band.

220.0025	1	Trunk Systems
220.0075	2	Trunk Systems
220.0125	3	Trunk Systems
220.0175	4	Trunk Systems
220.0225	5	Trunk Systems
220.0275	6	Trunk Systems
220.0325	7	Trunk Systems
220.0375	8	Trunk Systems
220.0425	9	Trunk Systems
220.0475	10	Trunk Systems
220.0525	11	Trunk Systems
220.0575	12	Trunk Systems
220.0625	13	Trunk Systems
220.0675	14	Trunk Systems
220.0725	15	Trunk Systems
220.0775	16	Trunk Systems
220.0825	17	Trunk Systems
220.0875	18	Trunk Systems
220.0925	19	Trunk Systems
220.0975	20	Trunk Systems
220.1025	21	Non-Government Nationwide
220.1075	22	Non-Government Nationwide
220.1125	23	Non-Government Nationwide
220.1175	24	Non-Government Nationwide
220.1225	25	Non-Government Nationwide
220.1275	26	Non-Government Nationwide
220.1325	27	Non-Government Nationwide
220.1375	28	Non-Government Nationwide
220.1425	29	Non-Government Nationwide
220.1475	30	Non-Government Nationwide
220.1525	31	Trunk Systems
220.1575	32	Trunk Systems
220.1625	33	Trunk Systems
220.1675	34	Trunk Systems
220.1725	35	Trunk Systems
220.1775	36	Trunk Systems
220.1825	37	Trunk Systems
220.1875	38	Trunk Systems
220.1925	39	Trunk Systems
220.1975	40	Trunk Systems
220.2025	41	Trunk Systems
220.2075	42	Trunk Systems
220.2125	43	Trunk Systems
220.2175	44	Trunk Systems
220.2225	45	Trunk Systems
220.2275	46	Trunk Systems
220.2325	47	Trunk Systems
220.2375	48	Trunk Systems
220.2425	49	Trunk Systems
220.2475	50	Trunk Systems
220.2525	51	Non-Government Nationwide
220.2575	52	Non-Gavernment Nationwide
220.2625	53	Non-Government Nationwide
220.2675	54	Non-Government Nationwide
220.2725	55	Non-Government Nationwide
220.2775	56	Non-Government Nationwide
220.2825	57	Non-Government Nationwide
220.2875	58	Non-Government Nationwide
220.2925	59	Non-Government Nationwide
220.2975	60	Non-Government Nationwide
220.3025	61	Trunk Systems
220.3075	62	Trunk Systems
220.3125	63	Trunk Systems
220.3175	64	Trunk Systems
220.3225	65	Trunk Systems
220.3275	66	Trunk Systems
220.3325	67	Trunk Systems
220.3375	68	Trunk Systems
220.3425	69	Trunk Systems
220.3475	70	Trunk Systems
220.3525	71	Trunk Systems
220.3575	72	Trunk Systems
220.3625	73	Trunk Systems
220.3675	74	Trunk Systems
220.3725	75	Trunk Systems
220.3775	76	Trunk Systems
220.3825	77	Trunk Systems
220.3875	78	Trunk Systems
220.3925	79	Trunk Systems
220.3975	80	Trunk Systems
220.4025	81	Non-Government Nationwide
220.4075	82	Non-Government Nationwide
220.4125	83	Non-Government Nationwide
220.4175	84	Non-Government Nationwide
220.4225	85	Non-Government Nationwide
220.4275	86	Non-Government Nationwide
220.4325	87	Non-Government Nationwide
220.4375	88	Non-Government Nationwide
220.4425	89	Nan-Government Nationwide
220.4475	90	Non-Government Nationwide
220.4525	91	Trunk Systems
220.4575	92	Trunk Systems
220.4625	93	Trunk Systems
220.4675	94	Trunk Systems
220.4725	95	Trunk Systems
220.4775	96	Trunk Systems
220.4825	97	Trunk Systems
220.4875	98	Trunk Systems
220.4925	99	Trunk Systems
220.4975	100	Trunk Systems
220.5025	101	Trunk Systems
220.5075	102	Trunk Systems
220.5125	103	Trunk Systems
220.5175	104	Trunk Systems
220.5225	105	Trunk Systems
220.5275	106	Trunk Systems
220.5325	107	Trunk Systems
220.5375	108	Trunk Systems
220.5425	109	Trunk Systems
220.5475	110	Trunk Systems
220.5525	111	Government Nationwide
220.5575	112	Government Nationwide
220.5625	113	Government Nationwide
220.5675	114	Government Nationwide
220.5725	115	Government Nationwide
220.5775	116	Government Notionwide
220.5825	117	Government Notionwide
220.5875	118	Government Nationwide
220.5925	119	Government Nationwide
220.5975	120	Government Nationwide
220.6025	121	Trunk Systems
220.6075	122	Trunk Systems
220.6125	123	Trunk Systems
220.6175	124	Trunk Systems
220.6225	125	Trunk Systems
220.6275	126	Trunk Systems
220.6325	127	Trunk Systems
220.6375	128	Trunk Systems
220.6425	129	Trunk Systems
220.6475	130	Trunk Systems
220.6525	131	Trunk Systems
220.6575	132	Trunk Systems
220.6625	133	Trunk Systems
220.6675	134	Trunk Systems
220.6725	135	Trunk Systems
220.6775	136	Trunk Systems
220.6825	137	Trunk Systems
220.6875	138	Trunk Systems
220.6925	139	Trunk Systems
220.6975	140	Trunk Systems
220.7025	141	Non-Government Nationwide
220.7075	142	Non-Government Nationwide
220.7125	143	Non-Government Nationwide
220.7175	144	Non-Government Nationwide
220.7225	145	Non-Government Nationwide
220.7275	146	Non-Government Nationwide
220.7325	147	Nan-Government Nationwide
220.7375	148	Non-Government Nationwide
220.7425	149	Non-Government Nationwide
220.7475	150	Non-Government Nationwide
220.7525	151	Non-Government Nationwide
220.7575	152	Non-Government Nationwide
220.7625	153	Non-Government Nationwide
220.7675	154	Non-Government Nationwide
220.7725	155	Non-Government Nationwide
220.7775	156	Non-Government Nationwide
220.7825	157	Non-Government Nationwide
220.7875	158	Non-Government Nationwide
220.7925	159	Non-Government Nationwide
220.7975	160	Non-Government Nationwide
220.8025	161	Public Safety/Mutual Aid Operations
220.8075	162	Public Safety/Mutual Aid Operations
220.8125	163	Public Safety/Mutual Aid Operations
220.8175	164	Public Safety/Mutual Aid Operations
220.8225	165	Public Safety/Mutual Aid Operations
220.8275	166	Public Safety/Mutual Aid Operations
220.8325	167	Public Safety/Mutual Aid Operations
220.8375	168	Public Safety/Mutual Aid Operations
220.8425	169	Public Safety/Mutual Aid Operations
220.8475	170	Public Safety/Mutual Aid Operations
220.8525	171	Available for any use
220.8575	172	Available for any use
220.8625	173	Available for any use
220.8675	174	Available for any use
220.8725	175	Available for any use
220.8775	176	Available for any use
220.8825	177	Available for any use
220.8875	178	Available for any use
220.8925	179	Available for any use
220.8975	180	Available for any use
220.9025	181	Indefinitely reserved
220.9075	182	Indefinitely reserved
220.9125	183	Indefinitely reserved
220.9175	184	Indefinitely reserved
220.9225	185	Indefinitely reserved
220.9275	186	Indefinitely reserved
220.9325	187	Indefinitely reserved
220.9375	188	Indefinitely reserved
220.9425	189	Indefinitely reserved
220.9475	190	Indefinitely reserved
220.9525	191	Indefinitely reserved
220.9575	192	Indefinitely reserved
220.9625	193	Indefinitely reserved
220.9675	194	Indefinitely reserved
220.9725	195	Indefinitely reserved
220.9775	196	Indefinitely reserved
220.9825	197	Indefinitely reserved
220.9875	198	Indefinitely reserved
220.9925	199	Indefinitely reserved
220.9975	200	Indefinitely reserved

Trunked Channel Groups

Group	*Channel Numbers*
1	1-31-61-91-121
2	2-32-62-92-122
3	3-33-63-93-123
4	4-34-64-94-124
5	5-35-65-95-125
6	6-36-66-96-126
7	7-37-67-97-127
8	8-38-68-98-128
9	9-39-69-99-129
10	10-40-70-100-130
11	11-41-71-101-131
12	12-42-72-102-132
13	13-43-73-103-133
14	14-44-74-104-134
15	15-45-75-105-135
16	16-46-76-106-136
17	17-47-77-107-137
18	18-48-78-108-138
19	19-49-79-109-139
20	20-50-80-110-140

PLANE TALK

MAKING SENSE OF CIVILIAN AERONAUTICAL COMMUNICATIONS

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New York to Kansas

Welcome aboard everyone! Today our first stop is a return visit to JFK Tower for some additional details about their operations. Many thanks to Dave Schoen for contributing this information. As Webmaster, Dave welcomes visitors to their website at **http://www.jfktower.com**.

Our second destination is the Kansas City Air Traffic Control Center, so fasten your seatbelts and let's go! Thanks to Joe Crane for permission to use this information; be sure to visit his site at **http://members.tripod.com/~Deckard1/zkc.html**.

❖ JFK Tower

Dave Schoen tells us about life at JFK: "Presently at JFK we have 36 controllers, of which 32 are Full Performance Level. This represents the highest percentage of FPL at JFK in its history! There are four supervisors, four Traffic Management Specialists, a Training Specialist, a Quality Assurance Specialist, an Assistant Air Traffic Manager, an Air Traffic Manager, and a secretary. The 36 controllers and the TMCs (Traffic Management Coordinators) make up the 'bargaining unit,' which is represented by NATCA (National Air Traffic Controllers Association).

"Currently, it is Kennedy's busiest time of the year. We have an average of 800 Air Carrier operations daily (Air Carrier means Jet), 235 Air Taxi (commuter type planes – Jetstream 41, Saab 340, etc.) per day and 50 General Aviation (private aircraft); we have occasional military operations as well, but not consistently enough to count in an everyday numbers game. This totals 1165 operations per day!

"In the wintertime, we have about 150 fewer operations than this, mostly because the international airlines which serve JFK run three or four flights a day to the same place in warmer weather, as opposed to just one or two in the winter. JFK's newest airline, JetBlue Airways, is growing in leaps and bounds, adding a pair of new flights every other week, and is expected to push the traffic count at JFK over 1200 before the end of the year.

"An interesting thing about JFK is our 'heavy jet' percentage. Because of our heavy jet population, we have a huge number of passengers every day. We also have to use increased separation between these aircraft as dictated by FAA procedures; this makes for an interesting time in the tower!"

❖ ZKC (Kansas City ARTCC) by Sector

(ZKC general high altitude frequency is 132.325; also 135.300)
VHF Frequencies:

SECTOR	Low Altitude	High Altitude	Ultra High
Anthony	118.350	133.200	
Columbia	118.400, 134.500*		119.475, 134.500
Hutchinson	118.800	134.300	135.900
Sedalia	119.650		
Emporia	120.200, 121.400		132.250
Topeka	120.500, 123.800		134.700
St. Charles	121.250, 125.900		
Richland	124.100, 133.800		
Decatur	124.300		
Natoma	124.400		
Garden City	125.200	133.450	
Chilicothe	125.250		
Marian	125.300		
St. Louis	125.500, 128.100		127.225
Butler	125.550		
Vandalia	125.725		
Gage	126.950		
Jacksonville	127.275	135.900	
Manhattan	127.350		
Springfield	127.500	132.900*	135.175
Mt. Vernon	127.700		
Ponca City	127.800		
St. Joseph	127.900		
Oklahoma City	128.300		
Farmington	128.400	120.825, 134.425	
Edna	128.600		
Tulsa	128.800	135.550	
Kirksville	132.400	134.625	
Chanute	132.900		
Maples	133.400		
Liberal	134.000	134.675	
Salina	134.900		
Quincy	135.525, 133.8		133.725

*Frequency appears more than once in list

❖ Other Centers

Frequencies in use nearby:

Des Moines, IA	118.825 High Altitude ZMP (Minneapolis Center
Marysville, KS	126.400 Low Altitude ZMP
Colby, KS	127.650 High Altitude ZDV (Denver Center)
Colby, KS	132.175 High Altitude ZDV
Goodland or Hill City KS	132.500 Low Altitude ZDV
Marysville, KS	134.225 High Altitude ZMP
Mankato, KS	135.000 Low Altitude ZMP
Hastings, NB	135.100 High Altitude ZMP
Sioux Falls, SD	135.450 High Altitude ZMP

Kansas City Approach/Departure Control (MCI)

MCI Final Approach	119.825
(Backup)	120.42
North/West	124.700/284.700
South/East	132.950/318.100*
GVW/OJC App/Dep	118.900/294.700 Satellite
MKC Downtown Appr	119.000/294.700
MCI Ground Control	(Backup) 121.650
MCI Ground Control	121.800
MCI Tower	(Backup) 125.750
FLV APP/Dep	126.600
MCI Tower	128.200/254.250
MCI Clearance Del.	135.700

Whiteman Air Force Base (SZL)

Clearance Delivery	121.750/335.800
Departure	125.925/398.200
Approach	127.450/284.000
Tower	132.400/255.600

Wichita Approach/Departure Control

ICT Tower	118.200/257.800*
ICT Ground	121.00/384.600
ICT Clearance Del.	125.700
ICT Approach/Dep	125.500/325.800 Northwest Low
ICT Approach/Dep	126.700/353.500 West
ICT Approach/Dep	134.800 East Low
ICT Approach/Dep	134.850/385.550 East High

Airport Towers:

New Century Air Center	118.300
Hutchinson Municipal	118.500/363.00 Tower/CTAF***
Topeka-Billard	118.700/257.800* Tower/CTAF
Salina Municipal	119.300/257.7000 Tower/CTAF
Forbes Field	120.800/255.900
Richards-Gebaur Memorial	124.200/256.800
Johnson County Executive	126.00/241.100
Sherman AAF	126.200/241.000
McConnel AFB	127.250/295.700/236.600
Kansas City Downtown	133.300/257.800

*Frequency appears more than once in list
**CTAF: Common Traffic Advisory Frequency

❖ Navigational Aid Recap

We've had some questions lately concerning Navigational Aids and how they work. Starting in today's column, we'll try to clear some of the confusion.

NDB: A navaid which is seeing less use nowadays is the NDB (non-directional beacon). When a pilot tunes in this beacon, the ADF (Automatic Direction Finding) instrument displays the direction relative to the aircraft that the beacon is, so that the pilot can fly towards or away from it. These are often used at smaller airfields as a simple aid to navigation close to the airfield.

GPS: The Global Positioning System uses signals received from satellites orbiting above the earth. A GPS receiver can, using four or more satellite signals, fix its position to within quite a precise area and even indicate its height above sea level. GPS equipment in aircraft can set waypoints and can display the track of the aircraft across the ground; in addition, it can give details of the wind speed and direction, groundspeed, etc., through a series of calculations. This system is becoming more and more popular, especially for light aircraft where the equipment provides greatly increased accuracy and reliability at a more affordable cost.

That's all for this month, see you in December with more aero comms, news and views. Until then, 73 and out.

Larry Van Horn
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San Antonio Federal Trunk System Update

Recently in this column I asked for an update on the extensive UHF Motorola trunk system used in San Antonio, Texas. *MT* reader John Willie Beck, Jr. (KC5TAL) obliged with our first in-depth look at this large multi-site trunk system located in the Alamo City.

San Antonio Federal Trunk System
System: Motorola AMSS SmartNet
Base Frequency: 406.000, Offset: 25-kHz

Fort Sam Houston (Site 0)
Frequencies:

407.350/Unknown	F-1 Control channel only
409.550/416.550	F-2 System Interconnect
406.950/418.550	F-3
407.150/415.750	F-4
407.950/415.950	F-5 System Interconnect

Talkgroups:

80	EMS Dispatch 1 (BAMC)
16816	Fire Central 1 Dispatch
18320	Police 1 Dispatch
18352	Police 2 Open

Wilford Hall Medical Center, Lackland AFB, and Kelly AFB (Site 1)
Frequencies:

406.550/Unknown	F-1 Control channel only
410.150/417.550	F-2
406.900/416.350	F-3
406.750/414.750	F-4
408.550/415.350	F-5
408.150/Unknown	F-6
409.150/417.150	F-7 System Interconnect
408.750/Unknown	F-8

Talkgroups:
40144 Kelley AFB Fire/Crash Dispatch 1
40224 Kelly AFB Police Gates 1
40240 Kelly AFB Police Open TAC 3
40256 Kelly AFB Ground Control 1
40320 Lackland AFB Police Patrol
43792 AirLife Telephone ID on F7 only
48080 Lackland AFB Fire/Crash Dispatch 1
48288 Lackland AFB Police Gate 1
48368 Kelly AFB/Lackland AFB MedNet Dispatch 1

48416 Medina AFB Police (Tentative)
48816 Lackland AFB Police Patrol
48832 Lackland AFB Police Unknown Usage
48992 Lackland AFB AirLife Landing 1

Brooks AFB (Site 2)
Frequencies:

407.550/Unknown	F-1 Control channel only
408.950/417.750	F-2 Control channel only
406.350/415.150	F-3

Talkgroups:
16272 Brooks AFB Police Dispatch 1
16304 Brooks AFB Police Open/TAC 2
16528 Brooks AFB Fire/Crash Dispatch 1

Camp Bullis (Site 3)
Frequencies:

408.050/Unknown	F-1 Control channel only
409.100/Unknown	F-2
409.375/Unknown	F-3
408.950/Unknown	F-4
408.175/Unknown	F-5
408.100/Unknown	F-6 System Interconnect

Talkgroups:

16528	Ranger Control

Randolph AFB (Site 4)
Note: This system is not operationol at presstime. No further information available.

San Antonio Veterons Administration Hospital (Site 5)
Note: This system is not operational at presstime. No further information available.

Selected San Antonio Area Military Conventional Frequencies

415.575/410.200	Base Housing Maintenance PL 218.1-Hz *(Interesting John. I show this as a US Post Office maintenance crew repeater with an input of 410.200 MHz-LVH)*
143.990/148.010	Army Military Affiliate Radio System (MARS). *(I show your 148.010 as an interconnect between the Army and Air Force MARS repeaters-LVH)*
166.675/Unknown	Camp Stanley Police *(I have no listings of any Army this frequency, yours is the first-LVH).*
413.000 Simplex	Randolph AFB Military Police
149.025/Unknown	Camp Bullis Ranger Control SIMO 407.300 + TRS ID *(I show this is a command and control network and is paired with 150.725-LVH)*
407.300/Unknown	Camp Bullis Ranger Control SIMO 149.025 + TRS ID *(I don't have a listing in the SA area for this one-LVH)*

Many thanks to John Beck for sharing this information with our readers.

Fort Lewis Washington System Active

Brett in Seattle passes along this update on the busy military trunk system at Fort Lewis, Washington.

System: Motorola Type II SmartNet (System ID 3B38)
Frequencies: 406.950 407.250 408.550 409.150 409.350 410.150
Note: It is reported that Fort Lewis is in the process of a two and four channel expansion of the existing six channel SmartNet trunked radio system. It is also supposed to be part of the new Pacific Northwest Motorola APCO-25 SmartZone trunk system that is being installed.

Talkgroups:

368	Fire Department/Hazmat/Decon (Tentative)
400	Training Operations
464	Fire Department/Primary Operations
528	Fire Department/Possible Tac
688	Range Control
880	Flight Ops/Flightline Fueling (Tentative) (c/s Base Ops/POL)
1008	DPW/Garbage Trucks (Tentative)
1104	Military Police, Possible Tac
1168	Military Police, Car-to-Car
1232	DPW (Tentative)
1264	DPW (Tentative)/Roads-Grounds-Sanitation
1392	Military Police, Primary Operations
1712	Military Police, Jail Operations
2032	Training Operations
2096	Encryption
2288	Power Supply (Tentative)
2608	DPW (Tentative)
2960	Madigan Security (Tentative)
3216	EOD Battalion (Tentative)
4336	Training Operations (Tentative)
4592	Chat
4752	Training Operations
4784	Training Operations
4848	Chat
4880	Training Operations
6416	Computers/Alarms
8528	Training Operations (Tentative)

Thanks, Brett, for sharing that information with our readers.

Update Camp Pendleton

Mike Chace-Ortiz and Laura Quarantiello have both provided updates on the UHF trunk system at Camp Pendleton Marine Corps Base in California. Here is that information from these two longtime *MT* readers.

Type: Motorola Type II (System ID 7100)
Base = 406.000, Offset = 25-kHz
Frequencies: 406.550 (1C) 406.950 (2C) 407.300 (3) 407.325 (4C) 408.200 (5) 408.750 (6) 409.275 (7) 409.750 (8) 409.950 (9) 410.150 (10)
Note: 407.175 has also been reported as a phone patch channel in this system.
Talkgroups:

16	Unknown User/Usage
400	Unknown User/Usage
528	Unknown User/Usage
592	Unknown User/Usage
1040	Unknown User/Usage
1072	Unknown User/Usage
1104	Charlie Field
1136	Unknown User/Usage
1168	Unknown User/Usage
1232	Field Units
1328	Unknown User/Usage
1360	Unknown User/Usage
1424	Range Control (c/s Longrifle)
1552	Guard Posts
1776	Unknown User/Usage
1936	Provost Marshal's Office PMO TAC 1 (144 MPs)
1968	Provost Marshal's Office PMO TAC 2
2000	Provost Marshal's Office PMO TAC 3
2160	Unknown User/Usage
2352	Unknown User/Usage

2416 Unknown User/Usage
2512 Unknown User/Usage
2832 Maintenance Base Housing
2576 Unknown User/Usage
2928 Maintenance Base Housing
2960 Unknown User/Usage
3024 Unknown User/Usage
3120 Field Units (Alpha)
3184 Unknown User/Usage
3344 Guard Posts
3408 Guard Shack
3560 Unknown User/Usage
3664 Phoenix Target Range
4016 Unknown User/Usage
4208 Unknown User/Usage
4432 Unknown User/Usage
4656 Provost Marshal's Office
4748 Unknown User/Usage
4784 Maintenance Base
4848 Aircraft Servicing
4880 Airfield Ground Operations (c/s Pendleton Ground)
4944 Unknown User/Usage
4994 Unknown User/Usage
5104 Unknown User/Usage
5488 Guard Posts
5680 Unknown User/Usage
5808 "Uniform" Channel 3
5936 Unknown User/Usage
5968 Rifle Range
6000 Gunnery Range
6096 Unknown User/Usage
7760 Unknown User/Usage
7792 Unknown User/Usage
8144 Unknown User/Usage
8176 Unknown User/Usage
8208 Unknown User/Usage
8304 Guard Shack
8368 Unknown User/Usage
8400 Unknown User/Usage
8560 Unknown User/Usage
8604 Unknown User/Usage
8656 Public Works
8688 Public Works
8720 Public Works
9008 Unknown User/Usage
9904 Unknown User/Usage
10352 Unknown User/Usage
10382 Operations
10832 Unknown User/Usage
10896 Unknown User/Usage

For *Trunker* file:

Comp Pendleton Marine Corps Base
B406.0 25-KHz.
MAP=22222222
OPTIONS=nVdF PLAN=0
dv406.5500,192,b
v406.9500,1a2,13
v407.3000,1b0,24
v407.3250,1b1,30
v408.2000,1d4,d6
v408.7500,1ea,71
v409.9500,21a,be
v410.1500,222,de

Again, updates are requested from our readers on this system.

And that does it for this edition of *Milcom*. We will conclude this month's column by presenting our first bandscan of the 138-144 MHz military land mobile band in Table One. Until next month, good hunting.

Table One: VHF Military Land Mobile Service

138.0000	NASA
138.0125	(No reported activity)
138.0250	Air Force (P-Nationwide), Army, Navy
138.0375	(No reported activity)
138.0500	Air Force (P-Nationwide)
138.0625	(No reported activity)
138.0750	Air Force (P-Nationwide)
138.0875	(No reported activity)
138.1000	Air Force (P-Nationwide), Army, Navy
138.1125	(No reported activity)
138.1250	Air Force (P-Nationwide), Navy
138.1375	(No reported activity)
138.1500	Air Force (P-Nationwide), Army, Navy
138.1625	(No reported activity)
138.1750	Air Force (P-Nationwide), Army
138.1875	(No reported activity)
138.2000	Air Force (P-Natianwide)
138.2125	(No reported activity)
138.2250	Air Force (P-Nationwide), FEMA (Nationwide)
138.2375	(No reported activity)
138.2500	Air Force (P-Nationwide), Navy
138.2625	(No reported activity)
138.2750	Air Force (P-Nationwide), Army, Navy
138.2875	(No reported activity)
138.3000	Air Force (P-Natianwide), Navy
138.3125	(No reported activity)
138.3250	Air Force (P-Nationwide), Army, Navy
138.3375	(No reported activity)
138.3500	Air Force (P-Nationwide), Navy
138.3625	(No reported activity)
138.3750	Air Force (P-Nationwide), Army, Navy
138.3875	Army
138.4000	Air Force (P-Nationwide)
138.4125	(No reported activity)
138.4250	Air Force (P-Nationwide)
138.4375	(No reported activity)
138.4500	Air Force (P-Natianwide), Army, FEMA
138.4625	(No reported activity)
138.4750	Air Force (P-Natianwide)
138.4875	(No reported activity)
138.5000	Air Force (P-Nationwide), Navy
138.5125	(No reported activity)
138.5250	Air Force, Army, NASA, Navy (P)
138.5375	(No reported activity)
138.5500	Air Force, Army, Navy (P)
138.5625	(No reported activity)
138.5750	Air Force (Nationwide), FEMA (Region 5/8), Navy (P)
138.5875	(No reported activity)
138.6000	Air Force, Navy (P)
138.6125	(No reported activity)
138.6250	Air Force, (Nationwide), Army, Navy (P)
138.6375	(No reported activity)
138.6500	Army, Navy (P)
138.6625	(No reported activity)
138.6750	Air Force, Navy (P)
138.6875	(No reported activity)
138.7000	Air Force, Army, Customs Service, Navy (P)
138.7125	(No reported activity)
138.7250	Air Force, Navy (P)
138.7375	(No reported activity)
138.7500	Air Force, Army, NASA (Nationwide), Navy (P)
138.7625	(No reported activity)
138.7750	Air Force, Army, Navy (P-Nationiwde)
138.7875	(No reported activity)
138.8000	Army, Navy (P)
138.8125	(No reported activity)
138.8250	Army, Navy (P)
138.8375	(No reported activity)
138.8500	Air Force, Army, Navy (P)
138.8625	(No reported activity)
138.8750	Air Force (P-Nationwide), FEMA, Navy
138.8875	(No reported activity)
138.9000	Air Force (P-Nationwide), Army, Navy
138.9125	(No reported activity)
138.9250	Air Force (P-Nationwide), Army, Navy
138.9375	(No reported activity)
138.9500	Air Force, Army, Navy (P)
138.9625	(No reported activity)
138.9750	Army, Navy (P)
138.9875	(No reported activity)
139.0000	Air Force, Army (P-Nationwide), Navy
139.0125	Army (P-Nationwide)
139.0250	Army (P-Nationwide), Navy
139.0375	Army (P)
139.0500	Air Force, Army (P-Nationwide), Navy
139.0625	Army (P-Nationwide)
139.0750	Air Force, Army (P-Nationwide), Coast Guard
139.0875	Army (P-Nationwide)
139.1000	Army (P-Nationwide), Navy
139.1125	Army (P-Nationwide)
139.1250	Air Force, Army (P-Nationwide), NASA, Navy
139.1375	Army (P-Nationwide)
139.1500	Army (P-Nationwide)
139.1625	Army (P-Nationwide)
139.1750	Army (P-Nationwide), Navy
139.1875	Army (P-Nationwide)
139.2000	Army (P-Nationwide), Navy
139.2125	Army (P-Natianwide)
139.2250	Army (P-Nationwide)
139.2375	Army (P-Nationwide)
139.2500	Air Force, Army (P-Nationwide), Coast Guard, Navy
139.2625	Army (P-Nationwide)
139.2750	Army (P-Nationwide)
139.2875	Army (P-Nationwide)
139.3000	Army (P-Nationwide), Navy
139.3125	Army (P-Natianwide)
139.3250	Army (P-Nationwide), Navy
139.3375	Army (P-Natianwide)
139.3500	Air Force, Army (P-Nationwide), Navy
139.3625	Army (P-Nationwide)
139.3750	Air Force, Army (P-Nationwide), Navy
139.3875	Army (P-Natianwide)
139.4000	Army (P-Nationwide)
139.4125	Army (P-Nationwide)
139.4250	Air Force, Army (P-Nationwide)
139.4375	Army (P-Nationwide)
139.4500	Army (P-Nationwide), FEMA (Region 4), Navy
139.4625	(No reported activity)
139.4750	Army, Navy (P)
139.4875	(No reported activity)
139.5000	Air Force, Army, Coast Guard, Navy (P)
139.5125	(No reported activity)
139.5250	Air Force, Army, Navy (P)
139.5375	(No reported activity)
139.5500	Navy (P)
139.5625	(No reported activity)
139.5750	Navy (P)
139.5875	(No reported activity)
139.6000	Air Force (P-Nationwide), Army, Navy
139.6125	(No reported activity)
139.6250	Air Force (P-Nationwide), Army, Navy
139.6375	(No reported activity)
139.6500	Air Force (P-Nationwide), Army, Navy
139.6625	(No reported activity)
139.6750	Air Force (P-Natianwide), Army, Navy
139.6875	Air Force
139.7000	Air Force (P-Nationwide), Army, Navy
139.7125	(No reported activity)
139.7250	Air Force (P-Nationwide), Army, Navy
139.7375	(No reported activity)
139.7500	Air Force (P-Nationwide), Army, Navy
139.7625	(No reported activity)
139.7750	Air Force (P-Nationwide), FEMA, Navy
139.7875	(No reported activity)
139.8000	Air Force (P-Nationwide), Navy
139.8125	(No reported activity)
139.8250	Air Force (P-Nationwide), FEMA
139.8375	(No reported activity)
139.8500	Air Force (P-Nationwide), Army, Navy
139.8625	(No reported activity)
139.8750	Air Force (P-Nationwide)
139.8875	(No reported activity)
139.9000	Air Force (P-Nationwide), Army, FAA, Coast Guard
139.9125	(No reported activity)
139.9250	Air Force (P-Nationwide), FEMA, Navy
139.9375	(No reported activity)
139.9500	Air Force (P-Nationwide), Army, FAA (Nationwide), FEMA (Region 3/6/10), Navy
139.9625	(No reported activity)
139.9750	Air Force (P-Nationwide), Navy
139.9875	(No reported activity)

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SRS and SSS

No, they aren't government agencies. SRS stands for "Sunrise Skip," and SSS for "Sunset Skip." These are excellent ways of improving your DX totals, by taking advantage of a loophole in the FCC regulations.

Most AM stations are required to reduce power and/or switch to directional antennas at sunset. In many cases, the nighttime signal is considerably weaker than the daytime signal. (For example, WLAC-1510 radiates 2811 millivolts/meter in my direction during the day; this drops to 869 millivolts at night. There are many stations whose power reductions are even greater.) Nighttime is also when AM signals travel further. If a DX target could use its more powerful daytime signal at night, it would be easier to log. And in fact, AM stations can use their daytime signals at night, though only for a few minutes a day.

For each station, the FCC assigns an average daily sunrise and sunset time for each month of the year, rounded to the nearest 15 minutes. (You can see the table on **http://www.fcc.gov/mmb/asd/bickel/srsstime.html**) Plugging in the coordinates of WQSV-790 Ashland City, Tennessee, we see the station is allowed to come on the air at 6:30am this month, and must leave the air at 4:45pm. In December, sign-on will become 6:45am, and signoff 4:30pm.

Of course, real sunset doesn't abruptly become 15 minutes earlier at the end of the month. Actual sunrise at Ashland City on November 30 is 6:42 am, and actual sunset is 4:33 pm. Note that actual sunrise is 12 minutes later than "FCC sunrise," and actual sunset is 12 minutes earlier than "FCC sunset." What this means is that WQSV can legally operate on its daytime power of 500 watts for 12 minutes of darkness in the morning, and another 12 minutes of darkness at night. During this period, WQSV should be audible at considerable distance.

The downside to this is what happens at the beginning of the month. On November 1, actual sunrise is 6:13 am, and actual sunset is 4:51. The station cannot come on the air until 17 minutes after sunrise, and must leave the air 6 minutes before actual sunset.

That said, you shouldn't just give up on DXing during the first half of the month. Just as sunrise and sunset times don't change abruptly on the first of the month, nighttime conditions don't abruptly start at sunset and end at sunrise. Rather, conditions gradually improve as darkness settles on your area, and gradually worsen as the sun comes up. Sometimes, when AM conditions are particularly good, signals may not disappear at all. On a number of occasions, I've heard stations as far as 600 miles away in the middle of the day.

Have you ever wondered what happens at a DX convention? In this picture, Peter George DXes FM while monitoring TV channel 3 for meteor bursts.

The moral of the story is to check the dials at sunrise and sunset. This is when much of the most interesting DX is heard. At this time of year, it's also a productive way to use that time you spend stuck in traffic commuting home from work. Give sunset skip DXing a try!

Bits and Pieces

Another new expanded-band station has appeared, and in a difficult-to-hear state. KBLI-1620 is operating from Blackfoot, Idaho. For those of us too far east to stand a chance of hearing KBOI-670, this new station will be our best chance for logging the Gem State. Unfortunately, 1620 is also the most crowded of the expanded-band frequencies, with seven stations. 1630 is probably the most open – while it has three stations, KKWY in Wyoming has a rather poor antenna and a rather poor signal to go with it.

• There have been a number of controversial auctions held on the Internet. This isn't one of them, but it's interesting nonetheless. In early August, radio station KMIN-980 Grants, New Mexico, was sold at auction on **www.ebay.com**. The minimum bid was $49,000. I've not been able to learn what the winning bid was.

• If you read the August *American Bandscan* and were thinking about using your scanner to listen for European video carriers, be advised there was an error in the August column. Jeff Kadet advises me the video frequency used in Eastern Europe is 49.75 MHz, not 49.25. The 48.25 frequency for Western Europe is correct.

• Dave Zantow N9EWO of southern Wisconsin forwarded an interesting Internet address for fans of WLS-890. **http://www.scott.childers.net/WLS99.htm** has memorabilia of the entire history of this popular station, including the days before it became a rock station. There's quite a bit of audio on this site as well.

• I recently attended the WTFDA Convention at Lake Placid, New York. Sixteen FM/TV DXers got together for a weekend of total DX immersion. If you have a chance to attend a DX convention, do it. It'll really jumpstart your interest in the hobby. For more information on the WTFDA, visit **http://www.anarc.org/wtfda**, or write WTFDA, Box 501, Somersville CT 06072. Ironically, the only DX noted at the Convention was my local station WSIX 97.9, heard by meteor scatter 884 miles from home!

Let us know what you're hearing. Write: Box 98, Brasstown NC 28902-0098, or by email to w9wi@bellsouth.net. Good DX!

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
georgez@nacs.net

Pirating with Cumbre on the Air

We frequently list *Cumbre DX* in these pages as an excellent source of breaking clandestine DX news. But, until now we never listed *Cumbre DX* as a resource for pirate DXing, since it excludes pirate loggings from its pages. This policy remains, but they now cover pirates within the "DXing with Cumbre" radio program.

Chris Lobdell, host of the "Pirating with Cumbre" segment of "DXing with Cumbre" has announced that the program will now air on a weekly basis. This schedule includes a **WHRI** relay at 0500 UTC Saturdays on 7315 kHz. The show is also carried several different times on various **WHRI** frequencies, including other relays via **KWHR** and **WHRA.** Detailed current schedules, at the **http://www.geocities.com/Area51/Station/7755/index.html#radio** URL, and archived RealAudio shows are on the internet.

Lobdell, a veteran DXer and pirate radio journalist, produces an entertaining weekly look at the pirate radio scene. Chris also will accept your logs via the Stoneham maildrop.

❖ What We Are Hearing

Once again this month, *MT* readers heard nearly two dozen North American shortwave pirate stations, all on 6950 or 6955 kHz. This variety shows us that pirate radio remains very much alive.

Blind Faith Radio- Doctor Napalm often tops the alphabetical station list in this magazine. His classic rock format remains popular. He sometimes appeared during the summer to combat "dead air." (Menin)

CELL- Here's a pirate that pays no attention to the ECPA privacy provisions. All of their programming consists of actual cellular telephone calls that were recorded off the air. (Old addresses now questionable)

East Coast Beer Drinker- Veteran pirate DXers immediately recognized the return of this old-timer. He hosts the rock music programming while consuming the beverage from his station name. (Blue Ridge Summit)

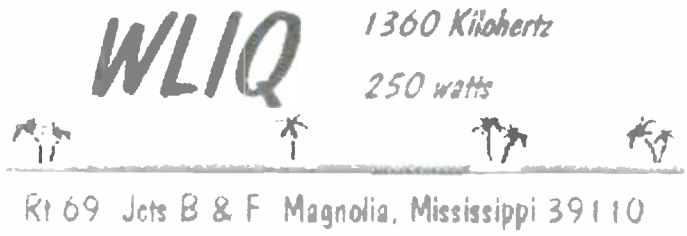
Ground Zero Radio- This old-timer has returned with rock and comedy, at least on a sporadic basis. (Belfast)

KIPM- Alan Maxwell's dramas are sometimes esoteric, but there is no doubt that his shows are unusual. He claims over the air that he is not crazy. (Lula)

KRMI- Radio Michigan International still has a nice mix of comedy, but it still has failed to provide an address for correspondence. (None)

Radio Metallica Worldwide- Dr. Tornado's volume of pirate transmissions has slowed from the frantic pace we remember from last year. But when he's on, his powerhouse 10 kilowatt transmitter can't be missed. He comes in as clear as the BBC. (Blue Ridge Summit)

Radio Obscura- This new one attracted attention with some sophisticated comedy, including a dragstrip for gerbils and Dr. Natural's encounter with a moose. (None; said send logs to *The ACE*)



WLIQ has returned

Radio Three- Sal Amoniac normally programs rock or oldies, but his secondary function is the promotion of pirate radio. (None; only verifies logs in *The ACE*)

Scream of the Butterfly- The internet relay that we mentioned in July has closed, but they are beginning their second year of relays on licensed WRMI. (uses johnnyrockin@hotmail.com e-mail)

Sycko Radio- Although they are not really new anymore, their rock music remains somewhat mysterious because they have no maildrop. The phonetic pronunciation of their ID is psycho. (None)

The Crooked Man- When lists of the most bizarre pirate of all time are prepared, the Crooked Man is always on them. (Old addresses defunct)

Voice of Captain Ron Shortwave- Ron says that because of his tight fiscal situation, he sold all of his equipment and now has to transmit from a CB radio. Whether or not this is true, he still can be heard. (Uses captainronswr@yahoo.com)

Voice of the Lake Superior Circle Route Network- Their ID is a mouthful, but their tunes are a mix of rock, pop, and jazz. (Blue Ridge Summit)

Voice of the Runaway Maharishi- Maharishi Ali Ganja will never be considered for appointment as the President's drug czar, although he claims to have plenty of experience for the job. (Belfast or Providence)

WEAK- Very few DXers reported the broadcast from Leonard Longwire's new oldies station, which appears to have appropriate call letters. Nevertheless he claims to use 500 watts. (Blue Ridge Summit)

WLIQ- Their late 2000 broadcasts have been announced mainly as tests. (Blue Ridge Summit)

WLIS- There's only one letter different in the call sign here from the previous station, but nobody will ever confuse Jack Boggan's interval signals with the rock on WLIQ. (Blue Ridge Summit)

WHYP- Sometimes they memorialize James Brownyard's licensed medium wave station in North East, PA, but at other times they parody the current pirate radio scene. (Uses whyp1530@yahoo.com e-mail)

WMFQ- The station's rock music is pretty standard fare in pirate radio nowadays, but their station ID's with a chanting male chorus remain unique on the shortwave bands. (Providence)

WRX- Jimmy the Weasel, another unique character, still pops up a couple of times a month. His format includes rants about Y2K, remarks about the odor of your immediate relatives, and sarcastic comments about other pirate stations and his listeners. That sounds odd, but the effect is unusual. (Milton)

92.5 Pirate Radio- Little is known about this new effort, where the announcer mentioned Florida frequently while playing oldies rock tunes. (None)

❖ Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign addresses. This finances a souvenir QSL to your mailbox, if you send your letter to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 24, Lula, GA 30554; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 29, Milton, ME 04294; PO Box 146, Stoneham, MA 02180; and PO Box 293, Merlin, Ontario N0P 1W0.

❖ Thanks

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via my e-mail address atop the column. This month's contributors include John T. Arthur, Belfast, NY; Marc Caouette, QTH Unknown; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Ulis Fleming, Glen Burnie, MD; Harold Frodge, Midland, MI; Scott Gentry, Richton Park, IL; William T. Hassig, Mt. Prospect, IL; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Mike Prindle, New Suffolk, NY; Mark Redfox, Albuquerque, NM; Chuck Rippel, Cornland, VA; Johnny Rockin, Los Angeles, CA; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; Niel Wolfish, Toronto, Ontario; and Andrew Yoder, Mt. Alto, PA.

Kevin Carey, WB2QMY
lowband@gateway.net

News, Tips & Loggings

November is typically the month that longwave DXing kicks into high gear in North America. The static-generating thunderstorms have all but vanished, and the long, cool nights make for excellent propagation below 500 kHz. This month I've put together some tips and resources that will help you to get started or improve your enjoyment of radio's basement band.

Do you know of a new longwave-related product or publication? Let us know and we'll cover it in a future issue of *Below 500 kHz*.

❖ On the Web

Alan Gale (UK) has assembled an impressive listing of longwave products on his web site at **http://www.alan.gale.clara.net/datafile.htm**. Just about every source for beacon guides, tapes, aviation publications, LF logging software, clubs and equipment is mentioned. It is very convenient to have this information organized on a single site. Nice work, Alan!

Speaking of LF suppliers, LF Engineering Co. is now on the web at **http://www.lfengineering.com**. Although the site's content is a bit sparse at this writing, you will find complete contact information (phone, e-mail), descriptions of several key products, and ordering information. I am hoping they will eventually add more graphics and the excellent tutorial content of their paper catalog.

❖ Need a Manual?

Need a manual for that dusty old rig you picked up at the last swap meet? W7FG Manuals has quickly become one of the nation's leading suppliers of aftermarket documentation for old radios, test equipment and station accessories. If you're into vintage gear, you'll want to have a copy of their catalog handy. Check them out on the web at: **http://www.w7fg.com** or write to W7FG Vintage Manuals, 3300 Wayside Drive, Bartelsville, OK 74006.

❖ A Source for Litz Wire

Lowfers are well aware of the low-loss properties of Litz wire for winding transmitting coils. Trouble is, Litz wire is usually expensive and hard to find. There are only a handful of firms that make this multi-stranded, insulated wire.

One supplier recently brought to my attention is the Cooner Wire Company. I spoke with their sales department and was told that small quantity orders are welcome (depending on availability, of course) and that a listing of their products is available. To obtain a listing write to: Cooner Wire Company, 9265 Owensmouth Ave., Chatsworth, CA 91311.

❖ Short 'n Sweet

Canada has a standard system of two-letter postal abbreviations for its provinces and territories, as does the U.S. for its states. From this point on, I will use these abbreviations for any Canadian loggings submitted to *Below 500 kHz*. I would appreciate those submitting logs to use the letter combinations shown in Table 1 below. Thanks to Jacques d'Avignon (ON) for this information.

Table 1. Canadian Abbreviations

Alberta	AB
British Columbia	BC
Manitoba	MB
New Brunswick	NB
Newfoundland	NF
Nova Scotia	NS
N.W. Terr. & Nunavut	NT
Ontario	ON
Prince Edward Isle	PE
Quebec	QC
Saskatchewan	SK
Yukon Territory	YT

❖ LF/MF Scrapbook

I continue to get occasional inquiries regarding Ken Cornell's out-of-print book, *The Low & Medium Frequency Radio Scrapbook*. Following the author's death in January 1997, supplies for the book were depleted, and many orders could not be filled. To my knowledge, the *Scrapbook* remains unavailable and plans by a family friend to republish it have not materialized. I will report any change in the situation here.

❖ Loggings

The loggings this month are excerpted from the *BeaconFinder*, a directory of LF beacons and utility stations covering the spectrum from 0 to 530 kHz. As many of you know, I began publishing the guide a few years ago in response to requests for an inexpensive, easy to use directory focusing solely on North America. If you are interested in obtaining the complete *BeaconFinder* (60 pages), drop me a note, or see the description elsewhere in this issue for more information.

During this season of thanksgiving, remember to take some time out of your DXing schedule to log some special family times as well. I wish you and yours the best for the upcoming holiday. *See you next month.*

Table 2. Selected Loggings (450-530 kHz)

FREQ.	ID	LOCATION
450	PPA	PUERTO PLATA, DOM. REP.
450	USC	SANTA CLARA, CUBA
500	ZGB	GOVERNORS HARBOUR
510	FA	FAIRBANKS, AK
512	FL	SILVER SPRING, MD
512	HMY	LEXINGTON, OK
513	PP	OMAHA, NB
514	OY	VALCARTIER, QC
515	CL	PORT ANGELES, WA
515	ONH	JEFFERSON CITY, MO
515	OS	COLUMBUS, OH
515	PKV	PORT LAVACA, TX
515	PN	PONCA CITY, OK
515	RRQ	ROCK RAPIDS, IA
515	SAK	KALISPELL, MT
515	ZRH	UNID/BAHAMAS?
516	YWA	PETAWAWA, ON
517	FN	CLINTON, IA
517	GQ	KANSAS CITY, MO
518	--	NAVTEX (VARIOUS LOC.)
518	GCT	GUTHRIE CENTER, IA
520	IQS	SALLISAW, OK
521	DWH	HOUSTON, TX
521	FEU	FRANKFORT, KY
521	GM	GREENVILLE, SC
521	INE	MISSOULA, MT
521	JET	FRANKFORT, KY
521	ORC	ORANGE CITY, IA
521	TO	TOPEKA, KS
521	TVX	GREENCASTLE, IN
523	JJH	JOHNSTOWN, NY
524	AJG	MOUNT CARMEL, IL
524	FMV	MOVABLE—USAF, AK
524	HEH	NEWARK, OH
524	HRD	SILSBEE, TX
524	MNL	VALDEZ, AK
524	UOC	IOWA CITY, IA
525	ICW	NENANA, AK
526	OJ	OLATHE, KS
526	RWE	CAMP ROBERTS, CA
526	ZLS	STELLA MARIS, BAH
529	FDV	NOME, AK
529	SQM	LEVEL ISLAND, AK
530	F9	CHATHAM, NB
530	NB	NORTH BAY, ON

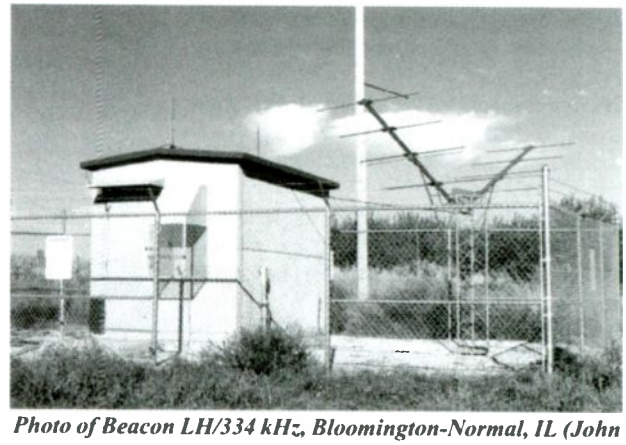


Photo of Beacon LH/334 kHz, Bloomington-Normal, IL (John Horton - IL.).

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T.J. "Skip" Arey, N2EI
tjarey@home.com

The Cult of K2

If you have tuned across the HF segments of the Amateur Radio spectrum over the past two years, you have probably heard an increasingly familiar statement: "Rig here is K2." There are but a handful of pieces of ham hardware that have, over the years, achieved such notoriety, bordering on cult status. These might include the Collins "S" Line, the Ten Tec Omni and probably one or two of the Drake series. Getting one the air with such equipment puts a swagger in one's fist for certain. The Elecraft K2, designed by Wayne Burdick N6KR and Eric Swartz WA6HHQ is such a transceiver. What makes it even more unique is that it achieves this by a marriage of two often mutually exclusive ideas: superior performance that comes in kit form.

The K2's performance has been reviewed in all the major ham magazines with a great deal of detail and lab testing. Its receiver is without peer, challenging the performance of the best of the best commercially manufactured equipment. It takes advantage of Phased Locked Loop (PLL) synthesis to reduce noise. It also has such advanced features as variable bandwidth IF filtering and IF derived AGC. Throw in dual VFOs with split operation and A/B switching, 10 memories, RIT, and both preamplification and attenuation and you're ready to go against anything else out there.

On the transmitter side you have output power variable from 0 - 10 watts, XIT, full break in CW and a built in keyer with multiple programmable memories.

The whole thing ties together through a microprocessor controlled front end with an LCD readout that is capable of providing "way too much information" at the touch of a button.

Now comes the really neat part! The radio is produced as a basic unit covering all amateur radio bands from 80 through 10 meters in the CW mode with up to 10 watts of power. For a lot of folks (me included) that's all the radio you might need. But beyond the basic unit, the K2 is expandable through the addition of a wide number of modular features that include 160 meter coverage (with second antenna input), SSB, internal battery pack, noise blanker and an automatic antenna tuner. On the drawing board at this time are a number of other modular features including a high power amplifier and a computer control port.

So, beyond the basic unit you can build in the features you desire and leave off the ones you have no use for. You create a custom transceiver specific to your amateur radio needs. You can build a unit that is completely self-contained, ideal for traveling and camping or set the unit up as the basis for a hard core contest machine. It's all up to you. With all available options the rig weighs in at under six pounds measuring 3" x 8" x 8". Big things do come in small packages.

❖ The K2 Support Community

Like me, some of you have very fond memories of Heathkit products. Over the years since Heathkit got out of the kit business, I have been forced to suffer through construction of a number of kit projects where I dreamed of having a manual of the quality that Heathkit used to provide. Folks, I'm going to say something I never thought I would ever say. The Elecraft team has produced a construction manual that is far superior to any Heathkit manual I have ever seen (and I've build literally dozens of Heathkits in my ham career). You don't even have to take my word for it. You can view the full manual and all appendices and errata sheets at the Elecraft site **http://www.elecraft.com/** .

Even though this kit is not strictly recommended for first time builders due to its over 200 piece parts count, I am aware of a number of folks who built the K2 first time out. As an experienced kit builder with a lot of board level repair work under my belt, the kit posed no real challenges to me. However, with each step I was thoroughly impressed with the attention to detail in the manual. As someone who wrote for many years for beginners in the radio hobby, I was very impressed by how the K2 assembly manual took ample time to explain each step and even went out of the way to point out potential trouble spots.

As with Heathkit manuals of old, you would build a stage and then conduct tests to see if things went together as they should have. The Elecraft folks even provide, right within the kit's design, the essential test equipment to assure your construction goes as it should. Built in are a voltmeter and a frequency counter along with a number of specific test points that allow you to check things out during construction and then keep things in peak operating condition for the life of the transceiver.

The manual even includes a number of modifications that can improve performance, given your operating practices. For instance, I chose to operate exclusively QRP (5 watts or less) with this transceiver. The manual makes suggestions on how to optimize the RF output for this consistently lower power level. The Elecraft Website also has an extensive Builders Resource Page that makes recommendations all the way down to the soldering iron and solder you might want to use to ease construction.

But as all those late night TV commercials say: "But wait...There's more!" When you decide to build a K2, you are welcomed into a fellowship of K2 owners. There is a very strong sense of community surrounding this rig. When two K2 users meet on the air, the exchange of K2 serial numbers often takes on more importance than the more traditional RST signal report. (By the way, I'm the proud owner of #946). There is an Internet E-mail reflector that serves as a meeting place for K2 owners and various fellow travelers and prospective purchasers. I discovered that through this list, nobody has to build a K2 alone! Routinely, folks post their progress and their problems. There is no such thing as a stupid question and any need is addressed by a number of knowledgeable folks. Often, you will get support on the reflector directly from Elecraft Staff. In this age of the Internet, it reminds me of some of those long distance calls I used to make to the Heathkit service engineers out in Benton Harbor, Michigan.

Also on the e-mail reflector you will run across a number of people who have performed a number of interesting tweaks to the K2, such as optimizing the rig for PSK31 transmission. Modifications and further improvements are freely discussed and the better ones even find their way to the official Elecraft website. This attitude and acceptance of modifications coupled with the modular design makes any K2 an ongoing "work in progress." Mine is usually up in the shack for a couple of weeks until somebody posts a neat new idea on the reflector. Then the K2 takes a trip down the basement for a little tweak or two.

For somebody like me who has a strong interest in both operating and construction this transceiver is close to perfect, or as I posted on the K2 reflector one night, "When I ride to Valhalla lay my K2 on my chest instead of a sword." You can find out more about subscribing to the e-mail reflector at the Elecraft website mentioned above.

❖ The K2 in Operation

In its basic form, the K2 is clearly a radio designed for serious CW operation. With full break in keying, the ability to crank the filters down to 0.10 kHz and RIT/XIT, you can dig out just about anything on the band. I have easily grabbed signals barely above the noise floor and pulled out a solid QSO. Units with the SSB module can be heard running with the "big dogs" during phone contests as well.

While designed for the ham bands, the K2's receiver is also a fairly high performance shortwave broadcast receiver. The edges of each band overlap widely into the SWBC portions of the spectrum and the K2 filters can be set wide enough for sharp AM signal reception. Several of us radio monitoring types made a point of mentioning this to the folks at Elecraft in hopes that they might consider designing a high performance general coverage receiver. Given the overall receiver performance of the K2, such a rig would be pure dynamite for the shortwave listener.

Compared to commercial gear, the K2's cost is nominal. A basic K2 80-10 meter CW Transceiver is $579.00. The SSB option is $79.00. The 160 meter module with second antenna jack is $29.00, The Noise Blanker is $35.00. The KAT2 Internal Auto Tuner costs $139.00. The internal 2.9AH battery with bracket is $79.00. Of course you provide the "sweat equity" by building the K2 and its modules.

Estimates of building time vary widely. An experienced builder could probably do the deed in a long weekend with no distractions. The rest of us can count on a few enjoyable hours each night over the course of a couple of weeks. I made a point of taking my time, as I really wanted to savor the K2 kit building experience.

At this year's Dayton Hamvention, Elecraft introduced another transceiver to the world: the K2's baby brother, the K1. The K1 is a two-band, 5-watt CW transceiver kit. It is a teensy 2.2" x 5 2" x 5.7" with low current drain and dozens of features shared with its big brother the K2. The K1 can be built for two HF bands. It comes in a standard configuration of 40 and 20 meters, but other bands are being made available as well. It will also have a number of modules to further enhance features and performance. The K1 is destined to be stuffed into any brief case and backpack. It is now shipping at an initial cost of $269 for the basic unit.

For more information on either of these transceivers, contact Elecraft at PO Box 69, Aptos, CA 95001-0069. Phone (831) 662-8345, Fax (831) 662-0830 or at their website **www.elecraft.com**.

❖ Uncle Skip's Contest of the Month

THE ARRL Sweepstakes (SSB) November 18, 2100 UTC through November 20, 0300 UTC. "CQ Sweepstakes CQ Sweepstakes" This is one of the "Big Ones." Everybody will be on the bands and conditions haven't been this good in years, especially on 10 meters. Jump on in and fill your log book.

Clem Small, KR6A
email: clemsmall@hotmail.com

Give Yourself an Antenna Book for Christmas

Christmas is getting close, and you might just want to get yourself a nice present to complement your radio hobby. Or, someone who cares for you might just be looking for a suggestion as to what you want old St. Nicolas to put in your stocking. Now is the time to let them know just what you'd like.

As you may know antennas are one of the things radio hobbyists can build for themselves with excellent results. So let's take a look at some of the books that can help you build and utilize antennas for your monitoring, hamming, scanning, AM BCB DXing, or radio experimenting.

You'll note that most of the books I reference below are directed primarily to radio amateurs. One reason for this is that there are many more books on antennas in the ham literature than in the SWL and monitoring literature. Another reason is that, in my opinion, books written for SWLs and monitoring enthusiasts tend to give too little information; they leave unanswered many of the questions that a hobbyist with much curiosity about their hobby will want answered. And so, although the books which I discuss below are mainly oriented toward amateur radio operators, they can give any radio hobbyist very useful information on how to understand, construct and utilize antennas.

❖ ARRL Publications

I'll start with one book which, although it has good material on antennas, feedlines, and wave propagation, actually covers much more than antenna-related topics. The book is the *ARRL Handbook for Radio Amateurs*. "ARRL" stands for "American Radio Relay League."

This book covers a really wide spectrum of information of use to the radio amateur, SWL, DXer or other radio hobbyist. Expect to find chapters on operating practices, construction techniques, how to understand and build receivers, antennas, transmitters, information on signal propagation, basic electronic theory as well as basic electronic design information, and much more. This handbook is an invaluable reference book for the radio hobbyist. If you have only one book in your radio library this should be it.

The *ARRL Antenna Book* is arguably the best antenna book published for hobbyists, and it is also quite useful as a practical reference for technicians and engineers. If you want a thorough grounding in antennas and related topics this book is an excellent choice. But, I should add that it is probably not the place to start antenna study unless you are of a technical bent and have time to study this over a lengthy period. On the other hand, this book has a wealth of how-to information on many, many different antennas – you can use it as a great how-to book even if you are not into studying the reasons behind the antenna designs you build.

ARRL publications can be obtained via **http://www.arrl.org/catalog/?category=Antennas%2FTransmission+Lines**, or by writing: American Radio Relay League, 225 Main St, Newington, CT 06111-1494, USA, Phone: 860-594-0200

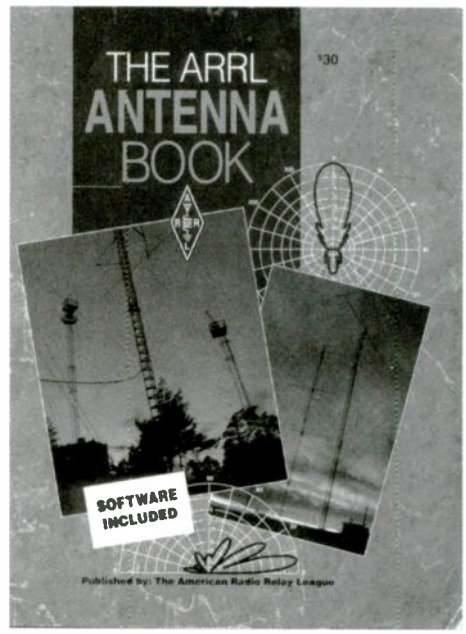


Fig. 1. An ARRL Antenna Book. This book is filled with practical antenna information as well as technical information on antenna functioning.

❖ An RSGB Publication

From "across the pond," the Radio Society of Great Britain (RSGB) has a number of antenna publications, and the flagship of their line is Moxon's *HF Antennas for All Occasions*. This book does not present as much theory as does the *ARRL Antenna Book*, but it has a wealth of practical discussion and how-to information for persons wanting to build their own antennas. RSGB publications are available from the ARRL addresses given above.

❖ Bill Orr

The series of antenna books by Bill Orr contains a number of useful and practical antenna books. These are very highly recommended for folks who want to build their own antennas. The books are small, and usually each one covers a specific type of antenna (i.e. HF Antennas, VHF antennas, beam antennas, wire antennas, etc.). If they were all bound together as one book they would be a very impressive practical antenna handbook. Orr's *W6SAI Antenna Handbook*, and perhaps his other works, are available from: CQ Communications, 25 Newbridge Rd., Hicksville, NY, 11801, 561-681-2922.

❖ Joe Carr

Joe Carr has many good books on radio and antennas. His *Practical Antenna Handbook* is a good source of how-to information on building and using antennas. This, and the other books mentioned this month, should be available from some of the suppliers who advertise in *Monitoring Times* such as Universal Radio.

❖ Kurt N. Sturba and Lil Paddle

As you may know, the field of antenna utilization and design is very broad and complex if you try to understand the basic phenomena underlying the practical utilization of antennas. Due to this complexity it is not at all uncommon for persons writing about antennas to be somewhat confused, and make statements that need correcting. On such occasions the fearless duo of Kurt N. Sturba and Lil Paddle jump gleefully into the fray to protect the innocent and correct the erring writers.

In addition, there are commercial antenna manufacturers who should know better, and yet they sometimes make totally exaggerated and unrealistic claims for their antenna's performance. Once again our intrepid defenders of antenna truth come to the rescue of innocent readers by exposing the errors made by these manufacturers.

You can learn from these entertaining and informative writers by subscribing to "Worldradio" magazine and reading their column Aerials. Or you can buy one of their books (*Aerials I, Aerials II*, and *Aerials III*). The recently published *Aerials III* follows in the tradition of the first two books of the series as a compilation of Kurt and Lil's past columns in "Worldradio."

To get some lessons on some of the things folks frequently get wrong about antenna-related topics this book is worth the reading. By the way, if you get a copy, be sure to read page 87 very carefully. For these publications check with Worldradio Books, P.O. Box 189490, Sacramento, CA, 95818.

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.

This Month's Interesting Antenna-Related Web site:

Just for fun you can try: **http://people.a2000.nl/jkolk/sp9803.html** to see what fun can be had with a cat's whisker for an antenna.

For less whimsical antenna information try: **http://www.borg.com/~warrend/guru.html** and, so the title claims, become an antenna guru!

❖ National Radio Club

The National Radio Club is dedicated to monitoring and DXing on the medium wave band (300 kHz to 3 MHz). They have many interesting practical papers and booklets on antennas listed on their website **http://nrcdxas.org/**, or you can write for their catalog from: National Radio Club Publications Center, P.O. Box 164, Dept. WWW, Mannsville, NY 13661-0164 U.S.A. Include a first-class stamp.

❖ And So

The books discussed above will give you a lot of help in selecting and making your own antennas. It's hard to beat the thrill of using a station when you've actually built some of the equipment yourself. And antennas are one of the best home-brew projects you can choose.

RADIO RIDDLES

Last Month:

I said: "OK, so that's one definition of the radio horizon. Now what is the radio ground? Is it the earth we walk on? Maybe, in a way, maybe."

Well, the surface of the earth is not usually very conductive unless it's covered with salt water. And so radio waves encountering the ground don't find much of a conductive path in ordinary earth. On the other hand, earth is conductive to a degree and RF currents do travel in the earth.

However, the conductivity of the earth is so low that it appears that a wave which encounters the earth's surface has actually encountered a conductive medium at some distance below the surface of the earth. The "electrical ground" is then said to be at that distance below the earth's surface. In some older literature this electrical ground is called "radio ground."

This Month:

Well, we've just talked about radio horizons, and radio grounds. Now what is "radiovision?"

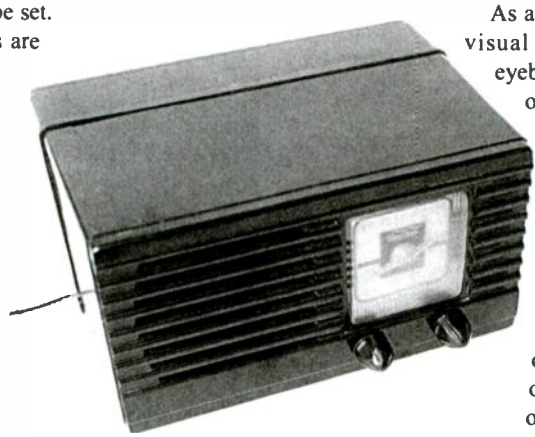
You'll find an answer for this month's riddle, another interesting, antenna-related web site, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Marc Ellis
email: mfellis@enteract.com

Restoring Your First Set

If you've been following the column for the last couple of issues and have set yourself up for restoration work as suggested, you should now be ready for your first project. I'd suggest that you take on a small ac-dc set (see the June and July columns for background information). Pick a model no older than late 1930s; tipoffs are a Bakelite case and an "All-American Five" tube set.

Radios like this are very common at antique radio meets, and I would think that some careful shopping would net you one for under $20.00. Also, the tubes and parts you might need are readily available. With very little cash at stake and only minimal demands on your time, you can delve into this type of set with minimal risk and a free mind.



Duplicate my work on this little Philco in your own ac-dc restoration project!

❖ Introducing the Patient

I selected an ac-dc set from my own collection to restore along with you. It's a Philco Transitone Model TH-something (the paper tag is ripped) and may date from the 1940s. I picked the Philco because I thought it was (at least among sets of this genre) a little jewel. I liked its very compact size and clean styling. I also found it interesting that the entire back of the set is enclosed in a neat Bakelite box which – when installed – is continuous with the cabinet proper. This is quite an unusual feature; most ac-dc set backs are of flimsy cardboard – usually in some stage of deterioration by the time we restorers get our hands on them.

A "semi-mini" model like this (front panel size 8-1/4" by 5") may not be the best one for a newcomer because space under the chassis is a little cramped. However, you'll certainly be able to duplicate my operations on your own larger set; they'll just be easier.

When I opened up the Transitone for a first look, I was a little surprised to see that it is not a classical "All-American Five." Given the Philco brand name, I shouldn't have been surprised and I'll explain in a minute. Briefly, I considered putting this radio aside and picking one with the standard 12SA7, 12SK7, 12SQ7, 50L6 and 35Z5. However, working with the Philco tubeset is little different in principal than working with the "All American Five," and it will give me a chance to expand your knowledge of tube lore.

As always, I gave the set a visual once-over, just eyeballing it for evidences of trauma (charred parts and the like) and signs of repair or tampering. I did find the radio to be pleasantly clean, and the only sign of charring was on the paper socket layout label – obviously from the heat of adjacent tubes. Some of the set's rubber-covered hookup wire was brittle and flaky – and a previous repairman had added electrical tape to cover some of the worst spots.

I also noted that a few of the capacitors (including the electrolytic filter capacitor) had been replaced. The work of this previous repairman was neat enough, but it was pretty obvious to see where he had been! He also left his mark via the addition of a small power resistor (pencil-marked 500 ohms) secured to the top of the speaker frame by a small bracket screwed into an existing tapped hole.

The only other mystery (at least to me) about the set was a small metal box with a soldered-on cover mounted under the chassis. Several leads (four that I can spot easily) emerge from it, and it may be the set's oscillator coil. Normally I'd never bother to look up the schematic on a small ac-dc set like this, but I'll have to in order to find out what's inside.

❖ About Those Tubes

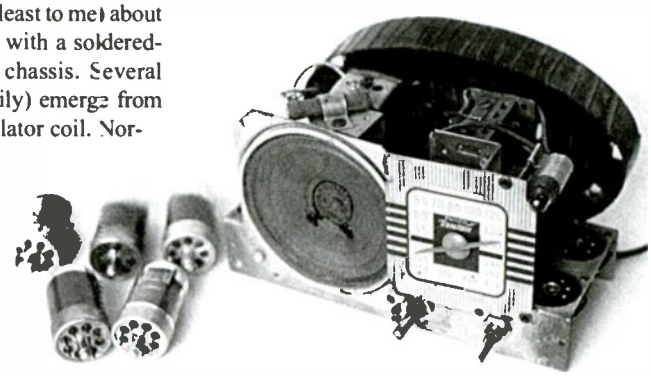
Instead of the "All American five" tube set, I found the following types shown on the socket layout chart: 7C6, 7B7, 7A8, 35A5, 35Z3. These are "Loktal" tubes, a type developed by Sylvania for Philco as a result of the latter company's rivalry with RCA. The rivalry erupted with RCA's release, with great ballyhoo, of its new line of metal tubes.

Those tubes were equipped with the then-new "octal" base (as used on the "All American Five,") which was fast becoming an industry standard. As the name suggests, octal bases had eight pins (or at least locations for eight pins; unused pins were not always installed). Protruding just below pin level was a Bakelite cylinder that slipped into a circular opening in the center of the tube socket. The cylinder was equipped with a locating key that slipped into a matching keyway in the tube socket hole.

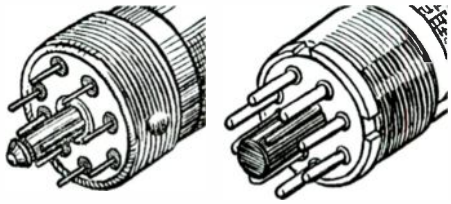
The Loktals developed by Philco to buck the trend were all-glass tubes. They also had eight pins (or places for eight pins), but the pins were not molded into a Bakelite base as with the octals. Instead, they were sealed into the glass envelope of the tube, being directly connected with the elements inside.

The only function of the Loktal's small metal base (which slipped around the pins without contacting them) was to carry a keyed locating cylinder similar to that on the octal design. However, this cylinder was made of metal and served as a ground connection for the tube. And it incorporated yet another novel twist: it carried a grooved circular indentation. When installed in its socket, a spring-loaded detent in the socket base slipped into the groove and locked the tube firmly in place.

Philco heralded the Loktal as a cutting-edge



Here's the set stripped of its cabinet and tubes in preparation for some basic housekeeping procedures.



Side-by-side comparison shows difference between Loktal (at left) and octal sockets. See text for details.

design and a marvel of reliability. Though the integral tube pins did cut r.f. losses (probably unimportant in broadcast sets) and were certainly a precursor of the glass miniature tubes to come, the release of the Loktal seems to have been pretty much a non-event. As far as I can see, the much-vaunted locking feature was an unnecessary frill; standard octals rarely worked loose from their sockets, even in auto sets where vibration could have created problems.

A word about Loktal nomenclature. With octal types, the first digit or two indicated the heater voltage: 6SA7 = six volts; 12SA7 = 12 volts. As a convenient way to differentiate Loktals from octals, 6-volt Loktal type numbers began with a "7" instead of a "6;" 12-volt type numbers began with a "14" instead of a 12. Heater voltages for the higher voltage types (such as the 35A5 and 35Z3 indicated for this set) are shown in the normal way. Apparently, with these less numerous tube types, the standard numbering system could accommodate unique designations without resorting to the voltage trick.

The 7C6 tube in this Philco set is a detector/audio amplifier analogous to the 12SQ7 in the "All American Five" set. The 7B7, used as the i.f. amplifier, is analogous to the 12SK7. The 7A8 is a mixer, or converter, tube like the 12SA7; the 35A5 is a beam power amplifier like the 50L6; and the 35Z3 is a rectifier analogous to the 35Z5.

Unlike the heaters in the "All American Five" group, the Philco tube heaters do not add up to the full line voltage. Hence a power resistor must be included in the series string. Installed in a flat metal housing, this resistor is mounted in the inside of the front chassis apron.

❖ Tube Checking

After a general "eyeball" once-over, my next step in a restoration such as this is to remove the tubes from their sockets, make sure that the right type was installed in each socket, and check each tube. Removing Loktal tubes from their sockets, especially those that have been untouched for many years, can be a bit of a trick. Not only does the spring detent lock require a little extra pressure to release, but the sockets and tube pins seem to be a little more susceptible to corrosion than the more common octal types.

When unseating a Loctal, NEVER attempt to rock the tube out of its socket by pulling on the glass envelope. You might very well loosen the cement (now very old, of course) holding the base to the glass. Instead, work a small screwdriver between the bottom of the base and the socket and gently apply pressure at several points on the periphery. If you don't find a "sweet spot" that pops the detent and unlocks the tube, try prying simultaneously with a second screwdriver at another point on the periphery.

Don't forget to remove and check the pilot light also. In some hookups, a burned-out pilot light can hasten the burnout of a tube (such as the 35Z5) having a pilot-light tap.

Although I do own a good tube checker, this time I did my checking as I recommend that you do at this stage in your experience. I used the lowest ohmmeter range on my multimeter to check for continuity across the filament pins. And, though I believe I neglected to mention it earlier, your workbench equipment should include a tube manual so that you can identify the pinouts of the tubes you run across. Original manuals can still be found at reasonable prices at antique radio swap meets, but they are also available from several sources as reprints.

If your tube set includes a 35Z5 or other tube having a pilot light tap, be sure to check continuity from the tap to each end of the filament. In my case, all tubes had good filaments and were in their proper sockets, but I did find one substitution made by that long-ago repairman. A 50A5 beam power tube was substituted for the original 35A5. Except for the heater voltage, these tubes are similar enough to be virtually identical.

That change might be the reason for the "mystery" power resistor I found atop the speaker housing. The change in heater voltage would call for a change in the heater string series resistor. We'll find out in due time.

❖ What's Next

You've noticed that, so far, I have made no attempt to plug in this radio. The reason: the paper capacitors in vintage radios are not to be trusted – even the ones that come enclosed in plastic housings. And the electrolytic capacitors (these are the ones with polarity markings and relatively high values such as 20- or 40-ufd) are especially not to be trusted. Even when these sets were in their heyday, the electrolytics weren't considered to be permanent. A shorted capacitor can take with it a tube, i.f. transformer, power transformer, or other expensive or hard to replace part.

I never work on an old radio without replacing all of its paper and electrolytic caps. At first I resisted doing this, because it takes all the fun out of spot-diagnosing a problem radio. When you change all of the caps you really do remove most of the problem sources. It seems almost like dirty pool.

However, I've come to realize that if a radio is worth working on at all it is worth recapping. It is a very small investment giving a very large return in reliability. As this is written, I'm preparing to leave for the Antique Wireless Association Conference in Rochester, NY. Part of the fun there is the major swap meet. I'll take along a list of the caps I need for this project and I'll also look for a 35A5 tube.

See you next time, when we'll recap the Philco, do some essential housekeeping, and try it out.

The Quadraform Medium Wave Receiving Loop Antenna

By Richard Q Marris G2BZ0

The original Quadraform LF Receiving Loop Antenna was published in the November 1999 issue of *MT*. It was intended as an indoor loop to operate under difficult local interference conditions. It covered a frequency range of 120 to 220 kHz.

The unusual design produced a considerable amount of interest. Some readers asked whether it could be modified or redesigned to cover other frequency ranges. As a first result, a modified version was published in the April 2000 issue, which covered the range 148 to 450 kHz. A medium wave version was promised to cover the AM Broadcast Band.

After going back to basics, a new MW model has been produced, and, on the prototype, it covers from 465 to 1655 MHz, to ensure coverage of the area around 500 MHz, which was of particular interest. However, the range can be easily adjusted to cover from 500 kHz. The original mechanical frame design has been adopted again.

❖ The Schematic

This is shown in Figure 1. The winding on the left-hand (L1) is counter clockwise.

The right hand winding (L2) is wound clockwise. They are tuned by a 2-gang variable capacitor 500 + 500 pf (C1A & C1B).

The loop is coupled to the receiver input by a 500 pf preset series trimmer capacitor, via a few feet of RG58 (50 ohms) feedline. This preset is notated C3.

The interwinding coupling capacitor C2, between L1 and L2, is of interest. The value selected gives the best bandwidth and nulling for this location. However, it is well worth trying other values to suit personal needs. Changing the value of C2 should not change the frequency range, providing L1 and L2 are absolutely identical, apart from being wound in opposite directions.

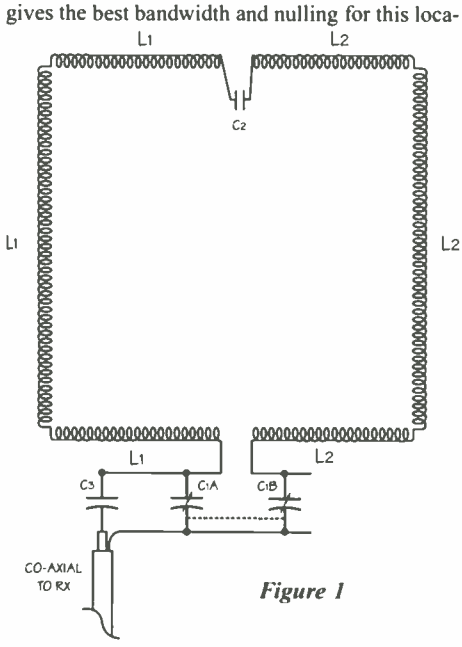


Figure 1

Each winding consists of two horizontal coils (e.g. L1 + L1) in a horizontal plane, joined by a vertical wire. The highest RF voltage will be towards the end of the coils and the high current in the vertical wire component.

❖ Construction

Loop Frame - Figure 2

The frame is constructed of 7/8-in. (22mm) outside diameter white UPVC tubing, as available in larger do-it-yourself stores. Two 6 foot (or maybe 2 meter) lengths will be required: plus 4 x 90 elbows and two wall clips (used later for mounting to base).

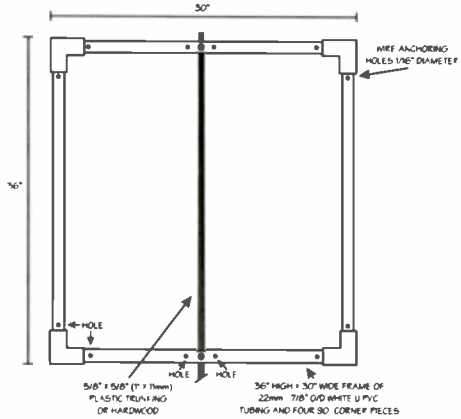


Figure 2

The sides are cut from the lengths of tubing and fitted at each corner with a 90 degree elbow to produce a frame exactly 36-in. high x 30-in. wide (see Figure 2). Small holes are drilled through the tubing at each corner, right against the shoulders of the elbows. These holes are for anchoring the winding wire turns.

A vertical center strut is bolted onto the frame as shown. It is made from a length of 5/8-in. x 5/8-in. (11 mm x 11 mm) white plastic electric trunking or hardwood. It is secured with a nut and bolt at top and bottom. Two wire securing holes are drilled through the tubing up against the strut, as shown.

Loop Winding L1 and L2 - Figure 3

For the winding, a 100 meter roll of 7/0.2mm PVC covered wire (1.2mm o/d). A contrasting color (e.g. black) to the white tubing should be used to facilitate ease of winding.

The vertical center strut should be removed.

L1 is wound *counterclockwise* commencing at the top left hand center wire hole. The winding must be *closewound* along the left-hand side of the top, right up to the shoulder of the left-hand top elbow, and taken through the wire hole at that point (see Figure 3).

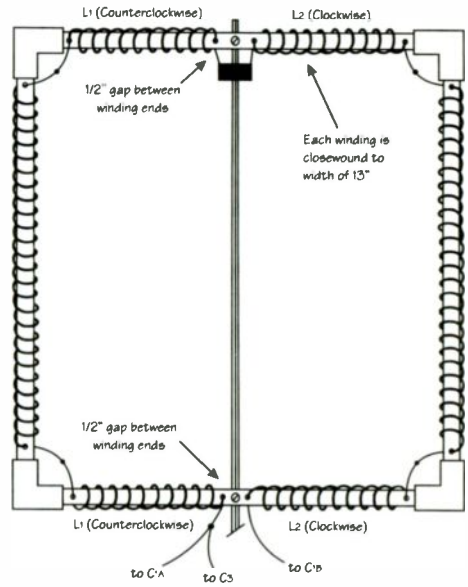


Figure 3

Then proceed down the left-hand vertical side until the bottom left-hand elbow is reached, and then take it through the provided hole. Continue, still winding *counterclockwise* along the bottom left-hand section of the loop frame. Terminate at the provided hole, leaving a tail (see Figure 3).

For L2, repeat the above on the right-hand half of the loop frame and winding clockwise (as Figure 3). Then fit on the vertical strut again.

❖ Loop support structure

This is made of good dry timber as Figure 4. A single side piece of copper clad board 4 x 4 x 1/16 inches provides a chassis plate, as shown, held in place with small woodscrews. An identical size front panel is on the front center (Figure 5A and 5B), and seam soldered to the chassis plate.

C1A and C1B variable capacitor is mounted on the panel/chassis plates and fitted with an optional slow motion drive, dial and knob (Figure 5A). The variable capacitor should be a rigid air-spaced type.

❖ Final Assembly

The finished loop is mounted on the loop support structure (Figure 5), using the two plastic piping wall clips screwed to the mounting board (see Figure 5B). The bottom of the vertical strut should be precut to fit, and wood screwed to the back of

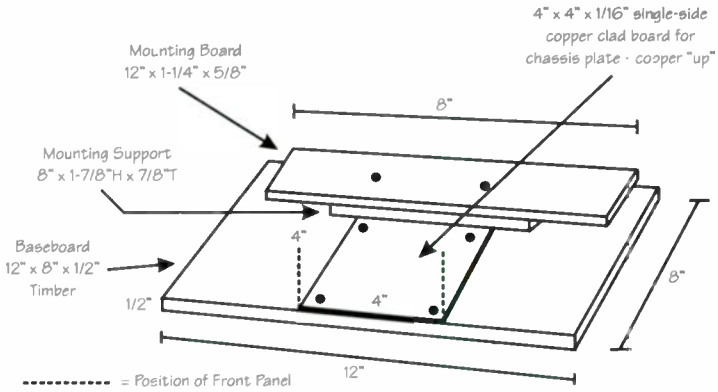


Figure 4

the support board.

C3 is taken from C1A or C1B (see later) to the coaxial feedline, with the feedline outer braid being soldered to the chassis plate. The feedline is cleated to the baseboard (Figure 5) and should be as short as convenient.

❖ Testing and Operation.

Ensure that the L1 and L2 windings are of equal size. They should be closewound to a winding width of exactly 13 inches. On the prototype this produced a frequency range of 465 to 1655 kHz.

Connect the 1000 pf capacitor C2. Just hook it in to start with, as you may wish to change the value, once the initial tests have been completed.

The loop will normally stand on a flat non-metal surface, alongside the operating position, so that the tuning capacitor can easily be adjusted. No grounding is required at the loop. Grounding the receiver for safety purposes should take place at the receiver.

With the loop connected to the receiver with a few feet of RG58 feedline, a station should be selected around mid-frequency range. Rotate the loop tuning capacitor until a positive increase in signal strength occurs. Rotate the loop on its axis for maximum signal, which will be when the turns of the loop are edge on to the station being received. Next rotate the loop through 90 degrees to test the nulling.

Assuming the above is satisfactory, then establish the frequency range of the loop on a calibrated receiver. It should be approximately as the prototype. If it is required to increase the frequency range at the HF end to 1700 kHz or a little higher, then this can be achieved by removing a few turns off the windings. This should be done by removing two turns at a time from the L1 and L2 windings. This should be done at the outer end of each coil adjacent to the 90 degree bend in the frame of the loop. Then check the frequency range again as previously described. If necessary, remove two more turns from each winding, until you are happy with the resulting frequency range.

Coupling Capacitor C3 should be carefully adjusted by increasing the capacity for maximum signal. Over-coupling will be indicated by a sudden increase in bandwidth. This should be done at various points on the frequency range until a satisfactory coupling has been achieved.

The intercoupling capacitor, C2, between the two windings was selected for best results at the author's location, with a value of 1000 pfs, helping to eliminate a particularly nasty piece of local manmade interference. The loop gives a sharp 100 percent nulling at right angles to the source of interference. The value of C2 can be experimented with, using values between about 350 pf and 1500 pf. This will give a small change to the bandwidth and nulling. It should not affect the frequency range, more than a very few kHz. If it does, then this invariably means that the L1 and L2 coil structures are not identical and should be rechecked.

The prototype has produced excellent nulling and interference rejection, whether man-made or from other stations. A preamplifier may be needed, depending on the RF gain of the receiver. Personally this has not been needed, due to using a high gain receiver. Wide-band preamplifiers are readily available at low prices. For the home constructor a multitude of circuits can be found in textbooks and magazines.

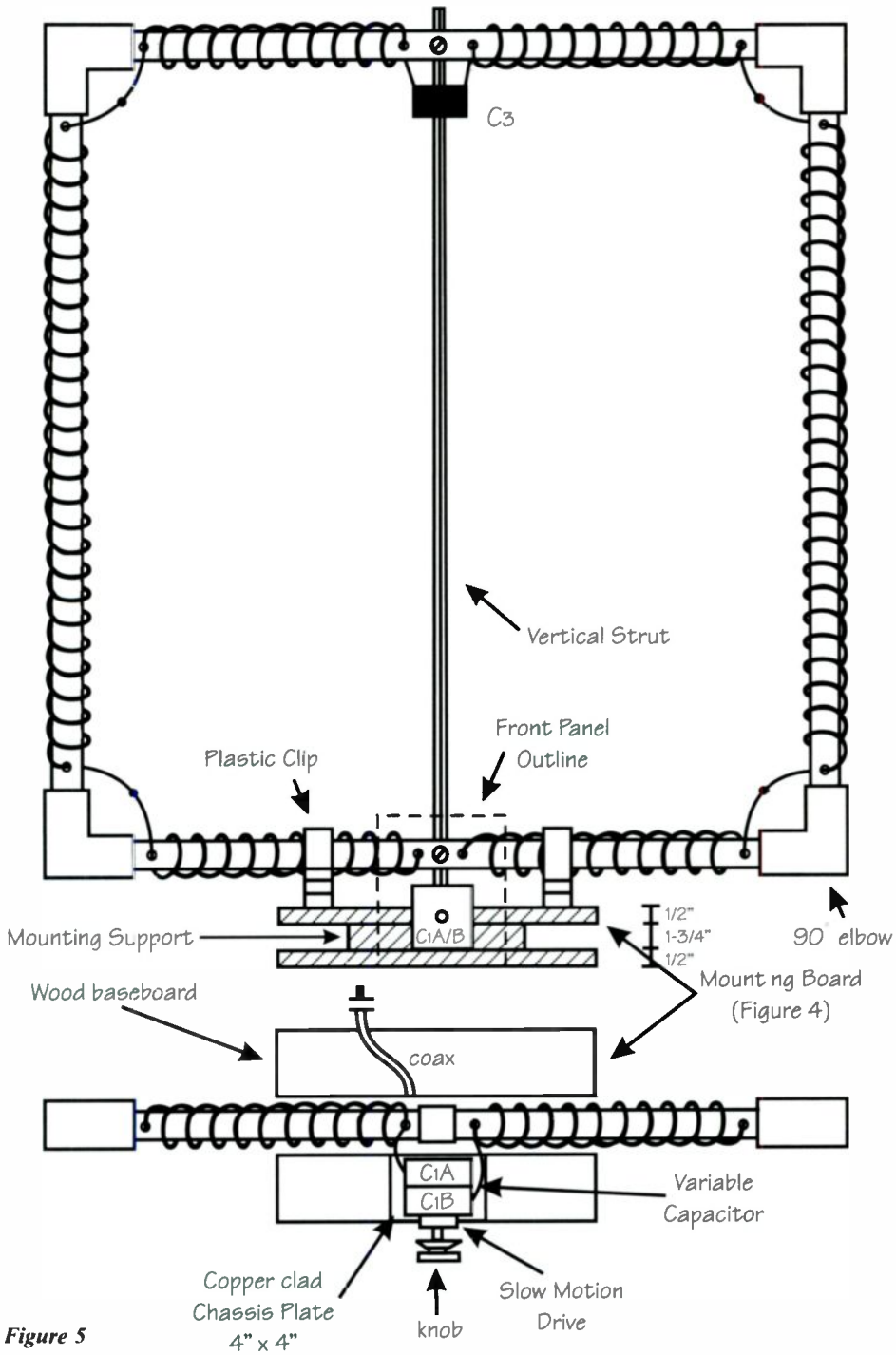


Figure 5

John Catalano, PhD
j_catalano@conknet.com

Where the Internet and Radio Monitoring Converge - On-Line Frequency Files and Databases

One of the best uses of the Internet is the sharing of timely information – its original reason for being. The Internet grew out of the need that universities and government agencies had to share information around the world. Well, since those early days in the seventies the Internet has developed many different purposes: some good, some not so good. For monitoring enthusiasts this data transfer ability translates into sharing active frequencies in the form of databases. Let's try a few sites that can reduce your search time and increase your listening pleasure.

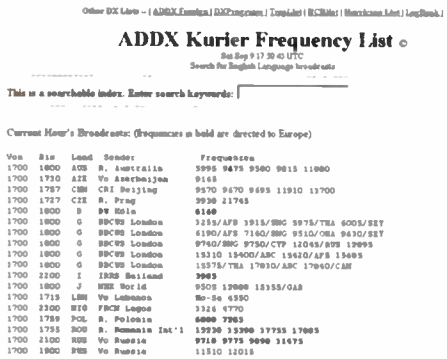


Figure 1 - Simple and Useful - ADDX Kurier's Only Screen

On-line Shortwave Frequencies

Although I started SWLing in the late fifties it wasn't until the 1970s that I discovered and joined SPEEDX. The organization was a group of SWLers who shared frequencies monthly via mail. Although it doesn't sound exactly timely, SPEEDX provided listeners with many more "eyes" into the radio world below 30 MHz. Today you can find SPEEDX at **http://www.cybercomm.net/~slapshot/speedx.html** with lots of monitoring links.

One of these links is to my favorite shortwave broadcast database, ADDX Kurier Frequency List at **http://raven.cybercomm.net/cgi-bin/cgiwrap/~slapshot/addx.sh**. I keep a link to this site on my "Personal Favorites" bar which is always displayed on my browser. When you go to the site it will display a list of stations currently on the air, at the actual GMT time. Figure 1 shows part of a list sorted alphabetically. Type the name of a station that you wish to hear in the box in the top center. The frequencies which the station is scheduled to be transmitting at that exact time will be displayed. The ADDX is simple, easy and quick to use with no file download required.

Clicking on **http://daniel-sampson.tripod.com/shortwave/time.html** will bring you to Prime Time Shortwave, where you can search English shortwave broadcasts schedules to North America. This site simply displays the frequencies, without the capability of database search or sort.

The WWW Shortwave Listening Guide at **http://www.anarc.org/naswa/swlguide/** is definitely worth a look, Figure 2. It also has a simple user interface where the broadcast stations which are scheduled to be on the air at the exact time and day of the query, will be displayed. However, if you wish to do some forward planning the schedule for a given type of program, on a given day, can be brought to the screen. There are forty plus program type categories that you can search.

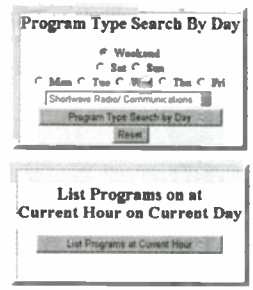


Figure 2 - The WWW Shortwave Listening Guide's Easy User Interface

Utility Station Info On-line

Intercepting utility signals and decoding RTTY, SITOR, FEC and alike, can be challenging and exciting stuff. But, for me, identifying the source of the signals completes the process. For this try going to **http://web.inter.nl.net/hcc/Shortwave/Cover.htm**, the Dutch-based shortwave radio publication's site for a list of utility station call letters and identifiers. This file uses the Adobe Acrobat program that can be downloaded for free from a number of sites. At this site you will also find a number of shortwave utility stations and their frequencies. This part of the site is under construction and the categories are a bit limited, but worth a look.

Some for the Scanner Buffs

Unlike shortwave, the propagation lengths of VHF/UHF signals are usually much shorter. Therefore, information must be customized to the geographic location of the listener. The Long Island Area Scanning Resources web page has been a long time source of local VHF/UHF stations in the northeast USA. It is a simple list of frequencies and users, based on state and county. Although no database functions are available, the lists are a useful start. The website is located at **http://www.fordyce.org/scanning/index1.html** .

PerCon, a long time name in frequency databases, has an on-line database, at **http://www.perconcorp.com/scripts/foxweb.exeprocmenu?\0\FCC\SPECTRUM\SPECTRUM\SPECTRUM**. This one is for everyone in the USA and Canada. This site is a true, full-function database that allows you to sort and search on a number of parameters including: callsign, frequency, frequency range, name, city, county, state, radio service and multiples of some parameters. The user can choose a number of forms of search output. Figure 3 is the "brief" form of the output. The "map" output provides the latitude and longitude of each station.

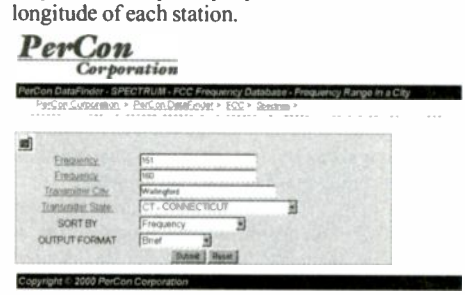


Figure 3 - PerCon's Comprehensive, Yet Simple, Database

If you have a recent ICOM receiver, such as an R2 or IC-R1000, another page on this site will output the results of your search as a file formatted for your receiver. The file can then be directly loaded into your ICOM receiver. This saves lots of time and possible conversion problems.

All PerCon databases cover the full radio spectrum, down through the AM (medium wave) band. But, because the results are localized transmitter sites, they are not very useful for international shortwave broadcasts. However, some strange USA domestic shortwave station owners are included in the database, which could make for interesting listening.

On the "Air"

Finding civil aviation frequencies in the area of specific airports is quick and easy if you click on The Airport Guide at **http://208.165.194.175/mapping/apt/aptsel.cfm** . Civil and military air frequencies, maps, runway information and nearby airports is everything you'll need to do serious aviation monitoring.

The Worldwide Airport Path Finder Web site is a more complex, but provides routing, communications and navigational frequencies for a flight between any two airports in the world! You can get help with your aircraft monitoring by clicking on **http://www.fallingrain.com/air/airports.cgi?NEW=1** .

❖ US Commercial Broadcasters

The FCC (Federal Communications Commission) maintains a website which has databases for commercial AM, FM and TV stations in the USA. Each type can be sorted on a number of different parameters. You can start with their FM station database at **http://www.fcc.gov/mmb/asd/fmq.html** .

❖ The Internet on the Internet

And finally, coming full circle, using audio streaming, many commercial and shortwave stations "broadcast" on the web. One web site that will provide you will a database of Internet radio stations is ILGRadio: IBWD - International Broadcasting Web Directory at **http://www.ilgradio.com/ibwd/** . Obviously, this is not the place to look for rare DX stations. However, if you want to get different perspectives on world affairs, world sporting results or shortwave frequency information, you will appreciate Internet international "broadcasts."

❖ From Database to Radio Program

The data from many of the web sites we have looked at this time can be copied directly into receiver control programs using data import programs. Or, for some applications, they can simply be used via standard cut and paste techniques.

I've been asked many times, by everyone from the *MT* editor to readers and even one of my family members, "Why don't you review a program which converts database data into data that can be used by various radio control programs?" While my answer is simple, the programs are not!

In my opinion, there is not a conversion program that is simple and straightforward to use. This is not a short-coming of conversion program writers. Rather, it is a result of the many various data forms that the databases can use and the corresponding myriad of radio program data formats. Don't get me wrong. If you are a practiced database programmer, you could probably successfully convert 90% or more. But for the rest of us, who want a click-the-button conversion, that does not exist.

I suggest you first determine the data format of your favorite radio control program. Then attempt to find databases which match. Alternatively, you can almost always use a cut and paste technique. First copy the frequency data from the database using Windows Copy. Then Paste this into a new NotePad document, which will save it as a text file. Then have your radio program read the text file. Although you may not get all the station information, at least you will have the new frequency list.

❖ Dream On

Ideally, how should the conversion program work? Take a look at a program called Conversions Plus, which is useful in converting between graphics and word processing formats. It automatically identifies the format of the source file and then converts it into a different "standard" format type. Now, if a Conversions Plus type of program could be produced which could simply and automatically "learn" radio program data formats, life would be much easier for us.

Now, don't all you programmers out there start sending me copies of your current database conversion programs. No matter what you think, to the majority of the users, they don't hit the mark! And don't start griping over my remarks: use some of that energy to develop a new generation of "smart," convenient conversion programs. Anyone who has really developed a new conversion program which is totally automatic and which works for all the popular radio control programs, should share it with us. Perhaps it will take a new crop of programs, without commercial allegiance to any one radio program product, to make the evolutionary jump.

❖ "Search Unsuccessful"

There is a professional management dictum that states, "There are three types of information: Correct information, Wrong information and No information. The worst is wrong information because it wastes valuable time without a chance of success."

Remember that the Internet is a dynamic place with sites opening, closing, updating and moving every minute. So don't be surprise by changes to site addresses. Also, always check the site for the date it was last updated to assess the validity and freshness of the information. This is only a slight inconvenience compared to the wealth of monitoring data which is at our fingertips via the Internet.

Ian Poole, G3YWX

What is receiver dynamic range?

Sensitivity is one of the main specifications people look at when buying a receiver. However, the sensitivity of a set is by no means the whole story. The specification for a set may show it to have an exceedingly good level of sensitivity, but when it is connected to an antenna its performance may be very disappointing because it is easily overloaded when strong signals are present, and this may impair its ability to receive weak signals.

The overall dynamic range of the receiver is very important. It is just as important for a set to be able to handle strong signals well as it is to be able to pick up weak ones. This becomes very important when trying to pick up weak signals in the presence of nearby strong ones. Under these circumstances a set with a poor dynamic range may not be able to hear the weak stations picked up by a less sensitive set with a better dynamic range. Problems like blocking, intermodulation distortion and the like within the receiver may mask out the weak signals, despite the set having a very good level of sensitivity.

What is dynamic range?

The dynamic range of a receiver is essentially the range of signal levels over which it can operate. The low end of the range is governed by its sensitivity, while at the high end it is governed by its overload or strong signal handling performance. Specifications generally use figures based on either the intermodulation performance or the blocking performance.

Unfortunately, it is not always possible to compare one set with another, because dynamic range like many other parameters can be quoted in a number of ways. However, to gain an idea of exactly what the dynamic range of a receiver means it is worth looking at the ways in which the measurements are made to determine the range of the receiver.

Sensitivity

The first specification to investigate is the sensitivity of a set. The main limiting factor in any receiver is the noise generated. For most applications either the signal to noise ratio or the noise figure is used, as described in the October issue of *MT*.

However, for dynamic range specifications, a figure called the minimum discernible signal (MDS) is often used. This is normally taken as a signal equal in strength to the noise level. As the noise level is dependent upon the bandwidth used, this also has to be mentioned in the specification. Normally the level of the level of the MDS is given in dBm i.e. dB relative to a milliwatt and typical values are around -135 dBm in a 3 kHz bandwidth.

Strong signal handling

Although the sensitivity is important, the way in which a receiver handles strong signals is also very important. Here the overload performance governs how well the receiver performance.

In the ideal world the output of an amplifier would be proportional to the input for all signal levels. However, amplifiers only have a limited output capability and it is found that beyond a certain level the output falls below the required level because it cannot handle the large levels required of it. This gives a characteristic like that shown in Fig. 1. From this it can be seen that amplifiers are linear for the lower part of the characteristic, but as the output stages are unable to handle the higher power levels, the signals starts to become compressed as seen by the curve in the characteristic.

The fact that the amplifier is non-linear does not create a major problem in itself. However, the side effects do. When a signal is passed through a non-linear element there are two main effects which are noticed. The first is that harmonics are generated. Fortunately, these are unlikely to cause a major problem. For a harmonic to fall near the frequency being received, a signal at half the received frequency must enter the amplifier. The front end tuning should reduce this by a sufficient degree for it not to be a noticeable problem under most circumstances.

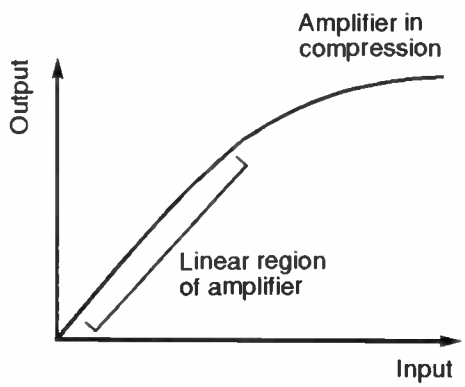


Fig. 1 A typical amplifier characteristic

The other problem that can be noticed is that signals mix together to form unwanted products. These again are unlikely to cause a problem, because any signals which could mix together should be removed sufficiently by the front end tuning. Instead, problems occur when harmonics of in-band signals mix together.

Third order products

When harmonics of in-band signals mix together they may produce a comb of signals as shown in Figure 2, and these may just fall on the same frequency as a weak and interesting station, masking it out so it cannot be heard.

It is simple to calculate the frequencies where the spurious signals will fall. If the input frequencies are f_1 and f_2, then the new frequencies produced will be at $2f_1 - f_2$, $3f_1 - 2f_2$, $4f_1 - 3f_2$ and so forth. On the other side of the two main or original signals, products are produced at $2f_2 - f_1$, $3f_2 - 2f_2$, $4f_2 - 3f_1$ and so forth as shown in the diagram.

These are known as odd order intermodulation products. Two times one signal plus one times another makes a third order product; three times one plus two times another is a fifth order product, and so forth. It can be seen from the diagram that the signals either side of the main signals are first the third order product, then fifth, seventh and so forth.

Here's an example with some real figures. If large signals appear at frequencies of 30.0 MHz and 30.01 MHz, then the intermodulation products will appear at 30.02, 30.03, 30.4 ...MHz and 29.99, 29.98, 29.97 ..... MHz.

Blocking

Another problem that can occur when a strong signal is present is known as *blocking*. As the name implies, it is possible for a strong

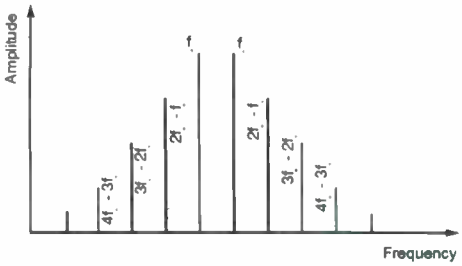


Fig. 2 Intermodulation products

signal to block or at least reduce the sensitivity of a receiver. Have you ever been listening to a relatively weak station when a nearby transmitter starts to radiate (transmit) and the wanted signal reduces in strength? The effect is caused when the front-end amplifier starts to run into compression. When this occurs the strongest signal tends to "capture" the amplifier, reducing the strength of the other signals. The effect is the same as the capture effect associated with FM signals.

The amount of blocking is obviously dependent upon the level of the signal. It also depends on how far off channel the strong signal is. The further away, the more it will be reduced by the front end tuning and the less the effect will be. Normally, blocking is quoted as the level of the unwanted signal at a given offset (normally 20 kHz) to give a 3 dB reduction in gain.

Dynamic range definition

When looking at dynamic range specifications, care must be taken when interpreting them. The MDS at the low signal end should be viewed carefully, but the limiting factors at the top end show a much greater variation in the way they are specified. Where blocking is used, a reduction of 3 dB sensitivity is normally specified, but in some cases 1 dB may be used. Where the intermodulation products are chosen as the limiting point, the input signal level at which they become the same as the MDS is often taken.

Whatever specification is given, care should be taken to interpret the figures, as they may be subtly different in the way they are measured from one receiver to the next. In general, where intermodulation is the limiting factor, figures of between 80 and 90 dB range are typical, and where blocking is the limiting factor, figures around 115 dB are typical in a good receiver.

Designing for optimum performance

It is not an easy task to design a highly sensitive receiver that also has a wide dynamic range. To achieve this performance a number of methods can be used. The front-end stage is the most critical in terms of noise performance. It should be optimized for noise performance rather than gain. Input impedance matching is critical for this. It is interesting to note that the optimum match does not correspond exactly with the best noise performance. The amplifier should also have a relatively high output capability to ensure it does not overload.

The mixer is also critical to the overload performance. To ensure the mixer is not overloaded there should not be excessive gain preceding it. A high level mixer should also be used (i.e., one designed to accept a high-level local oscillator signal). In this way it can tolerate high input signals without degradation in performance. Care should be taken in the later stages of the receiver to ensure that they can tolerate the level of signals likely to be encountered. A good AGC system also helps prevent overloading and the generation of unwanted spurious signals.

A receiver with a good dynamic range will be able to give a far better account of itself under exacting conditions than one designed purely for optimum sensitivity. Ham radio contest operators are particularly aware of this aspect of a receiver's performance and will ensure any sets they use have a good dynamic range.

Further information about amateur radio and radio in general can be found at **http://www.radio-electronics.com**

Bob Parnass, AJ9S
parnass@megsinet.net
www.megsinet.com/parnass

AOR AR-3000A

The AOR AR-3000A is not a new receiver. It was introduced in the mid 1990s and will likely be replaced by the AR-8600, shown at the 2000 Dayton Hamvention. The odds are that you are not familiar with the AR-3000A. The $1000+ price tag and relatively small number of dealers may explain why Americans own fewer AR-3000As than other receivers. Nonetheless, the AR-3000A is held in high regard by its owners and we tested an AR-3000A to learn why.

The AR-3000A covers an extremely wide part of the radio spectrum, from 100 kHz to 2036 MHz. The step size is programmable between 50 Hz and 999.95 kHz in increments of 50 Hz. A small "x10" pushbutton increases the step size by a factor of 10, making the largest step size 9.9995 MHz. Step size flexibility makes the AR-3000A useful for monitoring radio and television systems employing uncommon channel spacing, e.g., 6.25 kHz, 7.5 kHz, or 6 MHz. Reception modes include narrow FM, wide FM, AM, USB, LSB, and CW.

Memory, Scanning, and Searching

The AR-3000A has one VFO, termed "dial mode," and 400 channels divided among four banks of 100 channels each. The 100 channel bank size is too large and we would have preferred 10 banks of 40 channels each. Frequency, tuning step size, mode, and attenuator setting are programmed into each memory.

You can tune the VFO or scroll through the memory channels using a front panel tuning knob. The knob is rubber padded and turns smoothly, without detent, making it easy to tune around the HF bands or well into the UHF region. A "slow" pushbutton cuts the number of tuning steps per knob revolution by a factor of 5. Our radio makes a "chuffing noise" when tuning the knob in NFM or WFM modes with the squelch open.

You can scan memory channels, but only a single bank at a time. Global rescan delay is adjustable between 0 and 9 seconds. Memory channels may, of course, be locked out from the scan list. Our radio measures a pokey 11 channels/sec while scanning a mixture of AM and NFM memories in different bands.

The first channel (00) of the active bank may be designated a priority channel and that channel can be checked for activity every 1 to 19 seconds, depending on user preference.

Four pairs of frequency limits may be programmed for limit searches. Up to 100 frequencies may be locked out, or "passed," in each limit search bank.

Other Features

The AR-3000A LCD display shows the frequency and all other indicators, including a 9 segment S-meter and a 24 hour clock. You must be positioned above the radio to read the display; therefore, we couldn't read the display with the radio resting on a shelf at eye-level. While the display is backlit, the keypad is not. We found the white and brown keypad lettering almost impossible to read against the silver panel unless the room lighting was just right.

An internal lithium battery allows the digital clock to remember the time when power is interrupted. One can set the AR-3000A to turn on at a given time or turn off after a "sleep" interval, but we didn't use this feature.

A global frequency offset facility, which AOR terms "shift," adds or subtracts a preprogrammed offset to the current frequency at the push of a button. This is handy for monitoring repeater inputs or communications which take place between two stations on different frequencies, e.g., VHF-high band taxis.

The AOR-3000A rear panel (fig. 2) contains several connectors. An external speaker jack provides full volume output, unlike the front panel earphone jack. The supplied AC wall wart and mobile power cord plug into an odd 3-pin power jack. The power cord contains no fuse.

A genuine DB-25 connector is provided for computer control and the interface commands are described in the instruction manual.

You must supply your own 8-pin DIN plug to use the accessory jack. The jack is primarily intended for connection to a tape recorder. There are pins for squelch activated tape recorder control and pins for two different audio output levels.

There is only one antenna jack, a BNC connector. More expensive receivers, like the IC-R8500, provide separate jacks for shortwave and VHF/UHF antennas, so you don't have swap feedlines or buy a coax switch.

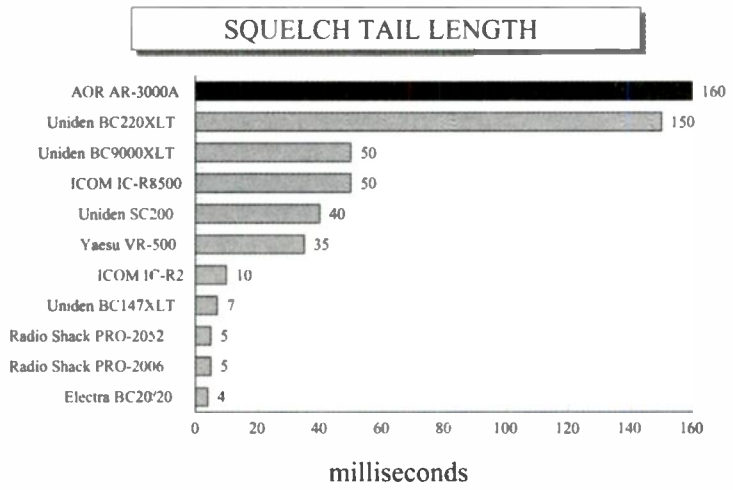
Performance

Our testing focuses on using the AR-3000A above 30 MHz. Our AR-3000A's image rejection at 155, 460, and 860 MHz with respect to 3 IFs, is excellent – over 60 dB in most cases.

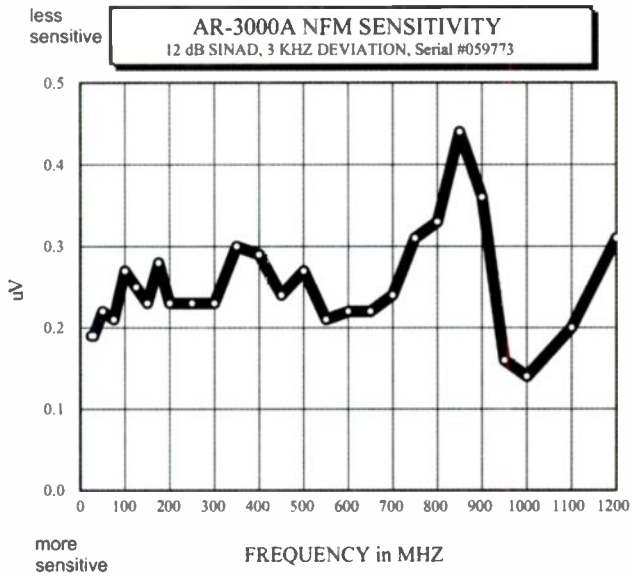
In the NFM mode, our radio has outstanding IF selectivity, much better than our two Uniden BC9000XLTs. The AR-3000A listens on FRS channels without hearing strong GMRS repeaters 12.5 kHz away. Our BC9000XLTs experience significant adjacent channel interference in the same situation.

Our AR-3000A emits an extremely long squelch tail, measuring 160 ms. (See the bar chart for comparison with other models.) This long noise burst at the end of each NFM transmission is annoying. We spoke with other AR-3000A owners who reported the same behavior.

Every modern scanner we've tested has birdies, that is, the receiver "hears itself" on various frequencies due to radiation from its own circuitry. Our AR-3000A has birdies which open the squelch while searching the 25 - 500 MHz range: 25.14, 25.6, 46.78, 51.2, 63.54, 64, 76.8, 89.6, 93.56, 115.2, 128, 140.345, 153.6, 162.865, 170.63, 200.38, 230.4, 278.065, 307.2, 323.085, 370.74, 384, 400.76, 430.78, 447.54, 448, and 460.8 MHz. We didn't look for birdies outside this range.



Notes:
One sample of each model tested.
Produced by a 155 MHz, 1uV unmodulated signal.
Squelch control set beyond threshold in NFM mode.



Measurements

AOR AR-3000A Receiver S/N 059773

List price $1,349.95
AOR U.S.A., INC.
20655 S. Western Ave., Suite 112
Torrance, CA 90501
Phone: 310-787-8615
Fax: 310-787-8619
http://www.aorusa.com

Frequency coverage (MHz):
0.1 - 2036

Steps: 0.05 kHz - 999.95 KHz
in 0.05 kHz increments

NFM modulation acceptance: 8 kHz

Intermediate Frequencies (MHz):
1) 736.23, 352.23, or 198.6
2) 10.7 or 45.03
3) 0.455

Image rejection due to 1st IF:
77 dB at 155 MHz
68 dB at 460 MHz
77 dB @ 860 MHz

Image rejection due to 45.03 MHz IF:
82 dB at 155 MHz
51 dB at 460 MHz
50 dB at 860 MHz

Image rejection due to 455 kHz IF:
64 dB at 155 MHz
63 dB at 460 MHz
68 dB at 860 MHz

Audio output power, measured at speaker jack:
744 mW @ 10% distortion

Squelch tail near threshhold (1 uV @ 155 MHz): 160 ms.

Practical memory scan speed: 11 channels/sec.
Search speed: 46 steps/sec.

Other wide band receivers we've tested, like the AR-5000, AR-7000, and ICOM IC-R8500, contain electro-mechanical relays which make a "click" noise when tuning across band boundaries. Our AR-3000A's relay is energized at 30 and 940 MHz, which permits scanning a mixture of frequencies in the common VHF/UHF ranges without suffering relay chatter.

❖ Modifications

AOR UK (**http://www.aoruk.com**) and clever AR-3000A owners have devised several modifications for the AR-3000A and are willing to share them on the Internet. Dave Alden's AR-3000A Scanner Stuff web site (**http://www.concentric.net/~d-alden**) is a good starting place. You can download different computer programs to control your AR-3000A.

Dave also provides files containing tips like how to change the priority sampling rate, increasing the audio base response, tapping the discriminator output, adding a 4 or 6 kHz AM IF filter, a wide filter for WEFAX, a 10.7 MHz IF output jack, and a tape recorder control relay.

Other modifications are documented at Erik Hansen's web site, **http://www.mods.dk**, including a simple tip by Mark Persson to double or quadruple the number of memory channels by "liberating" unused address leads on the memory chip. Some of the modifications involve soldering and unsoldering surface mount components and are not for the faint of heart.

❖ Wrap-up

Most everyone scans local police and fire activity. But, there's a lot more to monitor and the AR-3000A is a good wide coverage receiver for such spectrum snooping.

The drawbacks include a long squelch tail, difficult to read button labels, and large channel banks. Otherwise, the super wide frequency coverage, SSB detector, excellent NFM selectivity, S-meter, computer port, and smooth tuning knob make it an attractive radio.

The AOR AR3000A is available from Grove Enterprises. See ad in this issue.

MT REVIEW

The Antenna Line from AOR

By Bob Grove

AOR SA7000

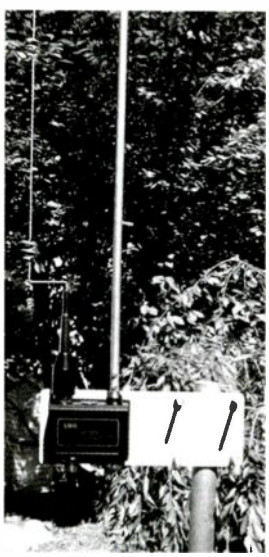
The AOR SA7000 is a wideband (30 kHz-2000 MHz) base or transportable monitoring antenna measuring 5 feet tall (longest element), and about 4 inches wide. The two vertical elements are conjoined by an impedance matching system to provide a nominal 50 ohm unbalanced load for the receiver cable (approximately 50 feet, included). It is not intended for transmitting.

The elements are made of durable steel, and the system is easily and quickly assembled using only a Philips screwdriver, pliers, and an Allen wrench (provided).

Our Test

We compared the AOR SA7000 with the popular Grove ScanTenna at VHF/UHF, and a GAP Titan HF vertical for 100 kHz-30 MHz measurements. While the ScanTenna outperformed the SA7000 by 6-10 dB on all our VHF/UHF test frequencies between 27 and 900 MHz, reception was quite acceptable. Similarly, at shortwave frequencies, in spite of the considerable difference in antenna length (5 feet vs. 30 feet), response of the AOR was only about 10-12 dB lower. When tuning the 100 kHz-500 kHz LF range, LORAN C and non-directional beacons came in loud and clear.

Years ago, the U.S. Coast Guard made similar short-element tests and found that an impedance-matched five-foot antenna was able to hear HF signals 100% of the time when compared to a full size antenna. This is because the main limiting factor below approximately 50 MHz is atmospheric noise, becoming increasingly disruptive the lower you tune in frequency. If an antenna is long enough to capture enough signal to overcome the receiver's internally-generated circuit noise, that's all that's required.



The net result is that the background noise is very quiet and S-meter readings will be quite low when compared to longer antennas, but the signal will be there above the noise, just as it would be when using a much longer antenna. Just turn up the volume!

The Bottom Line

We would recommend the AOR SA7000 wideband antenna for general purpose reception throughout the 100 kHz-2000 MHz range for wide-frequency-coverage receivers like the AOR AR5000 Plus, AR7000, Icom R8500, PC100/1000, R9000L, WiNRADiO WR1000/1550/3100/8000 series, and extended-frequency coverage scanners like the Alinco DJX10T, ICOM R2/3/10, Yaesu VR500, and AOR AR8200.

It is pre-eminently useful as a rapid-deployment field antenna for emergency and tactical applications. While received signal strengths will not be as strong as experienced with larger, separate scanner/HF antennas, they are adequate for local monitoring applications and near-field surveillance and countermeasures.

The SA7000 is available for $189.95.*

SA3000

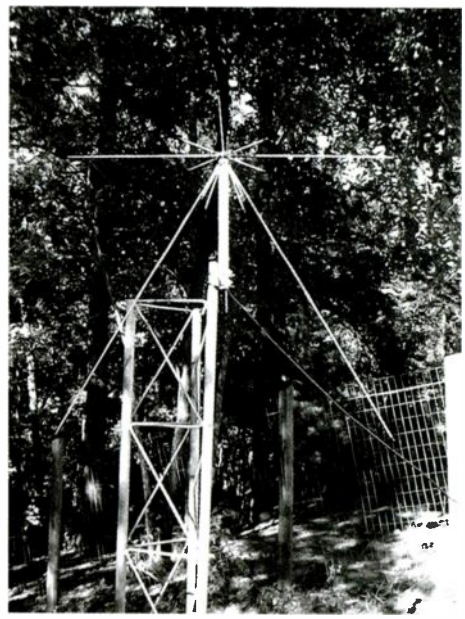
The SA3000 is an unconventional discone design intended for mast mounting. Essentially, it is a composite of several element lengths in an effort to extend the typical 8:1 frequency range of a discone so that it can accommodate wideband receivers over the entire 25-2000 MHz spectrum. As with the previously reviewed SA7000 antenna, signal strength measurements were compared to those received on the Grove ScanTenna. Overall reception was as good as that heard on the standard of reference.

Predictably, however, reception below 30 MHz deteriorated rapidly and substantially (although not as rapidly as on the ScanTenna). This is also characteristic of discone antennas in general, making VHF/UHF discones virtually useless for serious listening on shortwave and medium wave.

Because the elements are of various lengths, we suspect that the DA500 may be somewhat directional, and should be rotated while receiving tests are being made to find the most favorable compromise position. Directivity should be less pronounced on those frequencies in which various element lengths overlap in their frequency coverage.

The elements are made of strong, lightweight, stainless steel tubing; a sturdy connector block attaches to about 50 feet of coax cable (included) via a TNC connector. The receiver end of the coax is fitted with a BNC connector. We would suspect that the antenna could be used for transmitting as well as receiving over those frequency ranges closely impedance-matched by the antenna.

Although washers called out on our instructions were missing from our sample, we suspect that they probably weren't necessary for their intended placement. We were very impressed with this antenna, both from a standpoint of quality of manufacture and performance, and would recommend it for general purpose 25-2000 MHz receiving applications.



The SA3000 is available for $129.95.*

MA500

For mobile VHF/UHF monitoring applications, the MA500 magnetic-base antenna is a strong contender. The same VHF/UHF element found on the higher price SA7000 is firmly attached to a rugged, strongly magnetic base. About 16 feet of coax cable with BNC connector is included.

For this test we measured its performance against a Nil-Jon Super-M (see June *MT*, p.104) and an 18" whip. Although the Super-M is considerably shorter, we found it performed equally well against MA500 to perform nearly identically, given variables on the road. Both antennas outperformed the simple whip.

The MA500 is available for $99.95*

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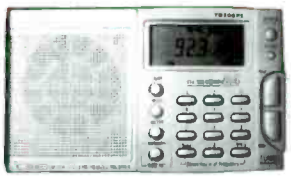
*Prices quoted are all from Grove Enterprises (PO Box 98, Brasstown, NC 28902; 800-438-8155; **http://www.grove-ent.com/order**) and do not include shipping.

Universal Radio - Quality equipment since 1942.

GRUNDIG YB-300PE & YB-400PE



The **Grundig YB-300PE** provides affordable AM, FM and shortwave reception (2.3-7.3 and 9.5-26.1 MHz). Enjoy keypad entry, 24 memories, backlit digital display, clock. With AC adapter, stereo earphones and case. New with one year warranty. #0300 $99.95
Reconditioned. Save $30 #2300 $69.95

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The R2 is a miracle of miniaturization. At only 2.3"x3.4"x1" it tunes from 500 kHz to 1310 MHz (less cellular) in AM/FM/FM-W. The R2 comes complete with two NiCad AA cells, charging tray, antenna, strap and belt clip.
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The new R75A may be the best value today in a communications receiver. Has dual PBT, Sync AM, coverage to 60 MHz, notch and 99 alpha memories. **SALE $669.99**

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The professional-grade Icom R8500 covers 100 kHz to 1999.99 MHz (less cellular). **SALE $1449.99**

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Note: Free items require purchase of indicated item. Prices shown are after coupon and subject to change.

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The PCR100 turns your Windows 95/98 PC into a wideband receiver. **SALE $189.99**

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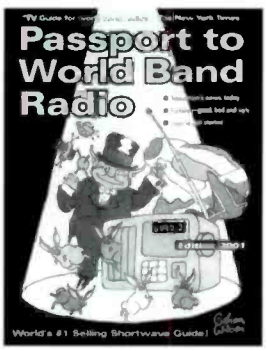

Here is everything you need to know about when and where to hear the world hour by hour, country by country and frequency by frequency. Equipment reviews too. This 560 page book is the world's #1 shortwave guide. Early bird price!
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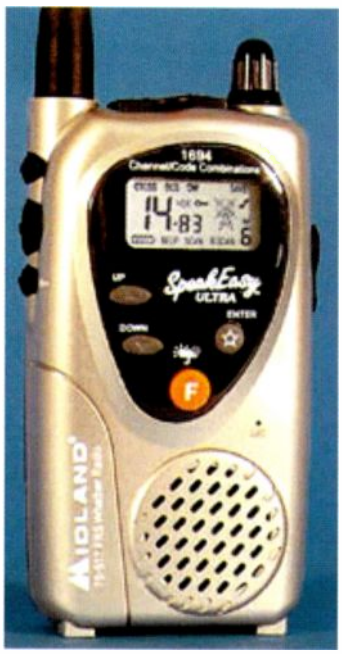
WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

Champagne Taste in FRS

Midland has packaged its best features into the SpeakEasy 75-517 and, just to emphasize the point, has wrapped it up in a champagne gold case. This top of the line model includes all the features of the popular 75-515 and, by user request, has added the ability to receive National Weather Service broadcasts.



The SpeakEasy '517 model includes not only the usual 38 CTCSS codes, but an additional 83 digital DCS codes as well to make 1694 total code/channel combinations to ensure privacy. With this many coding options as well as a Page button to send an alert tone, users can use their FRS radio without receiving unwanted transmissions, even at the busiest amusement park. The radio can be voice activated to allow hands-free operation: six sensitivity levels and six delay settings allow 36 settings to adapt surrounding audio conditions. For quiet operation, an optional headset is available.

Nine channel memory settings make it easy to switch to predetermined channel/code combinations. The FRS radio can scan for open channels or can scan for busy channels.

The display is a large backlit LCD panel which displays 12 different functions. Other featured include button lock, flexible rubber ducky antenna, battery save option, low battery indicator, jack for in-unit charging of optional NiCd batteries (wall charger or desktop charger sold separately), belt clip and hand strap.

The Midland SpeakEasy 75-517 is expected to be available in stores at presstime for a retail price of $79.95. Visit Midland's website at **http://www.midlandradio.com** or call 816-241-8500 for more information.

Key to the Millennium

Here's a collector's edition with a practical application – Morse Express is making available a special edition Millennium Key, made by Llaves Telegraphicas Artisanes in the Balearic Islands of Spain.

Based on the operating mechanism of their LTA Model GMO, this key has these additional features that will put it in a special place on your bench: hand polished, gold plated parts; ebony knob and base; certificate showing serial number and identification; presentation quality wooden box with red felt lining. To order or for more information contact Marshall Emm N1NFN, Milestone Technologies, 2460 South Moline Way, Aurora, CO 80014-1833, call 800-238-8205 to order, or visit **http://www.MorseX.com**.

You'd better hurry though – only 100 of these collectors items were made.

Fire GPS System

According to the International Association of Fire Fighters, almost 27 percent of fire fighters killed in the line of duty in 1998 died of burns or asphyxiation after being trapped. In response to this problem, David and Beverly Dymek of Downingtown, PA, have developed the "Fire GPS System," a navigational system that keeps track of where fire fighters are at any given time while they are in a burning structure.

The system uses a personal unit to continuously monitor and record the fire-fighter's location and movement within a burning structure. Should the fire-fighter get lost, this unit will instruct the fire-fighter how to retrace his path of entry while also transmitting data that alerts a base unit located outside the structure.

In turn, the base unit downloads data on the path of entry to a personal unit held by a rescuing fire-fighter to expedite rescue efforts. If the fire-fighter is motionless for more than two minutes, the personal unit automatically transmits this data to the base unit.

The Fire GPS System is in patent pending status and is currently available for manufacturing and for distribution. To obtain more specific information about this unique product, contact Noreen Amir at Intellectual Property Management Group Inc.. 610-992-6300 or E-mail: *ipmg2@bellatlantic.net* or visit **http://www.ipmg-inc.com/1675dd/index.html**.

Patent Wizard

By the way, since radio hobbyists and amateur radio operators are often advancing the application of new technology, you may be interested in a new patent drafting software. Filing for patents can seem like an expensive, lengthy, daunting process, especially to the individual inventor. A new software program called the Patent Wizard 2.0 allows inventors to draft their own patent applications and take advantage of a cheaper, relatively new type of strategy known as the "Provi-

sional" Patent Application or PPA.

Patent Wizard inventor and Registered Patent Attorney Michael S. Neustel says, "It gives inventors 'patent pending' while they determine the commercial viability of their inventions at the same time avoiding the high costs of a Patent Attorney."

A typical PPA can cost an inventor $2,000 or more with many patent attorneys. The Patent Wizard sells for just $199. The U.S. filing fee for a PPA is currently $75. PPA's provide "patent-pending" for one-year – in that time an inventor can decide if the product is worth pursuing and file for a formal patent application.

The Patent Wizard is available exclusively through two inventor resource websites: **http://www.PatentWizard.com** and **http://www.PatentCafe.com**

Cellphone Etiquette

Public tolerance of cellphone interruptions and distractions is wearing thin. Avoid those angry looks without giving up an important call with the Cellular Phone Alert Pen. Put your phone on Mute, keep it within 5 feet of the pen and when a call comes in a red light in the top of the pen will flash.

Two batteries are included and it works with all cell phones, says the ad. At $9.95 (plus $3.95 shipping) and a money-back guarantee, what have you got to lose? Send to Preferred Customers Guild, PO Box 9243, Dept PR590-WA, Central Islip, NY 11722-9885.

Read the Fine Print

Maybe I shouldn't call it a scam, because the ad in *Realtor Magazine* (sent by John Maky) isn't really lying: SafeTShield says it "is the only device that effectively filters up to 99% of the electromagnetic waves emitted from the earpiece of your cellular or cordless phone." Since it's the antenna, not the earpiece, that emits electromagnetic waves, that seems like a safe enough guarantee! Duped again, for "only $19.95"...

Watch for a resurgence of such "shield" product advertisements, now that there is increased interest in potential health hazards from cellphones.

Nitelogger Discontinued

Benjamin Michael Industries has announced that, after an admirable run of 16 years, their long-running Nitelogger cassette recorder has been discontinued. Advances in digital technology, shortage of appropriate parts, and the destruction of some stocked parts by a tornado last summer precipitated the decision.

President David Wyatt says existing orders will be filled but new orders will not be accepted. They will continue to honor warranty commitments. For more information contact BMI, 9445 Seven Mile Road, Caledonia, WI 53108; 414-835-4299. BMI continues to carry their popular wall clock for radio hobbyists.

Coax Catalog

If you're looking for connectors, adaptors, or coaxial cable of any kind, you don't have to look any further than Pasternack Enterprises. To request a copy of their 170-page catalog of coaxial and fiber optics write to them at P.O. Box 16759, Irvine, CA 92623-6759, call 949-261-1920, or visit **http://www.pasternack.com**.

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.

HERE'S WHAT OUR READERS ARE SAYING ABOUT *MT EXPRESS*:

"No doubt about it, the future is here! Sure nice to get the magazine so early, this has got to be the way! Thanks for a great job!"

- 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 sc easily. This is the way to receive a magazine."

- Don Naue

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Ad copy must be typed for legibility.

1-3/4" SQUARE DISPLAY AD: $50 per issue if camera-ready copy or, $85 if copy to be typeset. Photo-reduction $5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

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Monitoring Times assumes no responsibility for misrepresented merchandise.

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NON-COMMERCIAL SUBSCRIBER RATES: $.25 per word — *Subscribers only!* All merchandise must be personal and radio-related.

COMMERCIAL, NON-SUBSCRIBER, AND MULTIPLE SALES RATES: $1.00 per word. Commercial line ads printed in bold type.

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.*

WANTED: Back issues or complete collection of Monitoring Times Magazine. Also CB radio magazines, Popular Electronics magazine collection. E-mail me at N7SGV@excite.com.

For Sale: ICOM IC-R70 Communications Receiver. $400 plus shipping. Call Jerry (954) 720-1972

WANTED: Any auto shortwave radio. Philips 777, Becker, Hallicrafters SX88, etc. any condition. (516) 223-4638. Ask for Earl.

SALE: Active Receiving Antennas. Dymek DA100 (never used with cable), $65. Dumek DA100 (used), $40. MFJ 1024 (used) with whip and cable, $30. Gerald Park, W8QS, (517) 351-5106 or park@egr.msu.edu.

Closing Comments

By Bob Grove, Publisher

A Domestic Shortwave Service - Pro and Con

In 1934 the U.S. Congress legislated the formation of the Federal Communications Commission (FCC) as part of the Communications Act. Many of the original Act's precepts have been undergoing radical surgery recently in an effort to incorporate new digital technologies into the less sophisticated analog concepts.

One question that needs revisitation is, why is the U.S. still prevented from using the shortwave frequencies for a domestic service? After all, because of shortwave (HF) propagation, internal services of many foreign broadcasting agencies may be heard regularly throughout the shortwave spectrum. Shouldn't this same privilege be accorded the United States?

Two bodies proscribe a domestic service on shortwave. The Recommendations of the International Telecommunications Union (ITU) restrict domestic broadcasting on HF with one exception: Years ago, the ITU did delegate three bands as a domestic service for the tropics, extending north to the Tropic of Cancer, and south to the Tropic of Capricorn. These bands are 2.3 - 2.495 MHz, 3.2 - 3.4 MHz, 4.75-5.06 MHz. Most of these broadcasts are shortwave relays of a commercial AM or FM station intended for audiences in remote areas of a particular country.

The Federal Communications Commission (FCC) also prohibits it. Shortwave broadcasting falls under the jurisdiction of the International Bureau which says, "It should be noted that an international broadcasting station is intended for broadcasting to a foreign country and is not intended for broadcasting solely to the United States."

In the U.S., only the medium wave (540-1700 kHz), FM (88.1-107.9 MHz), and VHF/UHF TV bands are available for broadcasting within our national boundaries. But, some American SW broadcasters have been dodging around this for years, intentionally beaming their signals in patterns that take them across the continental United States. It's remarkable how many English language broadcasts are ostensibly beamed to such places as maritime Canada, Greenland and Iceland, but use frequencies and broadcast times that make these locations a most unlikely target.

Ironically, when a station applies to the FCC for a license, it is supposed to submit with its application a propagation analysis, showing that an acceptable signal strength will reach the intended target area(s). Given the frequencies used and the time of day, it is clear that many of these shortwave broadcasts are designed for domestic reception only. If further proof were needed, one has only to listen to the featured programming, which is generally on topics and products of primarily American appeal and which provide only local telephone numbers for response. (Many of these topics, were they truly aimed at and received by international audiences, would be a national embarrassment.)

These broadcasters not only fail to demonstrate a serious commitment to international broadcasting, but they don't even stay within the band provided for the purpose. The FCC's Part 73.701 specifically defines an international broadcaster as "employing frequencies allocated to the broadcasting service between 5,950 and 26,100 kHz, the transmissions of which are intended to be received directly by the general public in foreign countries." While there are exceptions, they don't seem apply to some stations' capricious operations. Several widely-heard U.S. broadcasters seem to move about the spectrum at random, including the tropical broadcasting bands and frequencies dedicated to fixed and mobile services.

Several years ago one of these mavericks usurped NASA's long-established primary nighttime communications channel, 5810 kHz, forcing our space agency to move to 5812 kHz to avoid the intruder's interference to America's Space Shuttle mission support!

A quick look at this month's Shortwave Guide reveals dozens of out-of-band frequencies – roughly 27% of the total – scheduled by U.S. international broadcasters. U.S. broadcasters submit their frequency requests to the FCC twice a year, and are charged a fee of $55 per frequency hour. It would appear that several stations actually request out-of-band frequencies.

The FCC seems to turn a blind eye as long as it receives its license fees, giving as one excuse the "increasing congestion and interference in the limited frequency spectrum allocated to this service." According to one FCC spokesman, although international broadcasters are required to be licensed, unlike medium wave domestic services they are not assigned specific bands or frequencies. International broadcasters can operate anywhere they wish so long as they don't interfere with other primary services.

Is the "squatter's rights" policy adopted by these broadcasters acceptable to the international broadcasting community and worldwide utility stations on whose frequencies the roving broadcasters appear? Presumably not, but coordination in this regard is largely voluntary. Many stations hire private consultants and the FCC also represents the interest of U.S. broadcasters at an informal frequency coordination group called the High Frequency Coordination Conference (HFCC).

This group meets twice a year to produce a coordinated schedule for a summer and winter season. The group attempts to resolve any potential channel and/or interference conflicts which may result between the parties they represent. The group currently includes the Voice of America (VOA), Radio Free Europe/Radio Liberty (RFE/RL), British Broadcasting Corporation, Deutsche Welle, Radio Nederland, Radio Canada International, the FCC, other broadcasters from west and east Europe, Russia, Turkey, Iran, Israel and Algeria.

The United States is one of very few countries that permit privately-owned shortwave stations designed to broadcast to foreign audiences. Prior to 1982 there were only four such stations in the U.S., but after WINB won a license (citing Public Law 80-402), the number has grown to 25, most owned by religious organizations. Why did the ITU not allow domestic broadcasting on HF for the majority of the nations? Was it concern for the potential coordination nightmare given the propagation characteristics of high frequencies? Or were most signatory countries too worried about the propaganda power of radio to allow an independent domestic broadcast service with national coverage?

Nationwide domestic broadcasting is coming anyway. With the imminent start-up of the XM and Sirius satellite radio services, the United States is on the threshold of experiencing truly nationwide coverage, although it will arrive on frequencies that do not wander outside the satellite's "footprint." Now that wide coverage is on our doorstep, isn't it time to end the charade of the "other" national domestic broadcast service and require its members to either operate within international treaty agreements and regulations or to change those regulations? Or does anyone really care?

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– Passport to World Band Radio, 1998

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