Volume 19, No. 2 February 2000

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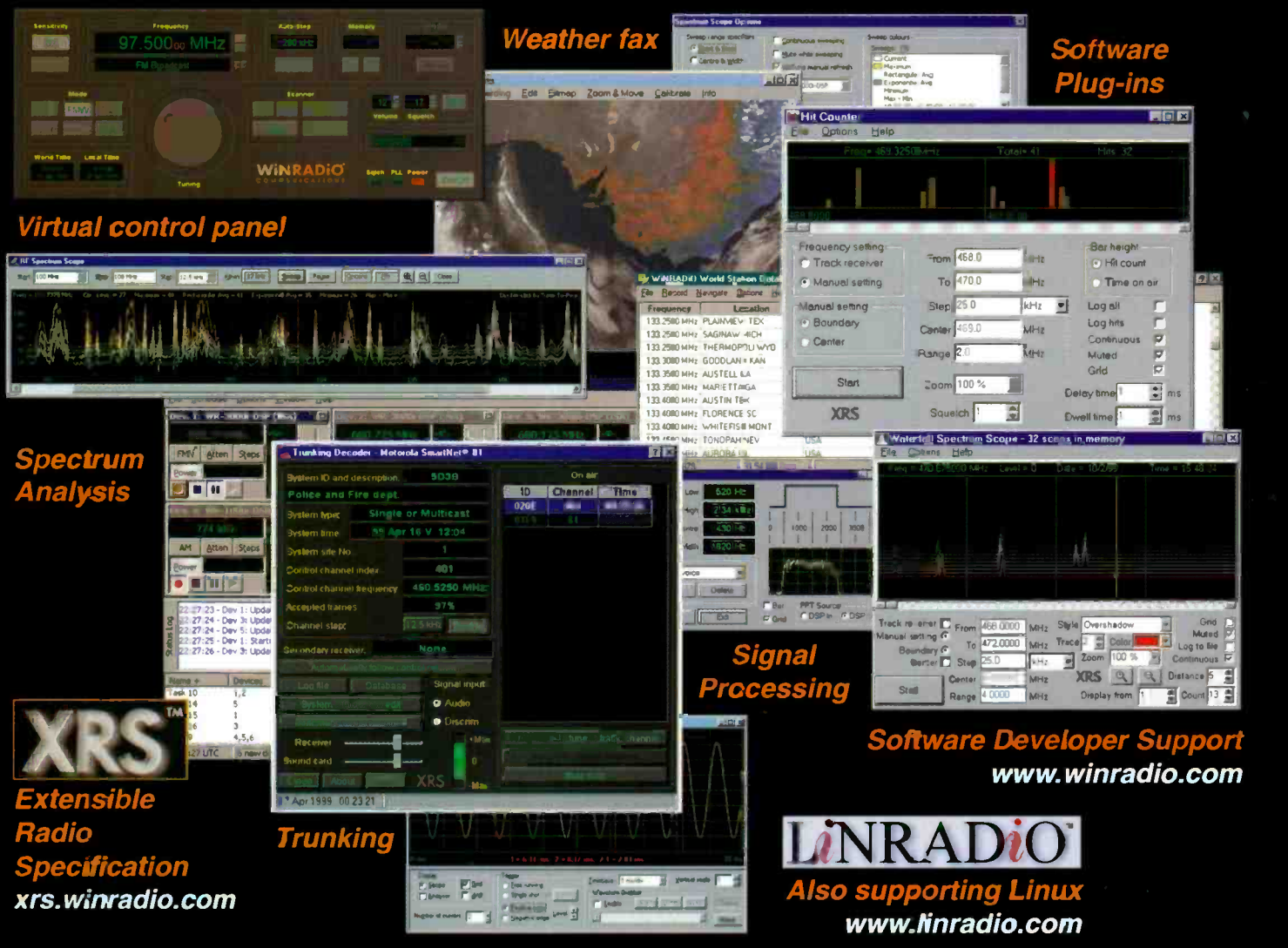

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Monitoring Times

Vol. 19, No. 2 February 2000

Cover Story

Crisis in North Carolina

By Robert Felton

Emergency coordinators had mobilized for an emergency, believed it had passed, then scattered – only to find themselves confronted, just a few hours later, by a disaster larger than anything they'd ever even imagined. In one of the counties hit by the worst flooding, there were no hams at all at the brand-new Emergency Operations Center – they had been told there was no need for an anachronistic service like Amateur Radio. In another town, trained volunteers couldn't reach the EOC and a 17 year old newbie put together and manned an emergency net for 11 days.

The unprecedented flooding following the hurricanes which hit North Carolina taught a few lessons about the importance of the Amateur Radio Emergency Service (ARES), how important it is to prepare, and how unpredictable a true emergency can be. See page 10 for the story. Cover photos courtesy Federal Emergency Management Agency (FEMA).

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Reviews:

Parnass puts the much-anticipated **Yaesu VR-500** wide coverage handheld scanner through its paces; he finds its text label display particularly useful (p.98). Tom Sundstrom gives *MT* an update on the latest developments in the **shortwave industry** (p.97). Hint to hobbyists: **Icom's W32A** transceiver doubles as a great scanner (p.103)!

WinRadio's open architecture has allowed third-parties to develop a number of plug-ins: Catalano looks at these and **WinRadio's trunking option** as well (p.94). Which would you rather lug around – a frequency book, innumerable scraps of paper, or a **Wizard organizer** by Sharp?! (See p.96)

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WASHINGTON WHISPERS

By Fred Maia, W5YI
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FCC to Reallocate 200-MHz of Prime Spectrum

On November 18th, the Federal Communications Commission (FCC) issued a Policy Statement concerning spectrum management handling as we enter the new millennium. The plan is to enhance competition and to encourage the development of emerging telecommunications technologies.

The electromagnetic spectrum is managed in the United States by two agencies. The National Telecommunications and Information Administration (NTIA) oversees federal government frequencies with the FCC administering all other spectrum. The NTIA also serves as the President's principal advisor on telecommunications and information policies.

Two hundred megahertz of prime VHF/UHF/Microwave spectrum – which spans several bands from 200 to 4,660 MHz – has been made available through the transfer of frequencies from government use and from the reallocation of frequencies used by existing nongovernment radio services.

Today, all of the radio spectrum below 300 gigahertz (GHz) is allocated for various purposes. Congress addressed the spectrum shortage issue in 1993 when the Secretary of Commerce was directed to transfer 200 megahertz of spectrum below 5 GHz, currently used by Federal agencies, to the FCC for licensing to the private sector "to promote and encourage the use of new spectrum-based technologies in telecommunications applications."

The law authorized the FCC to use competitive bidding (auctions) for the reassignment and licensing of spectrum for certain commercial radio-based services.

The first phase of the reallocation process was completed in 1994 when 50 MHz of federal spectrum was made available for immediate reallocation and 150 MHz for delayed reallocation. The 50 MHz designated for immediate reallocation were the 2390-2400, 2402-2417, and 4660-4685 MHz segments. The 2390-2400 and 2402-2417 segments were then reallocated to the Amateur Service on a primary basis.

Now the FCC will be reallocating the 150 MHz spectrum that was delayed. It includes the 2300-2305, 2400-2402 and 2417-2450 MHz segments which are allocated to the Amateur Service on a secondary basis.

The FCC Policy Statement serves as the framework for the reallocation. The spectrum identified for reallocation is shown in the following table.

Frequency Band	Width	Frequency Band	Width
216-220 MHz*	4 MHz	2160-2165 MHz	5 MHz
698-746	48	2300-2305*	5
1390-1395	5	2385-2390	5
1427-1429	2	2400-2402*	2
1432-1435	3	2417-2450*	33
1670-1675	5	4635-4660	25
1710-1755	45	See Note: *	15

Note: The bands 944-960, 1390-1400, 1427-1432, 1670-1675, 2500-2690 and 3650-3700 MHz are candidates for the remaining 15 MHz of spectrum. Part of the 216-220 MHz band and the 2300-2305, 2400-2402 and 2417-2450 MHz bands are allocated to the Amateur Service on a secondary basis. Currently, the 2300-2305 and 2400-2402 MHz segments are not allocated to any service on a primary basis.

The new spectrum will be used for a broad range of emerging radio communications services which will be implemented over the next three to five years. It includes various new and expanded mobile, wireless and medical telemetry services. Most of the spectrum will be assigned by competitive bidding.

The FCC said an aggressive and innovative approach to managing spectrum is necessary and includes the following principles:

- Allow flexibility in allocations as appropriate, including rules that would allow licensees to better respond to market demand.
- Promote new spectrum efficient technologies, such as those that support ultra-wideband and spread spectrum operations.
- Ensure that important communications needs, such as public safety, are met.
- Improve the efficiency of our assignment processes through streamlining and innovative techniques, including consideration of new approaches.
- Seek out ways to make more spectrum available, for example, through refarming methods, user fees or by reclaiming existing spectrum.

The Policy Statement inventories spectrum that is available for allocation and sets forth proposals for its use. The FCC plans to:

- Expand the General Wireless Communications Service (GWCS) spectrum to 50 MHz, from the current 25 MHz, and relocate this service to the 4940-4990 MHz band at the request of the National Telecommunications and Information Agency.
- Allocate 90 MHz for Advanced Mobile and Fixed Communications Service (AMFCS) at 1710-1755 MHz, 2110-2150 MHz and 2160-2165 MHz. This will be a new flexible use service available for mobile and fixed wireless service.
- Establish a new Land Mobile Communications Service (LMCS) in 10 megahertz of spectrum at 1390-1395 MHz, 1427-1429 MHz and 1432-1435 MHz. This allocation will relieve congestion and provide opportunities for use of new, spectrum efficient technologies for business radio communications.
- Reallocate the 48 MHz at 698-766 MHz (TV channels 52-59) for Fixed, Mobile and new Broadcast services for commercial uses following the same approach the Commission adopted recently in reallocating the 36 megahertz at 746-764 MHz and 776-794 MHz bands (TV channels 60-62 and 64-66).
- Allocate 10 MHz of additional spectrum for Fixed and Mobile service in two bands at 1670-1675 MHz, and 2385-2390 MHz and adopt appropriate service rules to permit licensees broad flexibility in the types of service and the technologies used.

As part of the Commission's efforts to effectively manage spectrum in the public interest, FCC Chairman Kennard also announced the creation of a Spectrum Policy Executive Committee. The Bureau and Office Chiefs involved in spectrum issues will participate on the Committee under the direction of Dale Hatfield (WIFO), Chief of the Office of Engineering and Technology.

The Commission said that their new allocation plans requires use of all of the frequency bands now included in the reserve of spectrum for future uses required under the 1993 Budget Act. The FCC replaced the existing spectrum reserve with a new reserve of 40 megahertz in the three frequency bands at 2300-2305 MHz, 2400-2402 MHz, and 2417-2450 MHz.

That basically means that Amateur access to these bands will not be impacted for the foreseeable future.

Action by the Commission November 18, 1999, by Policy Statement (FCC 99-354).

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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)

LETTERS TO THE EDITOR

NEWS AND VIEWS FROM OUR READERS — *Rachel Baughn, Editor*

Why Not Listen to Hams?

Charles Lewis, Deputy Manager of VOA's Transmitting Station in Greece writes, "I enjoy reading *Monitoring Times*. Judging from the lack of coverage in the magazine and my personal observations, one thing that seems to be missing in the US is an interest in monitoring the HF ham bands. I was formerly A22AA and S92SS, much rarer than SV0LM. Under those calls I received a lot of QSL requests from SWLs, even a surprising many for CW contacts; however, I received almost none from the US. Nearly all were from Europe. I wonder why that is so?

"I became interested in ham radio through SWLing back in the early 50s. Of course, that was the time when AM was still king, so it was easy to tune in amateur radiotelephone transmissions on simple receivers, even the old all wave entertainment radios."

– Charles Lewis, SV0LM

Devil's in the Details

In Bob Grove's reply to a question by Mark Burns in the October '99 "Ask Bob" column, he said "... electrons simply shift positions at nearly the speed of light from one atom to the next, on down the line." One reader wished to clarify this:

"Actually the electrons in a current carrying conductor do not travel at anywhere near the speed of light and I believe many physics texts provide information on the process, including a formula to calculate velocity. Length, diameter and type of the conductor are factors as well as something termed 'electron number density,' which itself is calculated using the conductor's mass density, grams per mole and Avogadro's number.

(Normally I would dust off an old physics text and provide the formula straight away but I am a recent arrival at my new post of assignment in Abu Dhabi, and my sea freight with all my possessions has not yet caught up with me.)

May I also point out one other small error in "The Launching Pad." Mr Reitz refers to temperatures in degrees Kelvin but I believe the scientific community long ago agreed Kelvin temperature would be described in "kelvins," not degrees Kelvin. Both errors may seem quite small but it would be helpful to *MT* readers to know the correct information."

– John N. Henning

Here is Bob's reply, "In radio frequency (RF) transmission lines, electromagnetic energy generated by the movement of electrons is still quite swift. Quoting the *ARRL Handbook*, 'In a real (non-ideal) transmission line, the energy actually travels somewhat slower than the speed of light (typically from 65-97 percent the speed of light...)' I would consider this to be 'nearly' the speed of light, although perhaps you would have been more comfortable with 'approaching.'

"So far as the proper use of 'kelvin,' you are absolutely correct. While Celsius and Fahrenheit scales are relative and use the degree as a unit, the Kelvin scale uses the kelvin as an absolute, thermodynamic unit. I doubt, however, that any reader would have been misled by the transposition of those terms."

– Bob Grove

In with the new; in with the old

Marc Ellis, author of *MT*'s new "Radio Restorations" column, received several email and snail mail letters from readers of his former column in Gernsbach publications. We asked

Continued on page 105

Electronic Suppliers Raided

Ramsey Electronics and Super Circuits were two of several companies recently raided at gunpoint, according to an Internet report. Both have longstanding reputations for selling inexpensive, quality educational kits and components to electronics hobbyists for many years through ads in electronic hobby magazines and via their websites.

"The U.S. Dept. of Justice is apparently reinterpreting federal wiretapping and smuggling laws to include small hobby radio transmitters," read the report.

Ramsey's website at **http://www.ramseyelectronics.com/scstore/sitepages/hobby/fedpage2.htm** elaborates on the equipment they may no longer sell. "Investigators believe world class 'kidnappers and organized crime' are using things like our $5.95 wireless microphone kits for their 'surreptitious' international espionage use! When in reality, they've been used for years and years as a valuable educational kit used in things like model trains, amateur radio, school projects, Scout projects, baby monitoring and more."

As in Bill Cheek's case, these raids put business owners at risk of looking down the barrel of a federal agent's loaded gun, a felony conviction, federal prison time, loss of property, and legal fees into the tens of thousands of dollars. The charge is that the products might be in violation of US Code Title 18, Section 2512 because they believe their "primary use" was designed for surreptitious use, and not for hobby and educational use.

Prohibited Ramsey kits include audio and video transmitters, several of which are disguised as other household objects, and 800 MHz converter kits. According to Ramsey, their primary customers are schools, Scouts and hobbyists.

According to the Internet report, "A high-ranking Justice Dept. official told one of the business owners the orders for these raids are politically motivated and originated from a very high level in the Clinton administration as a result of the Linda Tripp wiretapping case. 'They just need convictions,' the official said."

Headed for a Showdown

The FCC, Congress, National Association of Broadcasters, and community radio advocates are headed for a showdown over low power broadcasting. The FCC is expected to hand down its ruling on the Low Power FM License proposal we've been following for some months.

In a last-minute preemptive move, Rep. Michael Oxley, Vice Chairman of the House Telecommunications Subcommittee, introduced the Radio Broadcasting Preservation Act of 1999 – a short, 10-line bill which says the FCC "shall not prescribe rules authorizing the operation of new, low-power FM radio stations, or establishing a low-power radio service." It went on to say that any low-power FM licenses issued before the bill becomes law will be void.

National Assn. of Broadcasters president Eddie Fritts said the bill would "stop the FCC's misguided initiative."

Oxley claims "While the desire to provide a public forum for community groups is laudable, a multitude of alternatives already exists. Groups may obtain existing commercial or noncommercial licenses, use public access cable, purchase broadcast or cable air time, publish periodicals, and utilize Internet websites and e-mail, among many other options."

Hams, advertising, and Herbert Hoover

According to an article in *Senior* magazine, San Luis Obispo, CA, Herbert Hoover credited "the genius of the American boy" (i.e., hams) with the development of radio. The Navy wanted to keep radio as a military tool after World War I, but hams fought that effort, and it was a ham that built the first radio station in North America.

The issue of who was going to pay for radio – government, big business or some alternative – wasn't decided in the U.S. until the first commercial was run in 1922.

"It's inconceivable that so great a possibility for service and for news and entertainment would be drowned in advertising chatter," said Herbert Hoover, then Secretary of Commerce, under whose watch commercial radio was developed.

Creative alternatives

Paul Bendat got so fed up with commercial radio that he sold his four stations (WABY AM/FM, and WKBE AM/FM), but he's still broadcasting ... on **WABY.com**. Advertisers buy space on the site, but Bendat says, "It's much more fun on the Internet. You're not worried about the Arbitron [ratings], you're back to serving people who are out there. This is getting back to the fun of radio." (Schenectady *Gazette*)

KIIS-FM in Burbank, California, is doing its bit toward community access to the airwaves. Under its "Corporate Takeover" program, KIIS invites listeners to be disc jockeys and provides technical help to get them started. One person who has taken them up on the offer is Sister Mary Lisette Valenzuela. The 35 year old nun plays the rock and talks the talk with enthusiasm. How many opportunities does one get to influence 2.2 million potential listeners?

KIRN 67 AM in Simi Valley is an example of a radio station switching formats to adapt to its community. KIRN identifies as Radio Iran – the first 24-hour Persian radio station in the country! It was "a monster market was neglected," says the station's president.

Got Your Scanner On?

In a well-balanced article by *Orange County Register* reporter Phil Garlington, the author reminisces how he got started listening to scanners as a rookie reporter. He was rather sur-

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(See www.grove-ent.com/hmpgmt.html for more events and club info)

Feb 19: Oberlin, PA
Harrisburg RAC 2000 Winter Hamfest, Citizens Fire Company of Oberlin - Talk-in 146.16/76 MHz. Gen adm 8a.m. For more info see **http://hrac.tripod.com**, email *N3NJB@aol.com* or call 717-939-4825. VE testing 9a.m.

Feb 20: Brighton, CO
Aurora Repeater Association Swapfest2000, Adams County Fairgrounds, 9755 Henderson Rd. (west of US 85 off 124th Avenue); talk-in 147.15 (+); admission $3. Aurora Repeater Association, P.O. Box 473411, Aurora, CO 80047-3411, *N0ARA@qsl.net*

Feb 27: Levittown, NY
LIMARC Winterfest 2000, Levittown Hall, 201 Levittown Pkwy, in Hicksville, NY; Talk-in 146.850 (PL -136.5) 8a.m. For more info call 24-hr info line 516-520-9311, email *hamfest@limarc.org* or visit **www.limarc.org**

COMING UP:

March 10-11: Kulpsville, PA - The Winter SWL Festival. See **http://www.trsc.com/winterfest.html** for registration and info.
March 12: Waukesha, WI - SEWFARS ARC Hamfest - 414-835-7035
March 18-19: Midland, TX - St Patricks Day Hamfest - **http://www.w5qgg.org** or *oilman@lx.net*

prised to discover what a wide-spread hobby scanner listening is.

In the article, Ken Newkirk of Long Beach says his neighbors call him every time a helicopter flies over to ask, "'What's goin' on, Ken? You got your scanner on?' It's a way for people to find out what's happening in their neighborhood."

Some of this monitoring may be short-lived. Said Garlington, "Many urban police departments, including those in Orange County, eventually will shift over to digital radio.... It isn't clear yet whether Congress will even allow hobbyists to monitor digital police radio traffic."

Here are some recent system changes we've been told about by our readers:

Jacksonville, Alabama: Motorola 800 MHz ASTRO® digital system; activated July 1999. 151 separate agencies on a single system infrastructure. Compliant with the Project 25 digital standard's common air interface (CAI). Calhoun and Talladega counties were part of Motorola's initial field test.

County of Pima, Arizona: Contracted with EF Johnson to provide a three-site 800 MHz Multi-Net IITM trunked radio system to handle over 1,100 portable and mobile radios for the Sheriff's Office of Pima County.

Phoenix, Arizona: Going to Motorola Type II TRS by the end of this year for Police, Fire, and City Services. The frequencies have been allocated; some talkgroups currently active for testing. "They have made it very clear that they will not make the switch to digital until a fully capable digital scanner has been produced, because they do not want to shut out the many 'wonderful and helpful scanner listeners' in our city." Adam Goldman, Chief Operations Officer, Pozilla Software.

Los Angeles, California: City council signed a contract with Motorola to install a $50.8 million ASTRO digital trunked public safety communications system.

Denver, Colorado: Began next phase of the statewide digital communications system infrastructure which builds on a shared Motorola 800 MHz ASTRO communications system already in place in Douglas and Jefferson counties.

Hillsborough County, Florida: A court battle looms between Hillsborough County, Florida, and Ericsson over a high priced police radio system. Installed in 1994, the system has been plagued by glitches, and Ericsson wants an additional half-million dollars to make it Y2K compliant. "We put an extreme amount of money into this system, and it still doesn't work five years later," said County Commissioner Jim Norman. "I don't think we should pay a dime for Y2K compliance."

Reno, Nevada: Washoe County Commission approved an agreement with Reno, Sparks, the school district and the state for sharing operating costs for a new 800 megahertz Ericsson radio system.

Greensburg, Pennsylvania: Westmoreland County wants to install a high-band, 800-megahertz system that would require firefighters to get new radios. Volunteer firefighters said they have little or no money to purchase new equipment. County officials said a computer-based system could allow analog low-band radios like those used by local firefighters to communicate with the Motorola high-band system being developed. The software, however, still has to be approved and tested by the FCC.

Longview, Texas: Motorola 800 MHz trunked radio system, activated June 1999

San Antonio, Texas: Contracted with Ericsson to put all public safety in the San Antonio area on a new Ericsson EDACS Digital system.

Twin Cities area, Minnesota: Construction is underway on "the nation's first digital 'trunked' public safety radio system," capable of handling 2,400 conversations at once. The system is Project 25 compliant. Expected completion in 2 years. Start-up with Hennepin County, Minneapolis, the Metropolitan Council, the State Patrol and the Minnesota DOC. Other cities and counties are expected to buy in within the next eight years as their own radio gear wears out.

...And then there's ...

Holyoke, Massachusetts: City Council considering a recommendation from its Finance Committee to spend $15,000 for a second radio frequency and radios. The channel that police had been using as a backup is licensed to the town of Palmer, which plans to increase its use. That would throw all Holyoke communications onto one frequency, which could be dangerous.

Project 25 Mixed Reviews

Several years ago, the Association of Police Commissioners Association (APCO) led development of a system-design standard called Project 25 that was adopted by the Radio Board, despite continuing controversy over its cost and domination by Motorola.

Critics say Project 25, replete with computer, microwave and fiber-optics technology related to cellular telephones, is slower and much more expensive than a European police communications standard called Tetra, which is used around the world except for North America.

One critic is Mark Hoppe, a St. Paul radio engineering consultant, who wrote in *Radio Resource* magazine, "The state of Minnesota could have possibly built a statewide Tetra radio system and a new Twins stadium for the same price as a Project 25 trunked solution. In addition, virtually all Minnesota public safety agencies would have been able to afford the Tetra solution, rather than just a few large agencies, providing true interoperability of all Minnesota."

"Communications" is compiled by Rachel Baughn, editor, from news items sent in by our readers. The "theme" this month seems to be evidence of a more concerted effort on the part of government and big business to control access to the airwaves – both transmitting and receiving.

Those reporting this month: Anonymous, NY; Chanel Cordell, GA; Roger Cravens, GA; James Henderson, AL; Henry LaViers via email; Kenny Love, SC; Larry Mathis, CA; Doug Robertson, CA; Ed Schwartz, IL; John Stankovitz, NJ; Robert Thomas, CT; Gayle Van Horn, NC; Larry Van Horn, NC; Robert Wyman, FL

CRISIS IN NORTH CAROLINA

By Robert M. Felton

Buildings deemed structurally unsafe are marked for bulldozing with a red X. The entire first floor of this grocery store was flooded.

Radio: A toy to tickle the ears of fools.
– Francis Beeding

Though Beeding might have thought his judgment well confirmed during the CB heyday of the seventies, he would probably have thought differently if he'd been awaiting news of friends or family stranded on Ocracoke Island as Hurricane Dennis took its weird, veering course off the North Carolina coast during the summer of 1999. There, as high winds lashed the coast and saltwater submerged the streets, the island's only communication with the rest of the world for many anxious hours was provided by a lone ham radio operator broadcasting from the second story of his home. Everything, he reported, was out: no water, no power, no telephone.

Practicing for emergencies

Amateur communications during emergencies were disorganized prior to 1935; a ham would simply begin broadcasting and hope he caught the ear of someone who could provide the needed help. In that year, the American Radio Relay League (ARRL) organized the Amateur Radio Emergency Service (ARES) in order to systematize the provision of emergency backup communications during civil crises. If everyone knew where to go and agreed ahead of time upon the frequencies to be used, the reasoning went, a good thing could only get better.

By any measure, the program has been a resounding, if unsung, success: today, ham-provided backup communications are written into the emergency plans of virtually every level of the public sector, from municipal Parks departments through the Federal Government.

Though the formal organization chart describing ARES and its relationship with the National Traffic System (NTS) appears bewilderingly complex on first inspection, it's actually straightforward in practice. The United States is subdivided into 69 separate areas, or sections, on the basis of population and geography. The ARRL members within each section elect their own Section Manager. The Section Manager directly appoints, in turn, a number of officers who serve as a sort of cabinet, one of whom is the Section Emergency Coordinator (SEC). If the Section is subdivided into districts, the SEC will appoint for each a District Emergency Coordinator (DEC). The DEC's appoint local Emergency Coordinators (EC), each of whom appoints an Assistant Emergency Coordinator (AEC).

Though the actual day-to-day working of any one section will differ from another according to that Section's unique circumstances, the burden of recruiting and training hams for emergency work, interacting with local emergency services, and negotiating inter-jurisdiction communications agreements for crises that cross organizational boundary lines falls principally upon the ECs appointed at the municipal and county levels.

Generally, hams in the ARES get hands-on practice throughout the year, providing, for example, volunteer communications for civic events expected to draw a large crowd. Further, the ARRL sponsors a Simulated Emergency Test (SET) annually. The teams that participate in the SET are graded on the number of hams mobilized, the number of reporting stations, their ability to carry out certain tasks that become necessary in the course of the exercise, and several other parameters. Participation in the event enables local organizations to assess their strengths and weaknesses, and refine their plans in anticipation of the day when the emergency is real and every minute counts.

In North Carolina, 6-term Section Manager Reed Whitten has patterned the structure of the Section emergency communications team to match precisely the State Emergency Response Team (SERT) structure. The section is divided into three districts, and each district is subdivided geographically to match the state's subdivisions. Thus, for every administrative level of the SERT there is a one-to-one correspon-

GLOSSARY

AEC	Assistant Emergency Coordinator
ARES	Amateur Radio Emergency Service
ARRL	American Radio Relay League
DEC	District Emergency Coordinator
EC	Emergency Coordinator, local level
EOC	Emergency Operation Center
SBC	Southern Baptist Convention
SERT	State Emergency Response Team
SET	Simulated Emergency Test

dence with a radio coordinator.

Though the circumstances governing every emergency are different, the Section takes provision of emergency communications seriously; for two years in a row it had the nation's highest score in the SET. The Section exploits the Internet, too, maintaining a mail list that continuously updates, via e-mail, news of pending events that might require emergency communications. Last, Whitten takes an expansive view of the ARES role; they are not, he insists, message technicians: they're communications consultants. That distinction would prove vital when Floyd hit.

Mobilizing for hurricanes

The 1999 Labor Day weekend in the mid-Atlantic was governed by Hurricane Dennis. The storm came up from the Caribbean, tapped North Carolina, then went back out to sea and parked. As the coast filled with tourists eager for one last summer weekend at the beach, Dennis sat offshore and churned. Then, atypically, the storm turned again toward land. Rough seas made it impossible for the ferries serving Ocracoke Island to operate, and high winds prevented air travel, stranding hundreds of residents and tourists. One by one, as water rose and spread across the island, power, water and telephone went out of service. Hams on Hatteras and the mainland passed hundreds of messages, reporting on everything from their visual inspection of utilities, to the location of a pregnant woman who had to be airlifted to a hospital to give birth, to squelching a wild rumor of mass starvation on Ocracoke.

Then, only two weeks later, the after-action reports and performance analyses barely digested by the ECs, a spine-tingling message went out: Hurricane Floyd was coming. And the Weather Service, recalling the Sumo wrestler-sized storm that devastated south Florida and wiped the town of Homestead right off the map in 1992, was characterizing Floyd as Andrew's big brother.

Floyd entered North Carolina the night of September 15th. Covering a massive area, the storm dropped rain in buckets, but the winds dropped rapidly once the storm made landfall. By early afternoon on Thursday, the 16th, the sky had begun to clear and most residents were counting their blessings. Floyd was gone, alright – gone upstream, where he was dumping stupendous amounts of water onto land saturated by Dennis only two weeks earlier. The water was gathering in ditches, filling drainage courses, cascading into overfull ponds and streams, gathering into cataracts.

DEC Jim Lewis, N4PE, spent the night of the 15th at the Nash County EOC. The night was not so bad as promised, and by mid-afternoon Thursday his communications teams had returned to their homes. In Edgecombe County, home to Tarboro and Princeville, two of the towns hit worst by flooding, there'd been no hams at the EOC. The facility was brand spanking new, most of the officers had cell-phones, and the radio equipment was some of the best that money could buy; for that matter, the gear had been sold to them by A.B. Gentry, WN4Z, the local EC. There'd be no need, the hams were told, for an anachronistic service like Amateur Radio.

Pandemonium and a surprise hero

Friday morning, Gentry awoke early and looked outside. Water was creeping across his lawn and toward his home. He awakened his wife and prepared to leave. By the time they got to his truck, water was lapping at the running boards. Minutes later the truck was swept up by flood waters. At 7:00 am, the Edgecombe County EC was standing on top of his truck, in water up to his knees, frantically radioing for help. He and his wife would remain there for more than two hours.

Gentry's AEC, Steve Unrein, KE4EGK, spent Friday morning helping a neighbor saw up a tree that had fallen the preceding night. At about 11:00 am, his wife came running down the street to notify him that she'd just learned that parts of Tarboro were flooding, and she was going to evacuate her mother from her home. Unrein decided to go with her. Caught in traffic while returning home, he learned from a town police officer that the repeater had failed. He sent his wife and mother-in-law home and went to assist the police, eventually commandeering a town-owned cherry-picker to dangle an emergency antenna high above the station.

The rising water dissected Tarboro, making it difficult or downright impossible for hams to get where they needed to be.

Chris Plumblee, KG4CZU, a 17-year old high school student who'd received his license only a few months before, was idling around his home that Friday afternoon and only vaguely aware of the flooding when he received a telephone call from a ham in Rocky Mount, a town about 20 miles away. Could Plumblee make it to the EOC and lend a hand?

Plumblee went, expecting to find adults

FREQUENCIES

Ham operators everywhere have established communications nets that will be used when disaster strikes; a comprehensive listing of them is available from ARRL (225 Main St, Newington, CT 06111) for $4.00. It's well worth the money: this book is to the monitor as an entire cheesecake is to your greedy-eyed author.

Florida
144.90, 145.23, 145.35, 145.37, 146.49, 146.61, 146.70, 146.715, 146.73, 146.745, 146.76, 146.775, 146.82, 146.88, 146.91, 146.925, 146.995, 147.00, 147.03, 147.06, 147.15, 147.195, 147.24, 147.27, 147.375, 147.70, 3908, 3940, 3950, 28450

Georgia
53.45, 145.13, 145.27, 145.35, 145.39, 145.45, 145.47, 146.61, 146.805, 146.985, 147.00, 147.015, 147.045, 147.075, 147.585, 224.60, 224.94, 443.075, 443.175, 3975

South Carolina
145.25, 146.535, 146.79, 3993.5

North Carolina
146.67, 146.76, 146.94, 147.12, 147.015, 145.35, 147.30, 442.15, 442.35, 3923

Virginia
145.11, 145.37, 145.43, 145.49, 146.415, 146.655, 146.715, 146.745, 146.76, 146.79, 146.82, 146.91, 146.94, 146.97, 147.09, 147.12, 147.18, 147.195, 147.27, 147.165, 147.255, 147.345, 147.36, 147.39, 3680, 3910, 3947

All frequencies courtesy of American Radio Relay League

VISITORS

Disaster relief is a fearsome job. The demands are huge, the resources few, and the dimensions of the disaster are imperfectly known and ever-changing. Imagine, then, that your on-the-fly efforts to gain control must abruptly be set aside because some dignitary or other has decided to come share your pain.

On this point, the people I spoke with were nearly unanimous: Clinton's concern might be welcome, but his presence certainly wasn't. All aircraft were grounded during his visit, with the result that volunteers found themselves standing around for hours at soggy, *ad hoc* landing fields while helicopters awaited clearance to get airborne.

Even worse, the doors to the Edgecombe County EOC were locked by the Secret Service when the President passed. American citizens, those at the literal center of the desperate effort to save lives and property were, in essence, summarily placed under house arrest because the Chief Executive was in the vicinity.

There were other problems. Media folk from all over the world descended on the area and gobbled up precious communication resources. Some reporters, for example, kept cellular telephone connections open for hours rather than risk being unable to connect when it was time to file a report.

The long-standing advice (in some jurisdictions, statutes) about going to the scene of an emergency is still the best: if you're not participating in the relief effort, if you don't have a job to do – *stay away!*

who'd tell him what to do ("Cream and sugar in that?"). What he found, instead, was pandemonium, an EOC that had collapsed. He stripped the gear from his car, set his mag-mount antenna on a windowsill and, sitting on the floor, began assembling an emergency net. The next day his father would help him strap a groundplane antenna to a mast and tie the mast to the side of the EOC, where it rested atop an awning. Breaking only for sleep and chow, he would remain on station as net control for the next 11 days.

The near simultaneous loss of his home, business and transportation forced Gentry out of action, and Unrein was forced to take control of the local communications effort. By the end of that long, first day he'd managed to get people where they were most needed, except the town of Conetoe (Koh-knee-tuh), the remote home of approximately 600 people. He went there himself by helicopter, arriving at about 2:00 am Saturday. With the assistance of his son he hooked up an emergency generator for the shelter, hooked up the radios, and began filing reports. Before it was over, the Edgecombe County radio team would pass thousands of messages, covering everything from missing person reports to prescription requests.

The havoc ranged far beyond Tarboro and the adjoining town of Princeville, however. In Nash County, DEC Jim Lewis was assisting at the EOC and coordinating the work of ECs throughout low-lying eastern North Carolina. All were hampered by rapidly rising floodwaters and Mother Nature's wicked sucker-punch: they'd mobilized for an emergency, believed it had passed, then scattered – only to find themselves confronted, just a few hours later, by a disaster larger than anything they'd ever even imagined.

In the capital city of Raleigh, the state government was frantically organizing the relief effort. The EOC is located in the basement of a downtown office building, and consists of a rectangular set of hallways with small offices on the outside perimeter and, on the inside, a large central conference room with seating for about 100. Digital maps of the anticipated flood for various storm intensities adorn the walls, and video equipment is available for virtually any presentation medium; as many as three separate images may be displayed at one time. The radio room itself is a copper-lined vault left over from the Cold War era. Each day, representatives of the various state and federal agencies, and relief organizations, assembled at 5:30 pm to report on the previous days activities and coordinate interagency work.

The high water mark is easily visible at the Tarboro Town Hall and Community Center. Not so evident is the red X which also marks this building for razing.

On day 5, the Southern Baptist Convention (SBC) reported they had eight mobile kitchens scattered across the flood zone, and were serving thousands of meals daily. The Salvation Army had 75 mobile canteens in the area, and was moving in portable showers and sanitary facilities. The Red Cross was operating shelters, and churches and fraternal organizations throughout the nation were gathering food, clothing and money, and dispatching busloads of shovel- and Pinesol-wielding volunteers to assist in clean-up.

Consistent with Reed Whitten's vision of ARES as an emergency communications consulting service, area hams had arranged for a repeater installation needed by the Red Cross for coordination with the SBC feeding efforts: they found the tower, the equipment, installed it, and negotiated the necessary permissions with the FCC; a week later, they did it all over again.

North Carolina got whacked with yet another heavy storm only days after Floyd passed, before the flood had crested in some areas. When the water did at last recede, Tarheels found themselves looking at a fetid bleakscape of corpses, rotting animals, raw sewage, and dislodged coffins. More than 4.2 million acres were flooded. 43,000 homes were damaged, and another 15,000 homes were totally destroyed. More than 1,000 roads were closed, including, for weeks, I-95. Eleven major bridges were washed out, and 21 sewage treatment plants were flooded. More than a million poultry were drowned in their barns. Life in the affected areas will not return to normal for many years, if ever.

But ARES is determined to be ready for whatever comes next. In Tarboro, the local leadership met on October 10th to review the lessons of the Floyd disaster, and refine their plans. They were just in time, it turned out: only days later, the Weather Service announced that Hurricane Irene was on her way.

The author may be contacted at RMFelton@aol.com

RUMORS

The ARRL communications manual specifically admonishes emergency operators to scrupulously avoid broadcasting rumors. They know that news-junkies will be eavesdropping, and don't want emergency communications to be the source of misleading information that might lead to needless problems.

Listening in on the Tar Heel Emergency Net several evenings in a row, I never heard anyone directly contradict that day's official fatality count or offer a private estimate. I did hear a lot of comments, however, that in tone and context left no doubt that the operator believed the number of actual fatalities was much higher than the SERT had formally acknowledged. Privately, operators offered estimates ranging up to 200 dead. (The official toll, as of this writing, is 57.)

It makes you wonder: the State is saying *x*, but the people carrying the messages, who sure ought to know, say the number is much higher. Who's right?

The state, probably. Admittedly, the state wants scary numbers in order to bolster their petition for federal aid and is lumping specious fatalities into the official total. One of the official Floyd "victims," for instance, is an automobile passenger who died when the driver drove around a blockade and went off a washed-out bridge – long after the storm had passed. By even North Carolina standards, where public-sector dishonesty is a sort of spectator sport, this is opportunistic.

On the other hand, there are no reports in the media or on the net about people searching for missing relatives or friends. It's conceivable there might be one or two corpses yet to be discovered, but not 150.

How, then, does it happen that some operators are so certain the official numbers are significantly low? The most likely explanation is that the report of a single corpse is broadcast repeatedly with slightly different coordinates; tick-tick goes the operator's mental counter, many times for a single fatality. And don't forget that hyperbole tends, in any case, to flow in direct proportion to the adrenaline.

The lesson for the monitor is clear: don't assume that anything originating from the maelstrom is necessarily correct. The volunteers and emergency services personnel are doing the same thing you're doing: struggling to get the big picture and, sometimes, thinking aloud.

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Using Music to Help ID Shortwave Stations

by Bob Tarte

Shortwave reference guides like the *World Radio TV Handbook* and *Passport to World Band Radio* take some of the mystery out of DXing. *Monitoring Times* gives you another big leg up. So, on the international bands, identifying a station can often be as simple as checking time, frequency, and the language of a broadcast against a printed schedule. Bingo. You've bagged Iceland.

The situation gets trickier if you don't recognize the language, or if two same-language stations share a time and frequency – especially in the Tropical Bands (2000-5900 kHz) where hour-to-hour changes in propagation dramatically affect what you can hear. And even monthly publications have trouble keeping pace with the frequency and scheduling idiosyncrasies of domestic shortwave broadcasters. The station you've glommed onto might even be too new to have made it into print.

Say you're hearing what you're reasonably sure is Portuguese on a 60 meter band frequency in the wee hours of the night, but your reference materials turn up a big zilch. Common sense might indicate you've pulled in a Brazilian, but if the propagation gods are generous, you may have snagged Angola or Mozambique. Knowing what type of music is popular in the country you're hearing can give you a definite edge on an ID. Should the playlist lean toward samba-influenced tunes, Brazil is a safe bet. But if the ambiance leans toward *kizomba*, Angola is the ticket instead.

Knowledge of the kinds of music a station would never play can be just as important as knowing what it would. An unidentified Middle Eastern station broadcasting a *muezzin* calling passages from the Koran could originate from any Islamic country. But if you've tuned in any flavor of Middle Eastern pop music, you can safely eliminate conservative nations like Saudi Arabia or Iran.

The World Pop Bulldozer

While a dose of musical savvy can help pin down a country on the airwaves, there are a couple of caveats. First, music from one country may be popular throughout an entire region. Cuban-based salsa and *timbia* is played with often subtle local variants throughout Latin America and beyond. The juggernaut of African music, Congolese *soukous* – originally based on the Cuban rumba – still has incredible reach throughout the continent, though it's nowhere near as pervasive as in years past. The ubiquity honor goes to American rap and its offshoots, which have penetrated virtually every urban culture in the world. Whether pure or homegrown, hip hop music along with other western pop genres bulldoze local forms. A Lauryn Hill hit is just as likely from Maputo or Honiara as it is from Omaha. But keep listening, because the next song you hear may well be a traditional-based piece that will tip you off to country of origin.

The listing that follows is an introduction to some of the music you're likely to run into while DXing Latin American and Africa on the 120-, 90-, and 60-meter bands. Since even my golden verbal descriptions only go so far, I'm also recommending some currently available CDs that will not only give you an insight into different styles of world music, but also provide darned good listening. Every CD cited is in my own collection. For the most part, the listing below does not include countries with one or more major international broadcast stations, because these are usually easy to identify by other means. Instead, the focus is on stations that mainly inhabit the Tropical Bands and, in a few instances, medium wave.

Also not included here is info regarding music you'll find on evangelical shortwave stations in Guatemala, Ecuador, Swaziland, and elsewhere. Chances are, if you've keyed in the frequency for one of these, propagation favors your target area, and you're hearing devotional songs, you've hit the bulls-eye.

Finally, a tip for the fiscally conservative. You needn't spend all your cash on the discs cited below to benefit from this article. You can listen to most of them on-line via RealAudio sound samples at **amazon.com** or other e-commerce sites that sell CDs.

LATIN AMERICA & CARIBBEAN

Argentina

A country as cosmopolitan as Argentina absorbs musical influences from all over the world. But whatever pop fads come and go,

the national passion remains the tango. Centered around the big brother to the accordion – the *bandoneon* – and often accompanied by an orchestra, tango combines strong European melodies, a gypsy sensibility, and an unmistakable air of melancholy. It's become a musical craze as far away as Finland. Tango is easy to recognize. But if you need help, refer to anything by the legendary Astor Piazzolla, whose name is synonymous with tango's artistic peak.

Brazil

If the Portuguese language in rapid-fire fashion isn't a tip-off that you've tuned into a Brazilian station, the music will be. Samba, Brazil's national sound, is identifiable via its acoustic lead guitar, mellow vocals, gliding back beat, and sensuous percussion laid down by a metal scraper or multiple carnival drums. Regional stations might favor *forro*, a sparkling accordion based music usually played fast, or other pop based on ritual drumming borrowed from Brazil's *candomble* and *umbanda* religions. *Brazil Classics I: Beleza Tropical* (Luaka Bop label) is one of the best Brazilian anthologies you'll find. *Forro: Music For Maids And Taxi Drivers* (Rounder Records) will give you the lowdown on *forro*.

Cuba

There's little mystery to finding Cuba on shortwave. But in the winter months, you may also run across it on medium wave. From my Michigan location, Radio Taino often comes in loud and clear on 1180 kHz, eclipsing WHAM, Rochester, NY. The continuing music craze in Cuba is *timbia*, an update of New York *barrio*-spawned salsa, which in turn updated the big band mambo of the '50s. Listen for hard-charging brass, metallic-sounding timbale drumming, and high energy call-and-response vocals. Los Van Van does timbia proud on *Llego...Van Van* (WEA/Latina). A rural guitar-based style known as the *son* has also made a comeback thanks to the Grammy Award-winning *Buena Vista Social Club* (World Circuit/Nonesuch).

Colombia

Colombian radio broadcasts a wide range of Latin music, many with same generic romantic sound that you'll run into on Venezuelan stations. But be attentive for *cumbia*, characterized by a perky beat reminiscent of Jamaican reggae and often shot through with playfulness. Two discs on the World Circuit label, *Cumbia Cumbia* and *Cumbia Cumbia 2* include some of the biggest *cumbia* smashes. *Vallenato* is a macho accordion style from the Atlantic coast, fast as merengue but nowhere near as airy. Try *Fiesta Vallenata* (Shanachie or Sony Discos). *Porros* is a festive rural brass band genre you'll also hear on Colombian stations, and while you might find some CDs in the import bin, sadly there are no American-label *porros* CDs in print.

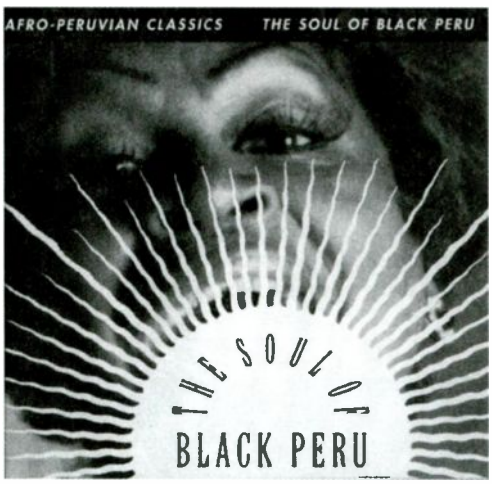
Dominican Republic

Picture the looseness of Cuban music played at double speed and propelled by an accordion played so fast you'd swear the performer had four hands. Toss a saxophone, metal scraper, and hand drum into the mix, and you've got Dominican merengue. For a great overview of this wild style, seek out *Merengue: Dominican Music and Dominican Identity* (Rounder Records). Prominent on Radio Villa, la sencilla, on 4960 kHz is an aggressive roots dance music called *bachata* which is recognizable by a slower quasi-rumba beat, simplified arrange-

ments backed by repetitive amplified guitar riffs, and an emphasis on vocals. Hey, that almost describes rock! Leading the charge is Juan Luis Guerra, with numerous American-label and imported *bachata* releases.

Guatemala

A handful of low power Guatemalan stations on the 120- and 90-meter Tropical Bands are easy to ID due to their penchant for playing marimba conjunto music. Conjunto in this context simply means ensemble, and the marimba is a wooden xylophone. Though most marimba conjunto music lacks the swing of other Latin styles, it can still be rhythmically complex. On major holidays and feast days of the saints, listen for flute and drum festival music punctuated by bottle-rocket explosions! For examples of both marimba conjunto and festival music, leap north to the superb anthology *Mexico: Fiestas Of Chiapas And Oaxaca* (Nonesuch) or try an import of Guatemalan marimba tunes.



Peru, Bolivia, Ecuador

Panpipe music of the Andes get a high profile on HCJB, though you might be lucky enough to hear a more dissonant, back country variant from regional broadcasters. Budget samplers of panpipe music are so numerous, you might even run into one at Walmart. The hardcore, less ear-pleasing Andean *huaynos* styles comprise the *Traditional Music of Peru* series releases on Smithsonian/Folkways. Less well known are Peruvian genres like *chica*, mixing traditional highlands music and rock, along with new urban music that's equal parts Spanish drama and American soul featured on the Luaka Bop label release, *The Soul of Black Peru*. Emphasizing street corner Andean string music is the highly recommended *Peruvian Harp & Mandolin* by The Blind Street Musicians of Cusco (Music of the World).

Venezuela

Broadcasters like Ecos del Torbes give Venezuela a high profile on the Tropical Bands, but CDs dedicated to the music of this country are sparse. That's too bad, because the lush, romantic Latin ballads played on Venezuelan stations make fighting static and interference worth the effort. Check out "Hablame" by Carangano y Jose Luis Garcia on *Danza Latina* (EMI Hemisphere), an anthology of Latin American dance music. *Cumbia* and salsa are perennial favorites, but for a taste of the gorgeous waltz sensibilities that still underpin Venezuelan pop, I'd have to steer you towards a disc by a Trinidadian composer. Lionel Belasco's career spanned over 40 years, and in addition to bringing Venezuelan melodies to his calypso compositions, he preserved traditional songs like "Rose of Caracas Waltz" and "Rosa Negra Vals Venezolano." Catch these on the nostalgic *Goodnight Ladies and Gents: The Creole Music of Lionel Belasco* (Rounder).

Other Caribbean Countries

Probably no one needs to be told that the national music of Trinidad is calypso. This far reaching style kicked off the careers of Harry Belafonte, Maya Angelou, and even Louis Farrakan – not to mention calypso greats like the Mighty Sparrow, Lord Kitchener, and Roaring Lion. Look for a speeded up version with synthesizers and drum machines called soca if you medium wave DX this country. In the Francophone Caribbean countries of Guadeloupe and Martinique, you might hear *zouk*, a synthesizer based-pop with Latin beats and Gallic inflections. Expect a variant of merengue from Haiti along with styles related to *compas* which mixes classic "voudou" drumming with sophisticated vocals, guitars, and pop arrangements. Boukman Eksperyans, which calls their Haitian pop *voudou adaje*, has brilliant CDs in print, including *Kalfou Danjere* (Mango). Also see *Hurricane Zouk* (Earthworks), *Zouk Attack* (Rounder), and *The Rough Guide To Calypso & Soca* (World Music Network) for Trinidadian styles past and present. A nice survey disc with a little bit of everything is *Caribe! Caribe!* (Putumayo).

Trinidad and other Caribbean countries have a sizable East Indian population, so if you hear traditional Hindu songs or pop from Indian film soundtracks, you might have pulled in Trinidad, Guadeloupe, Surinam, Panama, or other places on medium wave. I heard a lot of this while DXing the islands on medium wave during a vacation on St. Kitts. *East Indian Music in the West Indies* (Rounder) is a whole disc devoted to this niche.

AFRICA

Angola and Mozambique

Latin American pop took half of what it knows from traditional African genres. Small wonder that African pop took it back again, this time with Angolan *kizomba*, which adapts the Brazilian samba to a two-person marimba. An updated version with soaring Congolese-style vocals comes on Bonga's *Angola 74* (Tinder Records). Marimba also drives *chopi* music of Mozambique along with half-shouted vocals reminiscent of rural South African styles. To hear it you'll have to root out *Timbila* by Eduardo Durao and Orquestra Durao (GlobeStyle Records). *Telling Stories to the Sea* (Luaka Bop) offers a great overview of styles from Portugal's former African colonies, including Cape Verde, home of the aptly-named melancholy and samba-like *morna*.

Botswana

Musically speaking, much of what applies to South Africa can be said for the southern African nation of Botswana. Unlike the SABC, however, Radio Botswana on 4820 kHz plays lots of African and African-American pop, plus loads of reggae.

Cameroon

Bikutsi has taken Cameroon by storm by translating the fast rhythms of the *balafon* marimba to sampling keyboards. *Bikutsi Rock* by Les Têtes Brûlées (Shanachie) showcases *bikutsi* at its high-tech peak. For a more pastoral ambiance, *Heart of the Forest: Music of the Baka People of Southeast Cameroon* (Hannibal/Rykodisc) features the otherworldly yodeling voices and lovely harp instrumentals of the Baka pygmies.

Congo

It's tough to underestimate the role of Congolese music in Africa. The pop visionary who called himself Franco took the popular Cuban rumbas of the 1950s and gave birth to *soukous* by adapting them to electric guitar and local beats. The shortwave service of the former Zaire still plays plenty of *soukous* which you can easily identify by its joyous soprano repeating guitar figures, Latin beat, and mellifluous vocals. In his four-decade career, Franco cut too many LPs to count, but none are licensed to American labels. French imports are your best bet. Luckily, his contemporary, Tabu Ley Rochereau, has several American releases like Rounder Records' *Muzina* to whet your appetite for Congolese pop. For speeded-up modern *soukous*, Kanda Bongo Man's effervescent *Zing Zong* (Hannibal/Rykodisc) is a barnburner.

Ethiopia

Pop music in Ethiopia never recovered from the repressive military junta that ruled from 1974-1992. But urban folkies known as *azmaris* somehow slipped past the censors' noses. They continue to perform loose and crazy string-band songs heavy on the improvisation and topical commentary. This music is unique among urban African genres for not containing any apparent trace of Latin or western influences, and unlike East African neighbors Sudan and Kenya, it isn't shaped by Arab styles either. *Ethiopiques 2, Tétchawét* on the French Buda Musique label is well worth seeking out as a weird and wonderful anthology of these rarely heard *azmaris* styles.

Ghana

Ghana is the country where highlife was born (see Nigeria), though only in the past few years have I heard it played again on the GBC. While out-of-fashion for a while as yesterday's sound, you can't keep a potent genre down, even if the focus has shifted from big band instrumentation to electric guitars and synthesizers. *The Lord's Prayer* by Super Sweet Talks International (Sterns Africa) mixes classic and more modern highlife approaches. Drum music, gospel, and reggae are also Ghanaian favorites.

Kenya

Guitar Paradise of East Africa is the Earthworks label's aptly named collection of the *benga* guitar pop of Kenya's Luo people. Featuring guitar runs similar to Congolese *soukous* but with a slower beat some claim was lifted by James Brown's "Sex Machine" along with less of an overt Cuban influence, *benga* hit big in the '70s and resurged in the early '90s. With a classic sound akin to Nigerian guitar highlife, *benga* – along with the more rumba-influenced *virunga* – will certainly live long and prosper. But as in much of Africa, the pop scene thrives via a cassette culture that goes directly from live concert recordings to street corner tape kiosks with little dependence on indifferent government radio. *Taarab*, a traditional music of the Swahili people, may be a better bet on the airwaves. See Tanzania for details.

Madagascar

Malagasy music is incredibly sophisticated, from sparkling *valiha* zither music to infectious dance music by pop stars Tarika and Rosy that's as well-produced as anything on the planet. Both bands have a couple of fine American releases. Local guitar music is rhythmic, ornate, and lush, well represented by D'Gary on *Malagasy Guitar* (Shanachie Records). For anthologies featuring the above plus flute, accordion, and brass band music of the island, look for *Madigasikara One* and *Two* (GlobeStyle) and the two Shanachie-label *A World Out of Time* releases.

Mali and Guinea

Mali is home to a dazzling array of music, from the traditional *jali* court musicians who sing of Manding history accompanied by the *kora* harp (*Jali Roll* on Rogue Records is an updated example), to pop ensembles with *balafon* marimba, violins, and a kind of Oriental sound (Oumou Sangare's *Worotan* on World Circuit), to acoustic guitar wizards Afel Boucom and Grammy Winner Ali Farka Toure. Think harp and *balafon*, and you'll get a handle on Malian roots music. The Manding culture is prevalent is Guinea as well, and the folkloric side of Guinean music complete with the characteristic 'shrill' vocals, *balafon*, and *kora* ensembles aired on RTV Guineenne run rampant through *Les Ballet Africains de Papa Ladji Camara* (Lyrichord).

Mauritania

The sound of Mauritania is the sound of the Sahara Desert, lonely and austere. The emphasis is on the human voice with some string and hand drum instrumentation. *Sahrauis* (Intuition Records) is a three-CD set of music from the region. The Moorish people play music with passionate vocals and fast fretwork both reminiscent of Spanish flamenco, which Moorish music influenced. *Moorish Music from Mauritania* (World Circuit) by Khalifa Ould Eide and Dimi Mint Abba is highly recommended.

Namibia

Unless Namibian BC policies have changed this season, if you pull

in the Namibian Broadcasting Corporation, you won't be hearing African pop. Elevator music on 3270 kHz or 3290 kHz is a tip-off that propagation favors southern Africa.

Nigeria

Nigerian shortwave showcases lots of American soul music. But you'll also hear pop based on Yoruban polyrhythmic drumming, such as *juju* which combines a leisurely Afro-Latin flow with sparse instrumentation and smooth vocals. King Sunny Ade's *Juju Music* (Mango) is among the best African pop discs ever released. Also listen for the perennially popular mix of western instrumentation and local rhythms known as highlife, plus domestic variations on reggae. Nigeria has yielded a huge number of international sensations, including the late saxophonist -bandleader Fela Anikulapo Kuti, whose anti-government stance virtually assures he'll never show up on the Nigerian BC.

Senegal and Gambia

Mbalax rules in Senegambia, a souped up amalgam of Latin influences, fast and furious traditional *sabar* drumming, and nasal Islamic-sounding vocals. The most up-to-date anthology of Senegalese pop is *Streets of Dakar* (Sterns), or to get the rhythms with few externals, pick up *Tabala Wolof; Sufi Drumming of Senegal* (Village Pulse/Sterns). *Kora* harp music is also widespread (see Mali). Senegal's best-known singer is Youssou N'Dour, who guested on Peter Gabriel's *So* and has numerous American releases, though his '70s recordings with his group Etoile de Dakar are best. Other international stars from Senegal include Baaba Maal, Ismael Lo, and Omar Pene, all with fine American-label releases.

South Africa and Lesotho

South Africa is home to *mbaqanga*, an amplified pop derived from Zulu traditions and favoring thumping electric bass, a rather plodding rock-like beat, jangling guitars, and exuberant female vocals. This beat was the basis of many of the compositions on Paul Simon's *Graceland*. The same applies to a style called township jive or *kwela*, with an emphasis on jazz and R&B-inflected saxophone leads (see anything by the Boyoyo Boys). But I don't recall having run into other than classical music, western pop, and elevator music on Tropical Band SABC services like Radio Oranje or Radio Orion. If you're lucky enough to find otherwise, you may also connect with lovely Zulu chorale music known as *mbube*, whose most famous proponents, Ladysmith Black Mambazo, have several excellent American releases and also guested on *Graceland*.

For a nice overview of South African pop styles, including homegrown hip-hop, have a *South African Rhythm Riot* compliments of the Earthworks label. Since Lesotho is circumscribed by South African, there's little wonder that both countries share many musical tastes. The style sometimes called *sotho* has a similar beat and dynamics to *mbaqanga*, but is rawer, less melodic, frequently accordion driven, and punctuated by herding calls and whistles!

Sudan

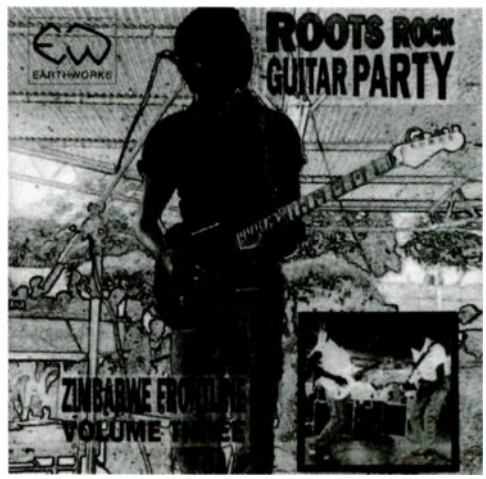
Merdoum is an ensemble style pioneered by the Abdel Gadir Salim All-Stars and beautifully represented on *The Merdoum Kings Play Songs of Love* (Shanachie). Lead instruments are the ubiquitous Middle Eastern *oud* lute, violin, and saxophone, tied together by bustling handdrum percussion, and a jazzy feel that almost approximates the western swing of Bob Wills! A more basic *tar* handdrum and *oud* lute style with clear Islamic roots from Sudan and Egypt's Nubian people is lovely and evocative beyond words on the latest Hamza El Din disc, *A Wish* (Sounds True).

Tanzania, Zanzibar

Few musics carry the melting-pot ideology as well as *taarab*, the wedding music of East Africa's Swahili people that's become a festive staple of Tanzanian life. Lush and exotic, *taarab* takes its vocal style from Indian film music, its instrumental arrangement from Egyptian string orchestras, its percussion from various Arab "bellydance" musics, and its rhythm from local traditional dance. Romantic, corny, and nearly irresistible, *taarab* conjures images of a clove-scented night in Zanzibar. The widely played so-called "women's taarab" was most recently collected on the German Network Medien label's *Spices of Zanzibar*, or look for four volumes of *taarab* anthologies on the GlobeStyle label, which also showcases the more Arab-sounding "men's taarab" on *The Style of Mombassa*.

Togo

Radiodiffusion Togolaise has a liking for middle-of-the-road American music – I once heard a 20-minute set of harmonica ditties – but listen also for *balafon* marimba-based traditional fare and polyrhythmic drumming.



Zimbabwe

Chimurenga and *jit* are two enduring Zimbabwean pop styles, both based on traditional *mbira* thumb-piano songs transcribed for electric guitar. The *mbira* is the heart of the Shona people's spiritual tradition, as heard on *Shona Spirit* (Music of the World). The charismatic father of *chimurenga* is Thomas Mapfumo, who lobbed anti-government singles during Zimbabwe's fight for independence. He as several top-notch American releases, as do *jit* inventors The Bhundu Boys. *Muchihedza* (Cooking Vinyl) is one of their best. Proof that Zimbabwean guitarists have the fastest fingers around can be had on the Earthworks label anthology *Roots Rock Guitar Party*.

Concluding Note

Not only isn't the above the list comprehensive, but it also doesn't even scratch the surface of the diversity of musical styles of any given country. Even a small nation like the Bahamas has more instrumental and vocal music traditions than you can shake the Sloop John B at. See *The Bahamas, Island of Song* (Smithsonian Folkways), *Deep River of Song: Bahamas 1935* (Rounder), *Joseph Spence, Happy All the Time* (Hannibal/Rykodisc), and... oh, never mind.

MT

ABOUT THE AUTHOR

Since 1989, Bob Tarte has written a world music CD review column for the Los Angeles-based music magazine, The Beat. Over 600 of his world music CD reviews are available at **www.technobeat.com**. If readers find the above analysis useful in their DXing, Bob promises a similar, but shorter, overview of Pacific and Asian music.

DXing the AM Broadcast Band

By Larry Van Horn, N5FPW
MT Assistant Editor

Hearing a distant radio station – or "DX" as it is known in the radio hobby – has been a favorite pastime of many a radio hobbyist. Ham operators chase DX for the challenging "DXCC" or "DX Century Club" award from the American Radio Relay League (ARRL). Shortwave broadcast listeners tune for flea-watt broadcast stations in far off lands in the hopes of increasing their total country and station counts. They also QSL (collect verification letters or cards) these elusive stations to qualify for awards from various shortwave radio clubs.

But no matter what aspect of radio a respected radio buff may be into today, ask him how he got started and the answer is almost universal: AM radio!

Most radio hobbyists and hams can trace their radio roots to an early brush with DXing while listening to distant stations in the AM broadcast band (530-1700 kHz). Whether the vehicle was a radio given to a youngster for a birthday or holiday or the family AM radio, hearing distant AM radio stations fill their radio speaker is how most DXers started out in the radio hobby.

Now that you are grown up, if you really want a challenge that has only been accomplished by a handful of radio hobbyists, try hearing at least one AM broadcast band station from each of the U.S. 50 states. In this article we will feature *MT*'s best bets for hearing 50 states on the AM broadcast band. But, first, a little introductory material is in order.

Not all AM Stations are Created Equal

One of the benefits of DXing the AM radio spectrum is that there are so many different stations on the air you could never hope to log all of them. But that is the challenge and fun part of DXing AM: to see how many different stations from as many different states you can log.

First of all there are 117 AM broadcast band frequencies spaced 10 kHz apart. Some of these channels have only a few high powered stations on them and others like the local channels (1230/1240/1340/1400/1450/1490) have hundreds of stations on the frequency.

And not all AM radio stations are the same when it comes to their on-the-air operations. Some AM stations are allowed to run their broadcast operation during daylight hours only, signing off the air at sunset. Some stations can run both day and night, but have to change their power and/or antenna pattern at sunset/sunrise. Still others are allowed nighttime operations, but only with a few watts, while still other stations can use as much as 50,000 watts and omnidirectional patterns. Still other operations are allowed to operate with reduced power starting at 6 a.m. local time during the winter months, then sign on at full power at local sunrise.

Although U.S. station transmit powers vary from a couple of watts to 50,000 watts, overseas AM broadcasters can use much more power, depending on their government authorizations, and they use a spacing of 9 kHz between frequencies. So you will find a wide variety of station facilities on each of the 117 U.S. frequencies that are available for AM broadcasters, and this translates to a lot of DX targets to hear.

When to Listen

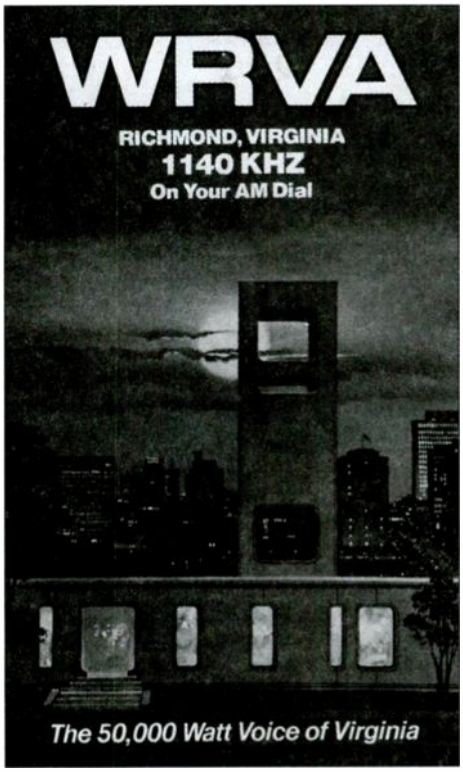
Another thing that contributes to the large amount of stations to be heard on the AM bands is radio propagation. Propagation on these frequencies varies not only seasonally (winter versus summer), but it is also diurnal. In fact, you can divide a 24-hour day up into five distinct periods in which propagation has markedly different effects on AM reception.

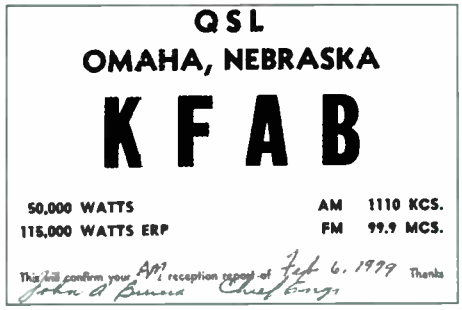
These five DX periods include:

1. Daytime hours (two hours after local sunrise until two before local sunset)
2. Sunset hours (two hours prior to sunset until 8 p.m. on East Coast)
3. Evening hours (8 p.m. on East Coast until local midnight)
4. Deep night hours (local midnight until 5 a.m. on the East Coast)
5. Sunrise hours (5 a.m. on the East Coast until two hours after local sunrise)

One little known fact is that sunset times

Selected QSLs from the author's collection of clear-channel stations. Though some of these QSLs date back to the 70s, you can still catch the same stations today.





for daytime-only stations and power/antenna pattern change operations are assigned by the FCC, so that sign-off on the 15th day of the month is at local sunset (to the nearest 15 minutes). During the last half of the month in the fall and the first half of the month in the spring, a daytime-only station may broadcast later than actual sunset. These are the best times to DX during the sunset skip periods.

Each period mentioned above will produce a wide variety of stations to be heard. The sunset skip period is particularly useful to listeners in the eastern part of the United States. This is because, as the sun moves west, stations in those time zones become audible after your local daytimers sign off (usually at full daytime power). West Coast DXers will see the same effect, but in reverse during sunrise periods as they watch East Coast stations sign on way before their local broadcasters return to the air.

One note of interest here is that the difference in DX between period three mentioned above and period four isn't really a function of propagation as much as it is station operations. Quite a few broadcasters sign off the air after their local midnight, thus uncovering other stations that might not be heard otherwise. This can be a daily occurrence or it might happen once a week. You will find that Sunday and Monday mornings will have a large concentration of stations leaving the air for a few hours.

So the best time to DX the AM band is from about two hours prior to sunset until two hours after sunrise. During these semi-darkness/darkness hours, AM radio signals are no longer absorbed by the lower levels of the ionosphere as they are during daylight hours, but they are propagated (reflected) over great distances via the ionosphere.

During daylight hours, you will be restricted in the distance AM station signals propagate. Usually about 300 miles is the maximum under normal conditions, but some stations have been heard even further under optimum conditions and using advanced equipment.

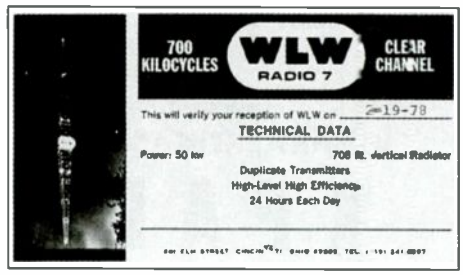
As I mentioned above, there is also a seasonal variation to monitoring AM signals. Winter months provide the best conditions for long haul AM reception since there are more hours of darkness in the winter months than the summertime. Also summer reception on the AM band is riddled with lightning static crashes which tend to mask weaker more distant station reception.

Equipment

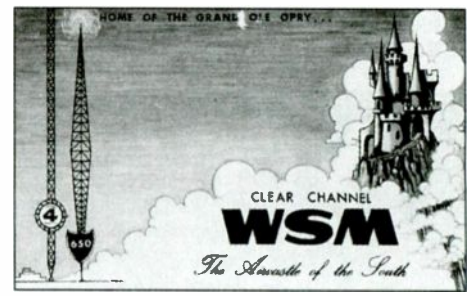
The equipment needed to monitor the AM frequencies is easily within reach of

every pocketbook. Chances are you have an AM receiver in your home right now. All you need to do is wait until darkness comes to your location this evening and start logging all the far-off AM stations you hear. Even on the simplest of equipment, you can hear from 50-100 stations at night from just about any location worldwide using the internal antenna of your AM receiver.

The average boom box or family clock radio, however, will only get you the loudest of the AM radio signals. If you really want to DX the medium wave band there are a few low cost alternatives you can



purchase that will boost reception and your "stations heard" totals. One of the favorite radios used by AM broadcast listeners is the GE Super Radio III. It has been a workhorse for many AM listening buffs,

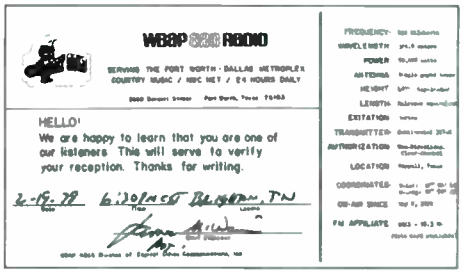


providing high performance for low cost ($59.95 plus shipping from Grove) for many years.

A low cost add-on accessory for this or

TABLE 1: MT'S 50 STATES PLUS DC BEST BETS

State	Call	Freq (kHz)	Location	Power (kilwatts)	Program Content
Alabama	WMKI	850	Birmingham	50kw-d 1kw-n	Kids Programming
	WPHG	1620	Atmore	10kw-d 1kw-n	Gospel Music
Alaska	KENI	650	Anchorage	50kw	News/Talk
	KDLG	670	Dillingham	10kw	Variety
	KBYR	700	Anchorage	10kw	News/Talk/ Sports
	KFQD	750	Anchorage	50kw	News/Talk
Arizona	KTAR	620	Phoenix	5kw	News/Talk
	KTNN	660	Window Rock	50kw	Country Western
	KMIK	1580	Tempe	50kw	Kids Programming
Arkansas	KAAY	1090	Little Rock	50kw	Gospel/ Religion
California	KFI	640	Los Angeles	50kw	Talk
	KNBR	680	San Francisco	50kw	Talk/Sports
	KNX	1070	Los Angeles	50kw	News
	KSMH	1620	Auburn	10kw-d 1kw-n	Religion
	KDIA	1640	Vallejo	10kw-d 1kw-n	Religion/Talk
	KGXL	1650	Torrance	10kw-d 1kw-n	Nostalgia Music
Colorado	KOA	850	Denver	50kw	News/Talk/ Sports
	KDDZ	1690	Arvada	10kw-d 1kw-n	Kids Programming
Connecticut	WTIC	1080	Hartford	50kw	Adult Contemporary Music/Sports/ Talk
Delaware	WDEL	1150	Wilmington	5kw	News/Talk/ Sports
	WDOV	1410	Dover	5kw	News/Talk
District of Colombia	WMAL	620	Washington	5kw	News/Talk
	WTEM	980	Washington	50kw-d 5kw-n	Talk/Sports
	WTOP	1500	Washington	50kw	News/Talk
Florida	WQAM	560	Miami	5kw-d 1kw-n	Talk/Sports
	WMIB	1660	Marco	10kw-d 1kw-n	Nostalgia Music
	WTIR	1670	Winter Garden	10kw-d 1kw-n	Tourist Information
	WAFN	1700	Miami Springs	10kw-d 1kw-n	Talk/Sports
Georgia	WSB	750	Atlanta		
	WRNC	1670	Warner Robins	10kw-d 1kw-n	Country Western Music
Hawaii	KHNR	650	Honolulu	10kw	News/Talk
	KLHT	1040	Honolulu	7.5kw	Religious
Idaho	KBOI	670	Boise	50kw	News/Adult Contemporary/ Oldies/ Talk
Illinois	WMAQ	670	Chicago	50kw	News/Sports
	WGN	720	Chicago	50kw	News/Talk/ Variety
	WBBM	780	Chicago	50kw	News
	WLS	890	Chicago	50kw	News/Talk
Indiana	WOWO	1190	Fort Wayne	50kw-d 9.8kw-n	News/Talk
	WMYS	1430	Indianapolis	5kw	Nostalgia Music
	WHLY	1620	South Bend	10kw-d 1kw-n	Nostalgia Music
Iowa	WHO	1040	Des Moines	50kw	News/Talk/ Country Western
	KCJJ	1630	Iowa City	10kw-d 1kw-n	Audlt Contemporary/ Talk
	KDNZ	1650	Cedar Rapids	10kw-d 1kw-n	News/Talk/ Sports
	KBGG	1700	Des Moines	10kw-d 1kw-n	Business News
Kansas	WIBW	580	Topeka	5kw	News/Talk
	KKGM	1250	Kansas City	25kw-d 5kw-n	Sports Talk
Kentucky	WHAS	840	Louisville	50kw	Talk
Louisiana	WWL	870	New Orleans	50kw	News/Talk/ Religion/ Country Western
	KWKH	1130	Shreveport	50kw	Country Western
Maine	WZON	620	Bangor	5kw	Talk/Sports
	WZAN	970	Portland	5kw	News/Talk
Maryland	WBAL	1090	Baltimore	50kw	News/Talk
	WMDM	1690	Lexington Park	10kw-d 1kw-n	Talk/Sports
Massachusetts	WBZ	1030	Boston	50kw	News/Talk
Michigan	WJR	760	Detroit	50kw	Sports/Talk/ Country Western
	WQSN	1660	Kalamazoo	10kw-d 1kw-n	Sports
	WJNZ	1680	Ada	10kw-d 1kw-n	Urban Contemporary Music
Minnesota	WCCO	830	Minneapolis/St Paul	50kw	News/Talk
	KSTP	1500	St Paul	50kw	News/Talk
Mississippi	WCPC	940	Houston	50kw-d .250kw-n	Religion/ Gospel
	WJNT	1180	Pearl	50kw-d .500kw-n	News/Talk
Missouri	KMOX	1120	St. Louis	50kw	Talk/News
Montana	KOFI	1180	Kalispell	50kw-d 10kw-n	Adult Contemporary/ Oldies/Talk



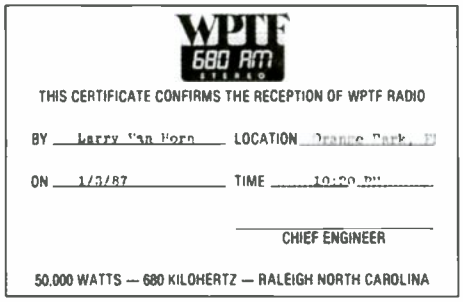
any radio that has a built-in ferrite loop coil is the Select-A-Tenna (also $59.95 from Grove). This high-Q loop antenna will boost your AM reception and also allow you to null out stations on a particular frequency, exposing weaker signals from another direction. Using a GE Super Radio and Select-A-Tenna here in Brasstown, I am able to null out my local AM broadcasters and receive more distant stations in their place.

At the opposite end of the pricing scale, if you are looking for the ultimate indoor antenna for medium wave reception and you have a quality HF communications receiver that does not have a built-in ferrite loop coil, then the Kiwi Amplified Loop ($359.95 from Grove) antenna is a great purchase. This unique, 12-inch circular, air core amplified loop will improve weak signal reception. It may be both rotated and tilted for maximum signal pickup and nulling of interfering stations, thus increasing the total number of AM stations you can hear.

TABLE 1: MT'S 50 STATES PLUS DC BEST BETS, CONTINUED

State	Call	Freq (kHz)	Location	Power (kilwatts)	Program Content
Nebraska	KRVN	880	Lexington	50kw	Country Western/ Religion
	KFAB	1110	Omaha	50kw	News/Talk/ Sports
	KAZP	1620	Bellevue	10kw-d 1kw-n	Sports Talk
Nevada	KDWN	720	Las Vegas	50kw	News/Talk
	KKOH	780	Reno	50kw	News/Talk
New Hampshire	WFEA	1370	Manchester	5kw	Nostalgia/Talk
New Jersey	WWRU	1660	Elizabeth	10kw-d 1kw-n	Spanish Talk
	WTTM	1680	Princeton	10kw-d 1kw-n	Business/News
New Mexico	KKOB	770	Albuquerque	50kw	News/Talk
	KCKN	1020	Roswell	50kw	Adult Contemporary/ Religion/Talk
New York	WFAN	660	New York	50kw	Talk/Sports
	WABC	770	New York	50kw	News/Talk
	WGY	810	Schenectady	50kw	News/Talk
	WCBS	880	New York	50kw	News
	WHAM	1180	Rochester	50kw	News/Talk/ Country Western
North Carolina	WPTF	680	Raleigh	50kw	News/Talk
	WBT	1110	Charlotte	50kw	News/Talk
North Dakota	KFYR	550	Bismark	5kw	Adult Contemporary/ Talk
	KSJB	600	Jamestown	5kw	Country Western
Ohio	WLW	700	Cincinnati	50kw	Adult Contemporary/ Talk/Country Western
	WTAM	1100	Cleveland	50kw	Talk/Sports
	WSAI	1530	Cincinnati	50kw	Talk/Religion
Oklahoma	KVOO	1170	Tulsa	50kw	Country Western
	KGYN	1210	Guymon	10kw	Country Western
	KOMA	1520	Oklahoma City	50kw	Oldies/Religion
Oregon	KPNW	1120	Eugene	50kw	News/Talk
	KEX	1190	Portland	50kw	Adult Comtemporary/ News/Talk
	KKJY	1640	Lake Oswego	10kw-d 1kw-n	Religion/ Gospel
Pennsylvania	KDKA	1020	Pittsburgh	50kw	News/Talk
	WCAU	1210	Philadelphia	50kw	Talk
Rhode Island	WHJJ	920	Providence	5kw	News/Talk
South Carolina	WESC	660	Greenville	50kw-d only	Country Western/ Sports
	WRIX	1020	Homeland Park	50kw-d only	Religion/ Gospel
	WGVL	1440	Greenville	5kw	Spanish "La Brava"
South Dakota	KSOO	1140	Sioux Falls	10kw-d 5kw-n	News/Talk/ Sports
	KOKK	1210	Huron	5kw-d .900kw-n	Country Western
Tennessee	WSM	650	Nashville	50kw	Country Western
Texas	WBAP	820	Fort Worth	50kw	Country Western/ Sports/Talk
	WOAI	1200	San Antonio	50kw	News/Talk/ Variety
	KRZX	1660	Waco	10kw-d 1kw-n	News/Talk/ Sports
	KTBK	1700	Sherman	10kw-d 1kw-n	Sports
Utah	KSL	1160	Salt Lake City	50kw	News/Talk/ Country Western
	KXOL	1660	Brigham City	10kw-d 1kw-n	Oldies
Vermont	WVMT	620	Burlington	5kw	Oldies/Talk
Virginia	WRVA	1140	Richmond	50kw	Talk
	WHKT	1650	Portsmouth	10kw-d 1kw-n	Religion/Talk
Washington	KIRO	710	Seattle	50kw	News/Talk/ Sports
	KOMO	1000	Seattle	50kw	Adult Contemporary/ Talk
	KGA	1510	Spokane	50kw	Talk
	KYIZ	1620	Renton	10kw-d 1kw-n	Adult Contemporary
West Virginia	WWVA	1170	Wheeling	50kw	Talk/Religion/ Sports/Country Western
Wisconsin	WTSO	1070	Madison	10kw-d 5kw-n	Nostalgia
	WISN	1130	Milwaukee	50kw-d 10kw-n	News/Talk
	WKSH	1640	Sussex	10kw-d 1kw-n	Religious
	WTDY	1670	Madison	10kw-d 1kw-n	Talk/Sports
Wyoming	KTWO	1030	Casper	50kw	Country Western/ News/Talk
	KKWY	1630	Fox Farm	10kw-d 1kw-n	Country/ Western

Legend: d=day n=night



Station List/Current Information

The AM broadcast band is a constantly changing section of spectrum real estate. Not only will the propagation conditions change minute to minute, but the stations themselves are constantly changing their facilities and callsigns.

To keep track of all of that, the listener should join one of the speciality clubs that are devoted to distant AM band reception. There are three worthy of consideration.

The granddaddy of all radio clubs is the National Radio Club (NRC), which has been around for 66 years. Their club newsletter, *DX News*, is published 30 times a year (weekly during the winter AM DX season). Here you will find up-to-date AM station information, reception logs both domestic and foreign (yes, you can hear other countries on the AM broadcast band), and station QSL information. For a sample copy of *DX News* write the NRC, Box 5711, Topeka, KS 66605-0711 and enclose a 33 cent stamp.

For visually impaired hobbyists they also have a reading service of their newsletter (available monthly) on cassette. For a sample copy of the DX Audio Service's cassette write NRC, Box 164, Mannsville, NY 13661 and enclose $3.00, or visit their website at **http://www.nrcdxas.org/**.

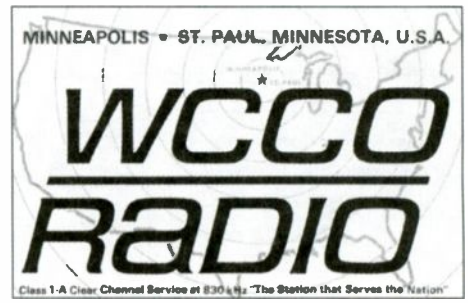
If you are looking for the best and most complete listing of AM radio stations in the U.S. and Canada, the NRC publishes its annual *AM Radio Log*. This year's 20th edition contains 321 pages printed on 8-1/2" x 11" paper, 3-hole punched for inclusion in a binder. Radio station listings are from the United States and Canada, including up to the last minute information on the new stations in the expanded band (1605-1705). Each station listing includes its location, frequency, call, format, network affiliation, station address, station slogan, day and night transmitter powers. There are cross-references by city and by call letter.

You can write to the NRC Publication Center at the Mannsville address above or see the December 1999 *MT What's New*. No self-respecting AM DXer should be without this valuable publication.

Another U.S. club devoted to medium wave band coverage is the International Radio Club of America (IRCA). *DX Monitor*, the official publication of IRCA, is published 30 times a year and contains members' logs, articles on radio stations, receiver reviews, technical articles, DX tips, and other material of interest to the broadcast band DXer. IRCA's electronic publication, the "soft" *DX Monitor* (SDXM), is published the same number of times, but distributed via e-mail.

For more information on the IRCA, visit their website at: **http://www.geocities.com/Heartland/5792/** or write them at: The International Radio Club of America (IRCA), P.O. Box 1831, Perris, CA 92572-1831, USA. You can get a printed sample copy of their newsletter by enclosing a 33 cent stamp or if you want an electronic version of *DX Monitor* send email to *philip_bytheway@mukilteo.hac.com*.

If you live in Europe, then check out The Medium Wave Circle club. This club started in 1955 and publishes a monthly publication called *The Circle*. You can find out more information on this fine club by writing: Medium Wave Circle Treasurer. 59 Moat Lane, Luton, LU3 1UU England or visit their website at **http://www.mwcircle.org/**.



Finally, you should check out Doug Smith's *American Bandscan* column right here in the pages of *Monitoring Times*. Doug provides great tips and info on the American broadcast bands (AM/FM/TV) and is a well respected source for broadcast information. If you have any further questions regarding AM broadcast band reception be sure to drop Doug a note in care of his column.

While a complete, detailed discussion of medium wave is outside the scope of this article, a subscription to the club bulletins above or Doug's column in *MT* will go a long way to fill in the holes. Also, I highly encourage the newcomer to visit the club websites above for some excellent information that these groups have placed online to help get you started in AM DXing.

Logging 50 States

While this is not an easy goal to obtain, with patience and some luck, logging AM broadcast band stations in all 50 states can be achieved. Table 1 is a list of best bets in the AM broadcast band for each state. The listed stations are usually heard at great distances. Your local interference can and will limit reception of these stations, so we have given you several stations to try for in each of the most difficult states to hear. There may be easier stations to hear for you from a particular state than is on our list depending upon your location in relationship to that state. Be sure you report your results to *MT*'s *American Bandscan* column!

So, this evening as the sun drops off into the west and darkness sets in, fire up your receiver and see how many states you can hear in the AM broadcast band. Good hunting and good luck.

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.

Decoding the Russian LEO Navigation Satellites

Part One: Signals From Space

By John David Corby

The signal was coming in loud and clear; it was a very fast, high-pitched telemetry signal, and it was interrupting my scanning session. Having been a shortwave listener for many years I was accustomed to the many varieties of encoded signals on the airwaves. I generally ignored them and adjusted the tuning looking for more interesting voice signals to monitor.

My handheld scanner was repeatedly locking in on 149.94 MHz. The signal broke squelch for several minutes and then went away. At first, I didn't pay any attention to it. It was just another undecipherable data signal, or so I thought. Later I would discover that I was receiving transmissions from the Russian military navigation satellite Cosmos 2218.

Once I had learned exactly what I was listening to, my interest was aroused, and soon several other similar satellites operating on a range of frequencies in the same part of the band were added to my log. Receiving signals from the whole Russian LEO (Low Earth Orbit) navigation system quickly became a passion. Within a very short time I realized that these signals must convey some kind of useful information, and my passion for listening, turned into a determination to decode that data.

I received a lot of help in identifying these satellites, and understanding their signals, from experts in the field such as *MT*'s own Larry Van Horn, and others who shared their knowledge through the HearSat (**www.hearsat.org**) mailing list.

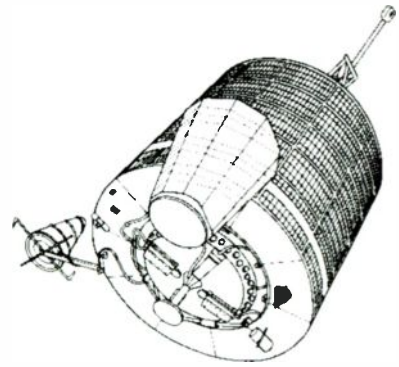
Commercially-built equipment is probably available which can be used to decode the data from these satellites, but I have never been the sort of person who will buy something when I can "brew-it" myself. Apparently, we "home-brewers" are a dying breed in the new world of plug and play. That is sad, but perhaps inevitable. I doubt if the equipment required for this project can be readily acquired by the hobbyist anyway. My objective was to find a way to decode these signals without spending any money. The result – after a lot of hard work – was a straightforward technique using a scanner, a PC, some common, readily-available software, and a budget of zero!

We will be unlocking the secret of how to decode these signals in Part 2. In Part 1, we are going to discuss the Russian LEO navigation satellite system, its purpose, history, and some of the things that make it such a fascinating target for monitoring enthusiasts. I hope that Part 1 of "Decoding the Russian LEO Navigation Satellites" will kindle the same excitement in you that I have enjoyed since that first accidental reception.

History and Purpose

The Russian LEO navigation satellite system has been in operation for well over twenty years. It is similar, in some respects, to a system formerly operated by the United States called the Navy Navigation Satellite System (NNSS). Both systems had a very similar purpose, and operated on almost the same frequencies. The American NNSS system has been retired from service since the end of 1996; its satellites redeployed in a new capacity as the Navy Ionospheric Measurement System (NIMS). However, the Russian system is still in operation.

The purpose of navigation satellites is to



provide a means for ships at sea to determine their position with some degree of accuracy. Although the system has undoubtedly been used to support military logistics, such as submarines, it has also found use in peaceful, civilian applications. The *Nadezhda* (Russian for "Hope") satellites, for example, carry COSPAS/SARSAT (search and rescue satellites; COSPAS is the Russian acronym for the same system). COSPAS/SARSAT satellites are used to locate emergency radio beacons carried by boaters, mountaineers, and explorers.

Today's Global Positioning System satellites do a better job and require less sophisticated receiving equipment, but prior to the GPS era, VHF signals were used by both the East and the West for the same purpose. Russia, too, has more sophisticated navigation systems in deployment, but perhaps for budgetary reasons it maintains its VHF system in operation. Recent launches of new vehicles indicate that the system may even be maintained for several more years to come.

There are two sub-systems deployed in the Russian LEO navigation system. One is operated by the military and is designated *Parus*; the other is operated as a civilian system and is designated *Tsikada*. The whole system has been referred to as *Musson* by some authorities.

TABLE 1.
The Russian LEO Navigation Satellite System
STATUS REPORT

This report is compiled using decoded data from the satellites, with contributions from members of the amateur satellite monitoring community. This report is not endorsed by any agency involved with the operation of these satellites, and is intended only as a guide for amateur monitoring of the signals.

Plane 1 (150.03, 400.08 MHz) 24953 Cosmos 2346 Military	Plane 11 (150.00, 400.00 MHz) 23603 Cosmos 2315 Civilian
Plane 2 (149.91, 399.76 MHz) 24772 Cosmos 2341 Military	Plane 12 (150.00, 400.00, 1544.50 MHz) 21152 Nadezhda 3 Civilian COSPAS-SARSAT
Plane 3 (149.94, 399.84 MHz) 25892 Cosmos 2366 Military	Plane 13 (150.00, 400.00 MHz) 23463 Tsikada Civilian
Plane 4 (149.97, 399.92 MHz) 24677 Cosmos 2336 Military	Plane 14 (150.00, 400.00, 1544.50 MHz) 25567 Nadezhda 5 Civilian COSPAS-SARSAT
Plane 5 (150.03, 400.08 MHz) 25590 Cosmos 2361 Military	Planes 1-6 are spaced 30 degrees apart to cover one Earth hemisphere. Planes 11-14 are spaced 45 degrees apart to cover the other hemisphere. Only one satellite is active in each plane.
Plane 6 (149.94, 399.84 MHz) 23092 Cosmos 2279 Military	

The *Parus* sub-system comprises six active satellites organized in orbital "planes" spaced 30 degrees apart in Right Ascension. The *Tsikada* sub-system comprises only four satellites organized in orbital planes spaced 45 degrees apart. Each sub-system thereby covers a complete hemisphere of 180 degrees. The orbital inclination of the Russian LEO navigation system is 83 degrees, which means that their orbital plane is tilted 83 degrees with respect to the equator. This orbit brings the satellites above the north and south polar regions, and thereby gives global navigation support.

Most ground monitors will receive one set of "ascending" (northbound) passes, and one set of "descending" (southbound) passes per day for each satellite. Each set of passes will typically include one easterly, low-elevation pass, one high-elevation, or near-overhead pass, and one westerly, low-elevation pass. For readers who are unfamiliar with satellite orbits, this can be explained by picturing a satellite in a fixed orbit 1000 km above the Earth, while the Earth itself is rotating below the satellite. The timing is such that, as the Earth rotates, a satellite's ground track passes further east or west on each subsequent orbit.

The overall result is that both the military and civilian sub-systems provide passes throughout each 24-hour period. Just like the GPS system, radio transmissions are continuous, but unlike the GPS system, coverage is not un-broken. Indeed there are often long periods during which no satellite is above the horizon. This system is clearly less capable than GPS, but nonetheless, it has its purpose, and it has been fulfilling that purpose reliably for a long time.

The principle behind the operation of the Russian LEO navigation satellite system is to transmit the precise position of a satellite at a precise time. A receiving station on the ground can then determine its own precise position using doppler shift of the received signal frequency. To assist in improving the accuracy of the doppler shift measurement, a pair of frequencies is used. One of these frequencies is the active telemetry signal in the 150 MHz band, while the other frequency is an un-modulated carrier in the 400 MHz band.

The current status of the complete system is shown in Table 1.

Receiving the signals

The signals are transmitted using

For decoding purposes, it better to use a communications grade receiver with Automatic Frequency Control (AFC).

Narrowband Frequency Modulation (NFM) which makes them ideal for reception by the average monitoring hobbyist using even the most humble scanner. My first experience of receiving these signals was indoors using a handheld scanner with a "rubber-ducky" antenna. Frankly I got lucky. Although such a setup will enable the casual monitoring enthusiast to hear brief samples of the signal, it is unlikely to provide the reliable, sustained signal needed for decoding.

I have found that for decoding purposes, it better to use a communications grade receiver with Automatic Frequency Control (AFC). Even though the frequency changes brought about by doppler shift in theVHF band are fairly small, it is an advantage to be able to lock onto the signal as precisely as possible.

The frequency pairs for each satellite are also shown in Table 1. As can be seen, the frequencies used are separated by 30 kHz. Some of the frequencies are re-used in more than one plane. The selection of frequency assignments for the military Parus system is such that it is unlikely that there will be satellites from two different planes, transmitting on the same frequency, in the same part of the sky. However, all the civilian satellites use the same frequency, and it is common for two of them to be above the horizon at the same time. When this occurs, the signal is useless for decoding unless the signals from the two satellites can be separated using a narrowbeam directional antenna. In practise it is better to wait for another pass.

Choosing the Right Antenna

I have experimented with many kinds of antenna. I am still surprised by the superior performance of the inexpensive magnetic-mount whip antenna that I keep on my car roof when mobile. Unfortunately, a car is not the best place for decoding, so at my home monitoring station, I have, from time-to-time, deployed a number of different antennas on my roof to compare performance when receiving the Russian navigation satellites.

I have found that the best performer is a small three-element Yagi (home-brewed of course), but I have also tried ground-plane, discone and circularly-polarized Lindenblad antennas. Results vary, but a good compromise is a simple ground-plane antenna. You must experiment with what works best in your location. My monitoring station is on top of the Niagara Escarpment northwest of Toronto, Canada. I have a good view of the horizon in all directions, but to the southeast is the City of Toronto which is a very noisy source of intermodulation distortion. A Yagi helps tune out the noise that would otherwise interfere with relatively weak signals from space.

The data signal transmitted by the Russian LEO navigation satellites is composed of blocks of data. The content of each data block can be determined from the time that it is transmitted. The signal includes the time-of-day (Standard Moscow Time, UTC+3, called "DMV" or "Zimneye Vremya") transmitted every second. In order to obtain a complete set of data you will need a clear signal lasting for two minutes. Unless you are very well coordinated, you will probably want to record a longer sample of the signal to make sure that you get the whole message. This is where getting a good antenna hooked up to a decent receiver will pay dividends. Otherwise you may find that signal fading, and intermodulation distortion from terrestrial signal sources will corrupt valuable parts of the data.

Monitoring these satellites provides a seemingly endless source of fascinating surprises. For example, the satellites sometimes have a very short life and are replaced by new vehicles. At least once, the active frequency assignment has been changed (this happened about 3 years ago when the frequency used in plane 1 changed from 149.97 MHz to 150.03 MHz with the launch of a new satellite. On another occasion, I discovered a clock reset of 8 seconds while one of the satellites was passing over the US east coast. Nobody has been able to explain the source of the control signal that caused that reset, but it is possible that it came from a Russian vessel operating off the United States eastern seaboard.

Try this at home

Now, here is a brief primer on the signal's data structure, and an experiment that you might want to try before we move onto the details of decoding the data in Part 2. The Russian LEO navigation satellites transmit a signal with three audio tones at 3, 5 and 7 kHz, at a data rate of 50 bits per second. The 7 kHz signal is a timing marker transmitted once per second.

Determine your local timezone equivalent to 00:00 hours DMV (UTC+3), then listen for the 7kHz pulses just before 00:00 DMV, and then again at exactly 00:00 DMV, and shortly after. The 7kHz pulses will be much easier to hear at, and immediately after, 00:00 DMV. The reason why this happens is very interesting, and is also very important to understanding this signal. In Part 2 we will learn why, and reveal what the Russian LEO navigation satellites are telling us.

Next month: unlocking the secrets behind the signals.

ABOUT THE AUTHOR:

John David Corby is a Canadian amateur satellite monitoring enthusiast living near Toronto. John is the founder of the HearSat Group which maintains a website at **www.hearsat.org**, and a mailing list "HearSat-L" which was originally sponsored by Grove Enterprises, publishers of *MT*. Questions and comments are welcome at jcorby@hurontario.net.

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File Box Fun

We are involved in one of the most technically advanced hobbies in the world. Many of the receivers we use for monitoring are filled with state of the art electronics that help to pull in all those signals we so diligently seek. We often augment our radio hobby efforts with a "bleeding edge" personal computer system that we use for equipment control and data manipulation. And then, of course, there is the Internet, which provides us with gobs of information to keep us as up to date about the hobby and the signals we listen to.

And yet, with all of this whiz bang gear, I still find one of the most valuable tools at my listening post remains the lowly 3x5 card, stuffed in its little box, all available at any of those "dollar stores" that have become as prevalent as cockroaches in the strip malls of America. You could take away my best receiver and leave me with nothing but a crystal set. I could still do a great job of DXing armed with just the information stuffed into those little file boxes I still keep in active use around my shack.

Maybe it's because I was involved in this hobby long before the personal computer was even a twinkle in Ed Robert's eye. (Now there's an esoteric reference!) But believe it or not, kiddies, there was a time when you probably couldn't prosper in this hobby without a couple of well-stocked 3x5 card boxes in your shack. What I hope to accomplish over the next page and a half or so is to rekindle some interest in this most valuable tool in the radio monitoring hobby. Let's take a look at some file box uses that will have you queuing up at the nearest stationary store.

The Scannist's Essential Tool

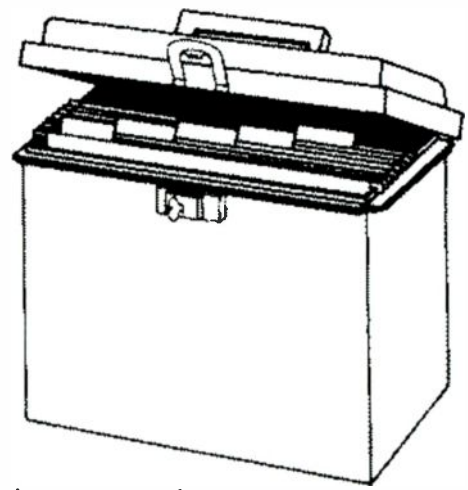
Modern scanning receivers are miracles of memory storage. Scanners with well over 100 channels are commonplace. If you have followed the exploits of Bill Cheek over the years you know he has pushed Radio Shack Pro 2000 series scanners out to 64 *thousand* channels. Some of the new "black box" computer controlled units have essentially unlimited memory. Now it is true that, if you have your scanner plugged into your computer (or is your computer plugged into your scanner?), you can manage your frequency structure on the computer's screen. Ah... but let's get real here. I have half a dozen scanners floating around my shack and only one of them is regularly connected to a computer. Regardless if your scanner handles 10 or 10 million channels, any serious scannist knows "Ya gotta have a plan!"

Enter our friend the file box. Most scanning receivers arrange their memory structure into banks. Each bank can be managed as a separate autonomous entity. Once you lay out what frequencies you want to program into your scanner's various banks, it is a simple matter to switch these banks in and out of service as use dictates. A 3x5 card can be set up for each bank you have programmed into your scanner. You can even use these cards to structure your banks by labeling them Police, Fire, EMS, Local Govt, Federal, etc. Then, when Murphy's Law strikes and your scanner memories get wiped out by accident or design, you can use your file cards to get things right once again.

You could also make out cards to remind you of alternate bank programming that may be event or activity driven. Examples of this might be a channel list covering NASCAR drivers for when you head out to the track. Or perhaps a special list of frequencies you know to be active during a nearby forest fire or other problem. You can lay out dozens of frequency strategies to answer any monitoring need and have them ready at your fingertips.

File Box Hits

Shortwave and broadcast band monitors always have a list of stations they really want to hear. These are often rare signals or stations that are the personal challenges that make this hobby so exciting. A file box set up to jog your memory about these empty spaces in your log book



is a great tool. A good way to go about this is a card box that is cross referenced by station (or country) name, frequency, and time that the signal is on the air. In this way you have a number of hints that will generate solid hits when you sit down at the dials.

Since this is the height of AM broadcast band DXing season, let's take an example from that aspect of the monitoring hobby. Imagine you're tuning around one late Sunday night and discover that one of the big clear channel powerhouses near you has gone off the air for a couple of hours for routine maintenance. We'll use 50 kW WPHT on 1210 kHz as an example, because it is the cross I have to bear in my neck of the woods.

With this juggernaut off line, I reach for my trusty file box to see what I might be looking for anywhere from 1190 through 1230 kHz (the range of its normal splatter!). Now I see I've got to be quick because one of the signals I'm looking for is scheduled to go off the air, so I tune my receiver up and catch the "end of broadcast" spiel associated with the station I am seeking, complete with a full legal ID. I've got a new one in the log thanks to my trusty "Hit List" file box.

A shortwave variation on this theme might be that I am tuning around the 41 meter band at 2100 UTC looking for targets of opportunity when I hear something coming in on 7275 kHz in accented En-

glish. I check my file box of needed stations by frequency and time. Then I put on the earphones to get the information for my QSL report on Radio Nigeria, again, adding a new one in the log.

Since you know what you're looking for, you can structure your hit list box any way you see fit to get the job done. Again, this points to the flexibility of the humble file box when it comes to filling your logbook with neat new stuff.

An Award Winning File Box

Many radio monitoring hobbyists enjoy the pursuit of awards. In the shortwave world, clubs such as the North American Shortwave Association **http://www.anarc.org/naswa/** have dozens of awards for hearing various groupings of stations. In the amateur radio community, folks collect awards for continents, countries, states, even counties, often by particular band or mode as well. Keeping track of your "haves" and "have nots" when going for any awards can be tricky. For example: A card verifying a 40 meter band Morse code contact with a VE callsigned ham in Canada could be applied to Worked All Continents, DX Century Club, Worked All Canadian Provinces, an ARRL Section Clean Sweep and for band and mode endorsements for any of these possibilities and probably a half dozen I haven't even thought of or known about.

Keeping track of the steps toward an award is a task that is perfectly fitting for our friend the file box. I am currently chasing after 5 Band Worked All States and QRP (Low Power) Worked All States. I have a file box with 50 cards in it. One for each state. Each card lists the 80, 40, 20, 15 and 10 meter bands as well as additional spaces for mode (CW or SSB) and low power (QRP).

As contacts are made and the cards come in, it's a simple matter to keep track of my progress through my file box. I write in the callsign of each contact and then put a check next to it when the verification card (QSL) is received on my end. All you need to do is make adjustments in information for whatever award you are seeking and you're on your way. When you get down to that last handful of contacts needed for the award, you may find that you'll want to work those harder ones into your "Hit List" file box, too.

Thanks for the Memories

As we have already seen, file boxes can make great memory joggers. Like many amateur radio operators, I enjoy the age-old ham pursuit of ragchewing. This is the process of just getting on the air and having a chat with whoever is around to answer your call. Over the years I have run across some great folks and heard some great stories.

Also over the years, I have had extended ragchews with hundreds, if not thousands of folks. Ham radio is a small enough world that, from time to time, you may run into a person again. Here is where the trusty file box comes into play once again.

I have a special file with 702 cards in it. These are divided into 26 groups of 27 cards each. Each of these 26 groups is placed behind a standard file box alphabetizing tab A... B... C... down through Z. The group behind the A tab has its 27 cards labeled A... AA... AB... AC down through AZ. Next would come the group B... BA... BB... BC... and so on through the tabs down to a final card ZZ.

This system has been around ham radio for many years, and it's very easy to use. You keep track of the various people you contact by way of the last two letters in their callsign. If the person's callsign is WB2KKS you would put his call and information on the KS card under the K tab. If his call was N8OAY his info would go under the AY card behind the A tab. Some of the shorter calls only have one letter after the callsign number and these would go on the first card behind each tab that just has a single letter on it. For example, NC2X would get his information placed on the X card behind the X tab.

So here's how the deal goes down. I have a nice QSO on 80 meters with this guy named Bob W8JHD. During the round of ragchewing I learn that he lives in Western North Carolina and enjoys listening to scanners and shortwave. I find out he's married and has a son. When the conversation is done, I pull out the HD card from my file and write down Bob's callsign, name, location (QTH), the contact date, band and mode. Then I'll add a line or two about the things we discussed and the additional personal information.

Then, six months or longer later, I hear W8JHD calling CQ on 40 meters. I contact him and, while looking at my card I can say, "Hi Bob. How's the family? Did you see that new scanner that Bearcat just came out with?"

One of the reasons I am always trying to get you folks to get your ham tickets is so you can make so many friends that you may even need a big file box to keep track of them all.

There are dozens of neat file box ideas, but there is one last set of cards you will surely want to keep handy. How about a card for each piece of radio gear you own including its model number, serial number and contact numbers for technical support and servicing? It sure beats trying to track this all down, because when you need it, you tend to need it in a hurry.

Have fun with your file boxes, folks!

Ask Bob

Bob Grove, W8JHD
bgrove@grove-ent.com

Q. I'm very pleased with my Grove Scantenna, but is it directional? Specifically, directional enough that I might want to think about a rotor? (Karl Geurs, e-mail)

A. Good question and the answer, believe it or not, is yes and no! While the Scantenna is designed to be omnidirectional, it sits just a short distance from a metal mast; therefore there is some interaction between the antenna and mast which produces lobing (pattern distortion) on some (especially lower) frequencies.

A good experiment would be to put the antenna on a metal pole which you can hand rotate while listening to various weak signals. That will prove immediately the degree of directivity on various frequency ranges as you hear fluctuations in signal strengths.

On an interesting side note, the popular Grove Scanner Beam has two main lobes (directivity patterns) in the 100-200 MHz range, both substantially off-center from the forward direction of the antenna. Neither we nor Antenna Craft, the manufacturer of the long-time favorite, has ever figured out why!

Q. Will current model shortwave receivers become obsolete when digital shortwave broadcasting becomes a reality? (Len Pollak N9LEN)

A. Three or four years ago, there was a debate as to which digital system was best, but no one hopped on any bandwagon to tout the marvels of digital HF. While some newer transmitters are reportedly digital compatible, and some experimental broadcasts are being made, there seems to be little progress in programming. Another problem is that digital compression bandwidths are twice as wide as current analog channels.

In 1998, Digital Radio Mondiale (DRM), a consortium of international broadcasters and manufacturers, proposed a worldwide standard called MPEG-AAC; it is hoped that a standard is adopted next year. Once a standard is adopted, it probably will be compatible with conventional analog systems, otherwise broadcasters would lose their entire audience until everyone replaced his receiver with a digital model.

Q. I read of Bill Cheek's legal problems selling a data slicer; what is it, and why is it illegal to sell? Since the parts can be bought at any Radio Shack, is it unlawful as well to publish information or schematics for them? (Thomas Risher, Whittier, CA)

A. A data slicer is a slang term for a data decoder interface, or analog-to-digital converter (A/D converter), a simple circuit which may be used to extract the raucous analog "zap-zap" sound of digital transmissions overheard on shortwave and scanner receivers and convert them into pulses that a computer will recognize.

While it is unlawful to sell equipment for the primary use of intercepting privatized communications, a data slicer alone cannot do that any more than a pair of earphones can. It must be used in conjunction with other circuitry and software which determines its actual application. A/D converters are the heart and soul of the computer industry and telecommunications in general.

It is lawful to publish information about data slicers or any other topic in the public domain. Prohibiting such distribution would be a violation of the Freedom of the Press as guaranteed under Article I of the Bill of Rights as specified in the U.S. Constitution.

Q. I have acquired an old tube-type radio and am puzzled as to how to read the capacitor color code. Is there a simple way of translating these dots or bands into values? (Thomas Risher, Whittier, CA)

A. As with the resistor color code which indicates resistance in ohms, the first three color bands or dots on a capacitor determine the capacitance in picofarads (pF). Inductors (coils) often express their value in microhenries (µH) using the same color code. In all cases, the first two colors are the significant numerals, and the third is the number of zeroes you add. View the device so that you read left to right, with the colors generally clustered at the left side of the device. On the oldest resistors, the colors are read in the order of body color, end stripe, and dot. The standard table of color/numeric equivalents is as follows:

Black	0	Green	5
Brown	1	Blue	6
Red	2	Violet	7
Orange	3	Gray	8
Yellow	4	White	9

For example, a 47,000 ohm resistor would have a color code sequence of yellow-violet-orange (4, 7, and 3 zeroes). The same colors on a capacitor would make it 47,000 pF, which equates to 47 nanofarads (nF) and .047 microfarads (µF). On a coil the colors would represent an inductance of 47,000 microhenries (µH) or 47 millihenries (mH).

For modern chip components where color spots would be too tiny, numerals are actually printed on the device; thus, the components illustrated above would be labeled 473.

Additional color bands or dots may be used such as tolerance (%) and voltage rating (in hundreds of volts).

Q. Where do the standard values for resistors and capacitors come from? Is there a mathematical or some other reason for the values? (Steve Clayton, Craig, CO)

A. There are 161 standard resistor values from 2.2 ohms to 10 megohms. Since standard tolerance for resistance variation is 5%, each value is approximately 10% higher or lower than the former. Resistors originally had much looser tolerance and, therefore, wider value intervals. I suspect the same discussion would answer how capacitor values were adopted.

Q. Which of the following will first become generally available in the U.S.—high definition TV, all-digital shortwave receiver, or a combination of the two? (Richard Dailey, Pittsburgh, PA)

A. I think you already have them in the right order. High definition TV is right on the threshold, but still quite expensive; no standard has yet been adopted for digital AM, although it is expected in 2000; and no one would put out a combination of the two until both are well entrenched in the public market.

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

Gary Webbenhurst
ab7ni@arrl.net

Lost and Found

I hope you found last month's tips helpful. Now it's time to get out your yellow highlighter pen for the February issue of *MT*. If you mark information that is of interest, you can go back later for reference or even make a photocopy for your binder.

5 Need a cheap desktop or auto HT radio holder? Buy some standard black metal bookends. I prefer the ones with cork on the bottom. They come in two sizes, so take your radio with you to the store. You simply bend back the top for the best viewing angle. Glue on some felt or fabric to protect the radio and you are set. You can also use them in your car. Slide the tongue part down the inside of your driver's window and bend the rest as necessary. (See photo.) Another possibility is a belt clip holder which can be affixed to the wall, wood or metal, even your car dash or door. (This is RS# 17-518.)

Cost, less than $5. (More expensive options are RS# 17-528 or 17-519.)

A black metal bookend is lined with felt, then bent over the driver's door window. Just slide your radio on.

6 Do you travel with several different battery packs, wall chargers and DC cords? Last month, I suggested marking all your radios and power sources with same colored labels. Use color-coded labels to identify which parts go to which radio. Then sort these by color into large clear kitchen **baggies** with the zip locks. Put all like equipment in the same bag. This keeps all the right components together and easily viewed through the clear plastic bags for quick deployment.

7 Last month I suggested some preventive maintenance on your radios. If you have any missing screws or knobs, there are solutions. If you are using a ham transceiver as a scanner, you are in luck. A call to the manufacturer's parts department should solve that problem.

How much will it cost? Depends. Frankly, I have found that a screw or two is free. Guess it is not worth charging you the few pennies and postage. Besides, they want to build good customer relations.

If you need knobs, belt clips, etc., there will be a small charge. Alinco has some great support on their webpage. A list of all the important phone numbers is at the end of this column. May I suggest a photocopy for future reference?

Remember there are many other sources for replacement antennas. (Wait for my April column on rubber duck antennas.) You can get glue-on belt clips from your local Radio Shack or Motorola (pager) dealer.

8 Perhaps the best parts bin is one you start. I suggest you buy a clear plastic storage tray. Never throw away *anything* without cannibalizing it for screws, connectors, knobs etc. Thus even an old, non-working radio found at the flea market has at least some value for parts. Build your collection by raiding your glove compartment and the workbench in your garage. Occasionally, you will find a hardware or hobby store with a supply of the small screws. Buy 'em up! Take along your radio and a representative sample of the screw you need to do some comparison shopping.

9 If it is a knob you need, there is one final possibility. You can make one by using a half stick of gum. Chew it to make it pliable, then press it on the shaft and shape it using your fingers and a large flat bladed screwdriver. Let it harden for a couple of days, then paint it black enamel, using a small water paint brush. Give it a second coat and finish with the white stripe in the appropriate groove.

10 Lost your scanner manual? Maybe you bought a used one without the owners manual. For standard (non-trunking) scanners, programming is pretty much the same. Look at your keypad. Hit Manual, the channel you want to program, then PGM, enter the frequency and hit Enter.

Why not make a photocopy of your existing owner's manual now? For a $1 of photocopying, it is cheap insurance. Put the extra copy in a safe place.

If it is ham transceiver, there are several possibilities. You can probably find a local ham who will allow you to photocopy his/her book. There is actually a book call *Lost Users Manuals*, available from Artsci (818-843-4080) for $20 plus s&h.

I have been urging the major manufacturers to offer their manuals on line, without luck, except at Uniden where some are downloadable from their website. Try **http://www.uniden.com/** Go to Customer Service, then Product Support and then Bearcat Scanners. You can download the manual for any of their scanners and or order parts and accessories.

You say you own a Radio Shack Pro scanner? I have repeatedly contacted the Customer Service people (via e-mail) who advise their manuals are available on their web site: **http://www.radioshack.com/** Go to Product Support/Communications/Scanners. You have to find the model number and go to each page and select all, copy and paste to your word processor, and then print it out. It works; it's just a little awkward and slow.

As for replacement screws, knobs, etc., I had no luck at Radio Shack. They did advise me that my idea to provide every RS store with a small supply of replacement items for FREE distribution is under consideration. Maybe if we shout in unison.....

Next month, tips on understanding Incident Command System (ICS.)

Sources for replacement part/repairs on amateur transceivers

	Phone	Web	Email
Icom	425-454-7619		
Yaesu	562-404-2700		
Kenwood	800 262-1312	http://www.pacparts.com	orders@pacparts.com
Alinco	310-618-8616	http://www.alinco.com/usa.html	
Standard	Currently out of business (check with an amateur radio dealer for more info)		
Uniden	800-235-3874	Long wait on the phone, but it is their dime. There will a small cost depending what you need. The female receptionist was very helpful.	

The numbers above are for M-F, 8-4 Pacific Standard Time. Be prepared to wait on hold.

Richard Barnett
ScanMaster@aol.com

The Scanner Industry Just Keeps on Truckin' (or Trunking)

It was only a few short years ago that many hobbyists were predicting the imminent demise of scanning. Hoards of major and minor trunking systems were dotting the national landscape. Try to scan in place like Atlanta, Ft. Worth, and Miami, among others, and you were essentially out of luck. Certainly the super-buffs might put up with channel hopping and locking out a data channel, but the industry couldn't survive on serving such a limited audience.

Along came the Trunktrackers from Uniden (the BC-235 portable being the first incarnation), and suddenly everything changed. Trunktracking scanners were not only possible, in actuality they worked brilliantly. Sales stabilized and customers breathed a grateful sigh of relief.

Perhaps to counter Uniden's home-run, companies such as AOR, ICOM, Alinco and others stepped up to the plate with advanced receiver designs; though terrific scanners, they still fell immensely short in their lack of trunking capability.

As scanner manufacturers strove to compete, ambitious and clever hobbyists began developing software to perform trunking functions. Efforts were made amongst groups of hobbyists online to develop shareware such as Trunker, and well-known scanner control software developers used the Bearcat 895 or ICOMs to create salable trunk tracking products for the PC.

The flurry of interest in scanners and software development gradually grew into a blizzard for our little niche hobby. Optoelectronics wowed us again with their advanced computer-controlled, Optocom device; Uniden upped the ante with the multi-tracking BC-245 portable; and now Radio Shack, with its GRE-manufactured PRO-92 portable scanner, has entered the fray.

Now that Uniden's primary scanner competitor has produced its own trunking scanner, what can be said about the comparison between the two? This editor has not personally used the PRO-92 for more than 15 minutes and is not qualified to make a studied comparison between it and its most direct competition, the Uniden BC-245 and the Radio Shack PRO-94. (Also, because of various business relationships, this editor does not feel it appropriate to provide a comparative analysis.)

What we can do here is enlighten you to some of the obvious, factual differences between the two radios, and offer test results from well-respected names in scanning.

First, one of the most important facts. The price of these radios is significantly different:
Radio Shack PRO-94/Uniden BC-245: From $200 to $230
Radio Shack PRO-92: Typically $350

The huge price difference alone would indicate significant advantages for the PRO-92 over the other models. This isn't necessarily the case, however, as we'll soon see.

What major features does the PRO-92 have going for it over the BC-245, PRO-94 and other Uniden-made models?

- 2-line alpha display
- PL/DPL capability and instant tone find
- Johnson LTR business trunking capability
- Selectable modes
- Standard battery operation
- Good interference rejection
- Good audio

What major features does the BC-245 and Radio Shack PRO-94 have going for it over the PRO-92?

- Price
- Motorola control channel trunking
- Trunking Scan List operation, ability to lock out talkgroups in trunking search mode
- Ericsson trunking AFS mode option
- Good sensitivity
- Computer programmability and control
- Easy to operate keys

Out of these items, which are the most important? To the majority of users it's probably three things: first and foremost, trunking operation; secondly, alphanumerics; with PL/DPL operation, third. The PRO-92 has the second and third items, and the BC-245/PRO-94 doesn't.

Uniden BC-245

If you live in an area which has no trunking, you want the ability to select modes (to listen to military aircraft, for example), and you don't mind ponying up the extra $100+ for the PRO-92, then that certainly is a legitimate choice.

But, if you live in an area with either Motorola or EDACS trunking, then according to most posts on the Internet, commentary on such List Servers as TRUNKCOM, and various other experts, the Uniden BC-245 is the hands-down choice.

The PRO-92 and Motorola Trunking

The consensus among most serious scannists is that the PRO-92 method of Motorola trunktracking is inferior. Motorola two-way radios themselves use the control channel to trunk, and that's what Uniden also relies upon. The PRO-92 uses subaudible signalling, a slow-speed data stream that is transmitted "underneath" the voice channel. (*See this month's "Tracking the Trunks" column for details - ed.*) While the Uniden model monitors the control channel for instructions, the PRO-92 must look at each voice channel to see if a desired talkgroup is communicating on the frequency.

There are apparently multiple problems with this method: If the system is busy (many system frequencies are active), then the PRO-92 has more subaudible data to check on its way to a desired talkgroup (unless it comes

Radio Shack PRO-92 *Radio Shack PRO-94*

upon a desired talkgroup early in its search); secondly, if the control channel has changed, the PRO-92 appears to slow down as it looks at a data channel as if it were a voice channel; thirdly, the subaudible signal often contains priority talkgroups, and, according to the experts, when more than one talkgroup is transmitted in the subaudible stream it has confused the PRO-92 (this has been called the "wobble" effect). This confusion leads to dropped communications, or transmissions where it is impossible to decipher which talkgroup is currently active.

The best evidence we've seen of these conclusions is found in a group of postings by Brian Cathcart of South Florida. Brian is a respected scanner hobbyist, particularly when it comes to trunk-scanning.

Brian Cathcart's Test Report

The following is quoted from Brian's side by side comparison of the Uniden BC-245 and the Radio Shack PRO-92.

System: Broward County, FL - Police, Fire, and Public Works TRS
Type: Motorola Type 2 SmartNet 5-site simulcast
Channels in system: 23

Talkgroups scanned:
8208 - BCFR North
8368 - BCFR North "Echo" Car-to-Car
8272 - BCFR South
8432 - BCFR South "Echo" Car-to-Car
9232 - BCFR West
9200 - BCFR West
8496 - BCFR TAC A
8528 - BCFR TAC B
8560 - BCFR TAC C
4400 - BSO District 9, 10, 22, 26 Dispatch
6704 - BSO INDIA
12400 - Fort Lauderdale-Hollywood International Airport Operations
4592 - BSO at Fort Lauderdale-Hollywood International Airport

The tests were conducted in my home in Coconut Creek. Both scanners were placed on a shelf 4-ft. from the ground next to each other, both running on battery power. Before these tests the PRO-92 was reset with a paperclip and initialized by pressing 0,1. When the "Welcome to Multi-System Trunking" appears, then Broward's 23 channels were programmed in.

The PRO-92 was using its stock antenna, the 245XLT was using an Icom FA-1443B dual-band ham antenna (they were switched for test 3). A "transmission" is from key-up to key-down of the transmitter. I tested them based on each transmission since a call can start on one transmission, end, and go to another frequency for the reply.

TEST 1 - 10:15am to 11:45am.

Scan the above listed talkgroups on both scanners, note the number of times transmissions were missed altogether, missed the beginning (or a large portion of the transmission), were right on between the two, had different IDs between the two, and the number of dropped transmissions.

On the PRO-92, the control channel of the system was NOT locked out (it does not have to be in closed mode), and the scanner was placed into "closed" mode to scan the above listed IDs.

Results
Out of 163 transmissions logged, the PRO-92:
- 33 missed altogether
- 60 missed beginning or large portion of transmission
- 27 were right on with the 245XLT
- 19 transmissions were different between the two scanners
- 16 transmissions were dropped
- 1 non-scanlist ID appeared

On the 245XLT:
- 7 transmissions were missed that the PRO-92 received
- No dropouts occurred

TEST 2 - 10:45am to 11:15am.

Same as TEST 1 but locked out control channel to see if the time it takes to check control channel for valid IDs slows things down.

Results
Out of 144 transmissions, the PRO-92:
- 19 were missed altogether
- 54 missed beginning or large portion of transmission
- 30 were right on with the 245XLT
- 20 transmissions were different between the two scanners
- 17 transmissions were dropped
- 2 non-scanlist IDs appeared

On the 245XLT:
- 2 transmissions were missed that the PRO-92 received
- No dropouts occurred

TEST 3 - 11:15am to 11:30am.

Same as TEST 2 but swapped antennas between scanners. Did not note number of transmissions but had same problem of IDs dropping out in the middle of conversations. Also no change in parts or all of conversations being missed.

TEST 4 - 11:30am to 11:45am.

Same as TEST 3 but connected PRO-92 to outside antenna. Reception improved dramatically, IDs did not drop out. No change in parts or all of conversations being missed.

TEST 5 - 11:45am.

Test of ID Hold function. Put ID 6704 on hold in both 245XLT and PRO-92.

Results
Out of 40 transmissions, the 245XLT received every one.
The PRO-92:
- 9 were missed altogether
- 26 missed beginning or large portion of transmission
- 5 were right on with the 245XLT

(This is striking: On the PRO-92, 35 out of 40 transmissions were either missed or incomplete while the BC-245 received every one of the 40 transmissions perfectly!)

Brian Cathcart, aka "The Scanner Dude," is the author of the *South Florida Trunking Guide* which covers trunking systems in Southeast Florida and gives operating tips for the Trunk Trackers. Here are his conclusions.

"For Motorola trunking the PRO-92 is definitely not the way to go. A few months ago when the 2000 Radio Shack catalog came out I told everyone on the list (online Listserver) that the handshake method would not work nearly as well as the control channel method. People didn't seem to believe it, thinking that the problems in the Optocom (which uses the same method) was only due to serial port speed. Well, now they are out and lo and behold I was right.

"The Uniden-made products are in my opinion the only way to go for large or multiple Motorola systems. If you live in Boynton Beach (a 5-channel system), then the PRO-92 would do fine. But in Broward County, Atlanta, or even Coral Springs, forget it. I'm keeping it, though, only for the PL/DPL and LTR functions. It won't replace my trusty 245XLT which I carry all over the country (and sometimes outside of the country, too)."

Brian can be reached by e-mail at *scannerdude@juno.com.*

The PRO-92 and Ericsson EDACS Trunking

While many users believe that the EDACS operation is comparable between the BC-245/PRO-94 and the PRO-92, there are some glaring differences. While the alphanumeric display on the PRO-92 is handy, the user control of EDACS trunking operation is far superior on the 245/94.

The BC-245 and PRO-94's AFS (Agency-Fleet-Subfleet) control function, with the partial entry feature known as XPAND, was developed in real field testing with EDACS systems all over the United States. It was created to provide a flexible, easy tool to explore EDACS. With the BC245 in Search mode, you will hear all active talkgroups on the system. When you hear something interesting just press Hold to stay with that talkgroup.

Say you hear a fire call on 04-041. Staying in Search mode you key in 0-4-dot-Enter and you instantly narrow reception to the fire agency, and you are now excluding the rest of the system. As fire communications occur, you hear them even if on unexpected talkgroups within the 04 Agency level.

You can't do anything like this on the PRO-92, except to press Trunk to hold on whatever talkgroup the radio has been letting you hear. But be aware that in "open" mode it doesn't let you hear all the system activity, because it follows only one talkgroup at a time, and during that time you don't hear other talkgroups. Only after that talkgroup has been idle for 4 seconds does it let you hear other system activity.

Since you don't know what you are missing, you may not notice this happening. (Note that early production runs of the BC-245 has its own 5-second delay issue. It has been reported that future versions of this radio may well have this matter resolved.) If you do Hold on a talk group on the BC-245/PRO-94, you will see, using the repeater indicator bars, that other system activity is occurring.

On the BC245 you can also use AFS for programming scan lists. Taking the fire agency as an example again, you could store "04-" in scanlist 1 as the only entry. Powerfully, this one, simple entry includes all the talkgroups in the fire agency. Then turning that scanlist on or off (and you have 10 in the BC245) you can select or deselect the fire agency, as you prefer, in your scanning mix. The assortment of scanlists and the flexibility of AFS combine to make a remarkable advantage for the BC245/PRO-94

Again, you can't do anything like this with the PRO-92. You will have to deal with each individual fire talkgroup and there is only one big bank to work with (no valuable scan lists as you have with the 245/94).

With the BC245 if you want to listen for rarely used talkgroups, you can start in Search mode and just hit Lockout each time an uninteresting talkgroup comes up. After a while the radio will get pretty quiet – and now you will only hear those infrequent, and perhaps more interesting, talkgroups.

Once again, you can't do anything like this with the PRO-92.

AFS in the BC245 lets you see what agency or fleet talkgroups are in because it reflects the intrinsic structure of EDACS. You know something about a talkgroup as soon as you see it on the screen. But decimal display in the PRO-92 doesn't help you recognize a talkgroup, unless you've seen it before. And, of course, if you like the decimal display, you can select that mode on the Unidens. If you want to scan individual talkgroups and you're not concerned that you don't have scan lists in which to select and deselect combinations of talkgroups, then the PRO-92's EDACS operation is comparable to the BC-245/PRO-94.

Wrap-up

The sentiment about the PRO-92 is well documented. There's even a web site now devoted to the disappointment with the radio: **http://sites.netscape.net/jack22182** (this was the URL at the time this article was being penned). Other newsgroups, list servers and web sites, including Rich Wells' excellent **Strongsignals.net**, have also been the repository of pointed opinions on this new model, including the musings of a number of users who are satisfied with the unit despite its shortcomings.

The PRO-92 does have many remarkable, non-trunking features, including the alpha display, selectable modes, a solid receiver, and the PL/DPL instant tone find. And perhaps one shouldn't quibble over the price: Only a few years ago a radio this advanced would have been expected to fetch a price of $500 to $700. You may want to talk with Grove Enterprises or your local electronics store to see if this scanner, or the PRO-94, or Uniden BC-245XLT is right for you.

Finally, we can only hope this wonderfully capitalistic concept of competition, which has brought us some remarkable equipment at very reasonable prices, will spur scanner manufacturers to tackle digital in the same spirit they have approached trunktracking. We can only hope (and urge online!).

Scanner Logs

SCANNING REPORT

Larry Van Horn
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Hickory, North Carolina, Trunk System

Courtesy of Staley Keener
Hickory public safety EDACS trunking system (callsign WPBP600). Frequencies in LCN order.

Hickory – Main System
01-856.9375, 02-857.9375, 03-858.9375, 04-859.9375, 05-860.9375

Hickory – Southwest System
01-856.4375, 02-857.4375, 03-858.4375

Hickory Talkgroups

01-011	Hickory Police 1 Primary
01-012	Hickory Police 2
01-013	Hickory Police 3 Car/Car
01-014	Hickory Police 4
01-015	Hickory Police 5 Admin
01-016	Hickory Police 6 CID
01-017	Hickory Police 7
01-031	Hickory Police 8
01-032	Hickory Police 9 Hospital
01-033	Hickory Police 10
01-034	Hickory Police 11
01-035	Hickory Police 12
15-157	Link to 154.875 MHz VHF

South Carolina Department of Natural Resources Frequencies/Info

Courtesy of Roland R. "Mac" McCormick III, KF4LMT

Channel 1	151.445	Greenville
Channel 2	151.430	Anderson (WNMF772)
Channel 3	151.445	Spartanburg (White Stone-WNMF771)
Channel 4	151.295	Greenwood (Ware Shoals-WNMN318)
Channel 5	151.160	Little Mountain (WNMN551)
Channel 6	151.325	Aiken (WNMF775)
Channel 7	151.160	Hampton (Estill-WNLF903)
Channel 8	151.415	Beaufort (Ridgeland-WNMF773)
Channel 9	151.430	Charleston (WNMN560, WNMF770)
Channel 10	151.445	Georgetown (WNLF901)
Channel 11	151.295	Orangeburg (WNMF774)
Channel 12	151.340	Sumter (WNMF769)
Channel 13	151.445	Cassett (Camden-WNMF778)
Channel 14	151.370	Rock Hill (Edgemoor-WNMF777)
Channel 15	151.415	Cheraw (WNMF776)
Channel 16	151.430	Aynor (Conway-WNMN317, WNLF904)
Channel 17	151.160	Pee Dee (Latta-WNMN319)
Channel 18	151.325	Santee (Eutaw Springs-WNMF768)
Channel 19	151.325	Long Mountain (Oconee) (Walhalla-WNMN550)
Channel 20	151.415	Columbia (WNMN559)
Channel 21	151.415	Mobile Talkaround
Channel 22	151.160	Mobile Talkaround
Channel 23	151.430	Mobile Talkaround
Channel 24	151.340	Mobile Talkaround
		151.250Statewide Units - Simplex
Channel ?	151.310	Colleton (Green Pond-WNQE863)

County/Districts
District 1: Oconee 1, Pickens 2, Greenville 3, Spartanburg 4, Cherokee 5, Anderson 12
District 2: Laurens 13, Abbeville 21, Greenwood 22, Newberry 23, McCormick 30, Edgefield 31, Saluda 32
District 3: Aiken 37, Barnwell 40, Bamberg 41, Allendale 43, Hampton 44
District 4: Dorchester 39, Colleton 42, Jasper 45, Beaufort 46
District 5: Williamsburg 28, Georgetown 29, Berkeley 35, Charleston 36
District 6: Richland 25, Sumter 26, Clarendon 27, Lexington 33, Calhoun 34, Orangeburg 38
District 7: York 6, Lancaster 7, Union 14, Chester 15, Kershaw 16, Fairfield 24
District 8: Chesterfield 8, Marlboro 9, Dillon 10, Horry 11, Lee 17, Darlington 18, Florence 19, Marion 20
District 9 (Coastal): Horry 11, Georgetown 29, Charleston 36, Colleton 42, Jasper 45, Beaufort 46

Georgia Department of Natural Resources Frequencies/Info

From an anonymous source

Frequency	Repeater Locations
151.235	Plant Hatch
151.475	Dublin, Blakely, Whigham, Crescent, Nashville, Chatsworth
151.460	Reidsville, Nahunta, Shell Bluff, Piedmont, Lookout Mountain
159.600	Sylvania, LaGrange, Meansville, Cumming
159.750	Modoc, Pine Mountain, Lincoln
159.915	Albany
159.720	Cordele
151.340	Georgetown
160.035	Brunswick, Sparta
159.930	Savannah
151.415	Fitzgerald, Toombsboro
151.220	Fargo, Kathleen
159.945	Canton
160.200	Statewide Simplex

Georgia DNR Code List (* Signals Interchangeable with Georgia State Patrol)
*10-0 Caution
*10-1 Unable to copy - change location
*10-2 Signal good
*10-3 Stop transmitting
*10-4 Acknowledgment (OK)
*10-5 Relay
*10-6 Busy, unless urgent
*10-7 Out of service
*10-8 In service
*10-9 Repeat
10-10 Out of service - Subject to call
10-11 Visitors present
*10-12 Stand by (Stop)
*10-13 Weather - road report
10-14 Do you have traffic for ___
10-15 I have a prisoner in custody
10-16 Meet this unit at ___
10-17 Call office ___ to radio
*10-18 Quickly
*10-19 Return to ___
*10-20 Location
*10-21 Call ___ by telephone
*10-22 Disregard
*10-23 Arrived at scene
10-24 Is ___ available for phone call at your station
10-25 Do you have contact with ___
10-26 Check boat registration
*10-27 Drivers license information
*10-28 Vehicle registration information
*10-29 Check stolen / wanted
*10-30 Unnecessary use of radio
*10-31 Crime in Progress
*10-32 Subject with firearms
*10-33 Emergency
10-34 Change to alternate frequency
10-35 Confidential information
*10-36 Correct time
*10-37 (Investigate) Suspicious person/vehicle
*10-38 Stopping suspicious person/vehicle
10-39 Urgent - use lights, siren
10-40 Office will not be in office this date
*10-41 Beginning tour of duty
*10-42 Ending tour of duty
*10-43 Murder reported
10-44 Finished last assignment
10-45 Network message - all units stand by
10-46 Advise time, location and phone where ___ can be reached
*10-50 Vehicle accident
*10-51 Wrecker needed
*10-52 Ambulance needed
*10-53 Road block at ___
*10-55 Intoxicated driver
*10-57 Hit and run
*10-74 Negative
*10-76 En route ___
*10-77 E.T.A . (estimated time arrival)
*10-78 Need assistance
*10-80 Chase in progress
*10-85 Delayed due to ___
*10-88 Present telephone number of ___
*10-91 Pick up prisoner
*10-99 Wanted - stolen indicated

DNR Violation Code Signals
1 Fishing without license
2 Shocking fish
3 Illegal baskets
4 Seining
5 Netting
6 Hunting without permission
7 Illegal trapping
8 Hunting without permission
9 Unplugged gun
10 Over bait
11 Night hunting
12 Dogging deer
13 Over limit
14 Out of season
15 Operating boat without life preservers
16 Operating without registration
17 Reckless operations
18 Operating boat U.I.
19 Skiing without life belt
20 Boat accident
21 Hunting accident
22 Drowning reported
23 Missing report

Dahlonega, Georgia, Army Ranger Trunk System

Courtesy of Larry Van Horn
Camp Frank D. Merrill, US Army Ranger Mountain Training Division–Dahlonega
Ericsson EDACS trunk system channel ("Brawley" CW ID)
LCN channels 1-407.250 2-407.375 3-407.575

Talkgroups:

00-006	Unknown
15-141	TMC
15-143	Alpha Command Post: A1W, A2J, 2B, 3S
15-144	Bravo Command Post: BB
15-145	Charlie Command Post: C1A, C1B , C2A, C1M

So now it is your turn to submit something to Scanner Logs. Let's see those frequency lists, systems maps, VHF-low band intercepts, etc. Until next month, good hunting.

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Shortwave Utility: An Alphabet Soup?

The complaint I hear most often from newcomers to utility monitoring is that all the old-timers seem to talk in code. Unfortunately, this is often true. While the US space program gets credit for inventing jargon and acronyms at the most astonishing rate ever seen, modern radio is not far behind.

In fact, old-timers are often just as bewildered by the alphabet soup of the last few years. Radio used to be simpler. Not simple, just simpler. People talked in AM (Amplitude Modulation) or SSB (Single Sideband). They sent Morse code in CW (Continuous Wave), and typed over two kinds of RTTY (radioteletype), Baudot and SITOR (Simplex Teletype Over Radio). Once in a while they sent weather maps in FAX (radiofacsimile).

AMTOR, a hobby variation of SITOR, and packet, a wireless form of computer networking, became popular in the late 1980s, when cheap adapters for personal computers became common. And that was pretty much it until around 1992, when suddenly, communication technology and the words used to describe it went crazy.

First, we got all excited about ACSSB (Amplitude Compandored Single Sideband), which was going to replace everything. It lost out, though, to new refinements of spread-spectrum (an old frequency-shifting system invented, improbably, by movie queen Heddy Lamarr). That, too, became kind of old news, as all the digital modes proliferated like bunny rabbits in Australia. Suddenly voices, texts, pictures – you name it – got turned into ones and zeroes and spat out into the ether by more odd-sounding tone and keying schemes than even computer programmers can keep straight.

With today's HF sounding like *Star Wars*, nobody knows what's next. The future of voice may be ALE (Automated Link Establishment), where radios go away by themselves to bleep at each other and pick the best frequency so you don't have to. There's already a computer program, PC-ALE, that gets us into the game here.

The future of everything else might be HFDL, High-Frequency Data Link, a digital extension both of ALE and packet. This is part of an even larger, global system being promoted by several large companies. It automatically picks the best routing from satellite, HF, or other modes.

Meanwhile, future radio jargon threatens to include such techspeak as convolution coding, entropy optimization, and collision detection. Translation into English? Well, that's why this column is here, just as soon as I figure it out myself.

More Panama Changes

Camillo Castillo, HP1AC, a radio amateur in Panama, reports on developments in this strategically located isthmus, as the US turns over the Panama Canal. A previous *Utility World* column mentioned the closing of Howard Air Base, and the moving of various anti-drug and rescue operations to Florida, Puerto Rico, and several Caribbean forward sites. This move is now pretty much complete.

While US radio facilities are closing down all over the former Canal Zone, there are persistent rumors that the large and very secretive intercept station at Corozal, on the Pacific side, will be the subject of some sort of covert agreement to continue its operation. Presumably, the spooks at Corozal hear drug smugglers and Cuban radio traffic as well as Camillo always seems to. We will see what happens here.

Meanwhile, a representative of HPP, Intelmar Radio, the large maritime coastal station now owned by Cable and Wireless, told Camillo that the station is pretty much on a skeleton crew. Like many since the move to satellites, they're often reduced merely to running a few hours of markers a day to keep the transmitters warm. They still serve a handful of ships going through the canal, though, especially those without satellite capability.

Cuban Spook Schedule

Camillo's daily "numbers" loggings provide us a schedule for the Cuban broadcasts in the hours 1100 through 1300 UTC (Coordinated Universal Time). These are mostly the CW "Cut Number Stations," but some are the "Atención" (Attention!) voice in Spanish.

Don't be intimidated if you don't know Morse. This deadly-accurate machine sending is just what computers love to decode. The only characters used are the letters ANDUWRIGMT, standing for the numbers 1 through 0, in 5-figure groups. Message preambles often show a pattern. Camillo has noted, for example, that Tuesday's 1200 messages on 6933 and 7889 kilohertz (kHz) often repeat at 1300, on the opposite frequencies.

The voice transmissions, as we've so often noted here, are straight AM, amplitude modulation, with a distorted audio peculiar to these stations. All Cuban frequencies are plus or minus up to 5 kHz, for interference or plain sloppiness. Starting times are close to the hour, and transmissions last 35 to 45 minutes. The purpose of this rather extensive schedule remains unknown after several decades of speculation, though presumably these are some kind of messages for spies.

Cuban Numbers Broadcasts

AM voice "Atención" frequencies are shown with an "A." All others are CW "cut" numbers. Times are UTC, frequencies are kHz.

Day	1100	1200	1300
Mon		6796	6796
		6982	6982
Tue		6933	6796
		7889	6933
			7889
Wed		6796	6796
		6854	6933
		17499A	
Thu	4479	6825	6766
	10345	6933	6854
			7889
Fri		6796	6796
		6866	6826
Sat	8140	6796	6866
	10345	6933	6933
			7880
Sun	4459A	6768	6777 6786 6795
	6785A	6776	6933 6980 6985
		6795	6990 7889

Utility Logs

Hugh Stegman

Abbreviations used in this column

AB	Air Base
AFB	Air Force Base
ALE	Automated Link Establishment
AM	Amplitude Modulation
ANDVT	Advanced Narrowband Digital Voice Terminal
ARQ	Automatic Repeat Request teleprinting scheme
ARQ-E3	Single-channel error-checking teleprinting mode
ASCII	American Standard Code for Information Interchange
AWACS	Airborne Warning And Control System
CAMSLANT	Communication Area Master Station, Atlantic
CAMSPAC	Communication Area Master Station, Pacific
CP	Command Post
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Administration
EAM	Emergency Action Message
FACSFAC	Fleet Area Control and Surveillance Facility
FAPSI	Federal Agency for Government Communication and Information
FEC	Forward Error Correction
FEMA	Federal Emergency Management Agency
Gantsec	US Coast Guard Greater Antilles Section
JSTARS	Joint Surveillance Target Attack Radar System
LDOC	Long Distance Operational Control
LSB	Lower Sideband
MARS	Military Affiliate Radio Service
MFA	Ministry of Foreign Affairs
MWARA	Major World Air Route Area
PACTOR	Packet Teleprinting Over Radio
RSA	Republic of South Africa
RS-ARQ	Simplex ARQ teleprinting scheme
RTTY	Radioteletype
SAM	Special Air Mission
SELCAL	Selective Calling
SITOR	Simplex Teleprinting Over Radio
SPAR	Special Air Resources
UK	United Kingdom
Unid	Unidentified
US	United States
USCG	US Coast Guard
VIP	Very Important Person
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).

2428.0 MKL-Royal Air Force, Kinloss, UK, with CW bulletins at 2100. (Ary Boender-Netherlands)

2474.0 PBC-Dutch Navy, Goeree, RTTY bulletins at 2200. (Boender-Netherlands)

2598.0 Canadian Coast Guard, weather for Atlantic coast at 0059. (Ron Perron-MD)

2607.0 FUO-French Navy, Toulon, testing in RTTY at 2225. (Boender-Netherlands)

2789.0 FUE-French Navy, Brest, testing in RTTY at 2227. (Boender-Netherlands)

2815.0 IDR8-Italian Navy, Rome, RTTY bulletins at 2229. (Boender-Netherlands)

2845.0 PBB-Dutch Navy, Den Helder, RTTY bulletins at 2229. (Boender-Netherlands)

3195.0 "R"-Russian Navy, Ustinov, CW channel marker at 2300 (Boender-Netherlands)

3196.0 Prague Meteorological, Czech Republic, RTTY weather at 2302. (Boender-Netherlands)

3476.0 REA4-Russian Air Force, CW 5-figure code groups at 2041. (Boender-Netherlands)

4004.0 VLDR-Czech military, working J7VT with 5-letter CW code groups for "181," at 2307. (Boender-Netherlands)

4360.0 AAR5AQ-US Army MARS, working AAT1AM and AAR5GB, at 0149. (Perron-MD)

4363.0 3AC-Monaco Radio, with voice loop and music at 2145. (Boender-Netherlands)

4372.0 "9-N"-US Navy, working "G-7-Z" at 0110. "N-7-Y"-US Navy aircraft tracking net control station, with "6-C-M," "0-Z-Q," and Giant Killer (US Navy FACSFAC, VA), at 2050. "2-X-M"-Probable US military, in large communications exercise, at 2225. (Perron-MD)

4395.6 FCQR-Slovak military, Zilinia, with coded CW traffic at 0000. (Boender-Netherlands)

4396.0 FCQR-Slovak military Zilinia, with RTTY traffic at 2316. (Boender-Netherlands)

4460.0 Cuban "Atencion" numbers in AM, at 1102. (Camillo Castillo-Panama)

4745.0 Strat 01-US Air Force EC-135 with 2 distinguished visitors, in patch via Hickam to Offutt AFB, NE, at 0739. SPAR 56-US Air Force VIP, working Hickam at 1336. (Paul Bunyan-MO)

4906.0 Unid-Mechanical English voice in AM, probably Russian intelligence, with 5-number groups at 0507. (Gary Neal-TX)

5687.0 German Air Force 133-Aircraft calling DHM 9*, headquarters, Muenster, at 0305. (Perron-MD)

5696.0 Air Force Rescue 864-probable USC-130, in search with CAMSPAC Point Reyes, US Coast Guard, CA, at 0056. Coast Guard Rescue 1503, in patch via CAMSLANT Chesapeake to District 5 Command Center in Portsmouth, regarding a different search, at 2250. (Perron-MD)

5841.0 Coast Guard 20C-US Coast Guard helicopter, in radio check with Panther (DEA, Bahamas), at 0001. Coast Guard 10C-US Coast Guard helicopter in drug op with Panther (DEA, Bahamas), at 0210. (Perron-MD)

5961.0 WGY 908-FEMA Region 8, Denver, CO, working WGY 928, SD, at 1453. (Bunyan-MO)

6200.0 CAMSPAC Pt. Reyes-US Coast Guard, patching Navy vessel *Victorious* to Coast Guard District 11, Long Beach, CA, for search, at 0325. (Perron-MD)

6513.0 Canadian Coast Guard Iqualit, with weather at 0118. (Perron-MD)

6640.0 New York LDOC, with patch to Dispatch from United 979, on the ground in Puerto Rico with a medical emergency at 0735. (Tom Sevart-KS)

6666.0 "2-U-D"-US military, with several EAMs at 0030. (Jeff Haverlah-TX)

6694.0 Halifax Military-Canadian Forces, working warship *Halifax* at 1314. (Perron-MD)

6697.0 Fire Ship-US military, with long EAM, simulcast on 11494, at 2343. (Haverlah-TX)

6712.0 Post Goal-US military, with nightly test count at 0044. (Haverlah-TX)

6715.0 Pick Axe-US military tactical identifier, calling Labor Day at 0155. Kilogram, working Labor Day at 0312. (Jeff Haverlah-TX)

6739.0 Architect-Royal Air Force, UK, with airfield "colors" weather, at 0632. (Sevart-KS)

6950.5 "S25"-Unknown US government, attempting to troubleshoot computer link with station "EA," could not update duty status in any mode, finally went to landline, at 0440. (Steve Kramer-TX)

6854.0 Cuban "Atencion" numbers in AM, also uses 6980, at 0303. (Castillo-Panama)

6996.0 AEM1AM-US Air Force MARS, in LSB, at 0933. (Boender-Netherlands)

7439.0 US Coast Guard Cutter *Wrangell*, working Cutter *Spencer*, went to 5223 kHz secure at 2040. (Perron-MD)

8026.0 SAM 27000-US Air Force VC-137, a former Presidential aircraft apparently still in VIP service, calling Andrews AFB at 1410. (Bunyan-MO)

8300.0 New Star Radio Station-Chinese music and female numbers voice, probably Taiwan intelligence, at 0801. (Sevart-KS)

8505.0 UFZ-Vladivostok Radio, Russia, CW marker at 1907. (Boender-Netherlands)

8685.0 7TF-Boufarik Radio, Algeria, CW marker at 0215. (Castillo-Panama)

8828.0 Tokyo VOLMET, Japan, female English voice with Asian/Pacific weather forecasts, at 1140. (Gary Cohen-China)

8903.0 N'Djamena Radio, Chad, working Lufthansa 572 at 0301. Kinshasa Radio working Lufthansa 572 at 0315. (Ken Maltz-NY) Manila Radio, selcal check with Singapore Air flight #11, at 1148. (Cohen-China) *Central/West Pacific MWARA –Hugh*

Utility Logs (continued)

8971.0 Cardfile 71A-US Navy P-3, warning Fiddle (Jacksonville, FL, drug ops) of waterspout spotting, at 1252 (Allan Stern-FL) Dagger 10-Probable P-3, in an extended drug pursuit with Blue Star (Roosevelt Roads, PR), at 0400. (Perron-MD)

8974.0 Townsville-Australian Air Force, giving weather to Shepherd 491, unknown aircraft, at 1305. (Perron-MD)

8983.0 Coast Guard 2107-US Coast Guard helicopter, working CAMSLANT at 2107. (Perron-MD)

8987.0 MKL-Royal Air Force, UK, with CW weather at 0809. (Sevart-KS)

8989.0 Unid Korean speaker working another bootlegger, on a US Air Force discrete at 1230. (Perron-MD)

8992.0 Pick Axe-US military, getting working frequencies (Z160 and Z205) from Hickam Global, HI, at 0149 (Haverlah-TX)

8993.0 Camp Lejeune-US Marine Corps base, NC, calling Mainsail (general call) and MacDill Global, at 2018. (Perron-MD) *MacDill closed in 1998. Oops. -Hugh*

9007.0 Dragnet X-ray-US E-3B AWACS, reporting to Raymond 24,.Tinker AFB, via Canadian Forces Trenton Military, at 0334. (Perron-MD)

9025.0 SAM 050-US Air Force VIP flight, with direct dial to SAM Command at 0534. (Haverlah-TX)

9031.0 Ascot 3200-Royal Air Force, came from 4742 kHz, getting Dakar weather from Haven (Ascension), at 0710. (Perron-MD)

10780.0 Stargate- US Air Force JSTARS E-8C surveillance aircraft, patch via Cape Radio, FL, to Raymond 19, Robins AFB, GA, at 1543. Cape Radio testing with Ascension at 2233. ARIA-US Air Force Advanced Range Instrumentation Aircraft, said it was transmitting on 7833 and receiving on 9043, at 2330. Both these freqs were active later. (Stern-FL)

11071.7 Unid-FAPSI, Russian intelligence, using Crowd-36 RTTY mode, good sync but no copy, at 1747. (Bob Hall-RSA)

11143.0 "B-9-C"-Unknown military, Australian accent, no joy on attempted radio check with "N-5-S," at 0729. (Bunyan-MO)

11175.0 Husker 55-US military VIP flight, with patch to Offutt Base Ops via Thule, arranging an admiral's arrival, at 0055. (Haverlah-TX) NASA 817-US National Aeronautics and Space Administration, patch to Edwards AFB via McClellan to cancel a balloon launch at 2347. Pelican 712-US Navy, patch to Jacksonville duty office, asked if they could "hold his alligator," told the gator was "bent," at 1324. (Stern-FL) *Malfunctioning tactical data link -Hugh*

11178.0 Hotel 01-Dutch Navy, radio check with PJC and PJK, both Dutch Navy, Curacao, at 0559. "4-B-H"-Unknown aircraft in drug interdiction pursuit with "7-N-I," Dutch accent, at 2245. (Perron-MD)

11226.0 SPAR 67-US Air Force VIP flight, working Andrews at 0112. (Haverlah-TX) Reach 0037-US Air Mobility Command, making direct dial to Hilda East after ALE callup, at 2301. (Perron-MD) *New US Air Force autolinking system –Hugh*

11232.0 Canforce 9-Canadian Forces CC-150, arrival information for Trenton Military at 0219. Magic 9-Royal Air Force, Waddington, UK, getting weather from Trenton at 1255. (Perron-MD)

11235.0 Bravo 3-Spanish speaker giving what sounded like a position, at 2147. (Perron-MD)

11244.0 Sunburst-US military, in large net with Hog Leg, Back Stretch, Publisher, Andrews AFB, Attentive, Artistic Style, and Force Out, starting at 1911. (Haverlah-TX)

11468.0 Unid-Russian Navy, with undecodeable RTTY traffic, at 1605. (Hall-RSA)

12225.1 ATT, ATTCNY, ATT152-Probably all AT&T ALE addresses, daily (Mike Chace-PA)

12511.0 9HSH3-Motor Vessel *Zim*, Venezuela, with ARQ traffic at 1615. (Boender-Netherlands)

12615.0 URU-Mariupol Radio, Russia, with ARQ traffic at 1621. (Boender-Netherlands)

12616.0 LZW-Varna Radio, CW marker at 1619. (Boender-Netherlands)

12634.0 TAH-Istanbul Radio, Turkey, calling EGMD in ARQ, at 1626. (Boender-Netherlands)

12818.0 SAB-Goteborg Radio, Sweden, calling ERKV in ARQ, at 1611. (Boender-Netherlands)

12856.0 XSG-Shanghai Radio, China, CW marker at 1619. (Boender-Netherlands)

13155.0 Offutt AFB, NE, with EAM echoed by Andrews at 2004. (Haverlah-TX)

13200.0 Shopworn 1-US military, with patch via Offutt to Power Kit, then working Shopworn 2, clear and secure, at 1855. (Haverlah-TX)

13206.0 Trenton Military-Canadian Forces, working an unid ground station and a C-130, passed working frequencies of 130.65 and 349.4 MHz, at 0248. (Perron-MD)

13261.0 Honolulu-Pacific MWARA, Hawaii, working French Navy 5582 and 5583, at 0155. (Perron-MD)

13291.0 Gander-Atlantic MWARA, Canada, position and selcal check with American 621 at 1337. (Perron-MD)

13330.0 American Airlines flight 84, working unknown ground LDOC with position and selcal check, at 2208. (Perron-MD)

13846.7 RFFLBVO-Unknown French Forces with coded ARQ-E3 traffic at 1632. (Hall-RSA)

13946.7 6HH-Tunisian diplomatic, location unknown, testing in FEC at 1555. (Hall-RSA)

13977.0 HBD20-Swiss MFA, Berne, with coded ARQ traffic at 1628. (Hall-RSA)

14383.5 NNN0TWT-US Navy/Marine Corps MARS, with patches at 2218 (Sevart-KS)

14686.0 Atlas-DEA/Collins comm center, IA, in drug op with Flint 130, a DEA aircraft enroute to Sundance 100 (Bogota, Colombia), then back to Flint Base (Dallas, TX), went to 19131 kHz at 1719. (Perron-MD)

15015.0 Unid-Probably US military, calling Scott Airways, no joy seeing as this is the wrong frequency and Scott isn't on Global anyway. (Haverlah-TX)

15088.0 Coast Guard 6576-USCG helicopter near Puerto Rico, working CAMSLANT at 1951. (Perron-MD)

15867.0 Service Center-US Customs aviation, OK, in clear and secure checks with Omaha 390, at 1727. (Perron-MD)

15962.0 Sunburst-US military, in net with Publisher and another station, at 1833. (Haverlah-TX)

15962.0 Pock Mark-US military, attempting patch via WAR 46, US Joint Alternate CP, at 0015. (Haverlah-TX)

16141.7 KDAKRFR-Egyptian MFA, Cairo, with ARQ messages in Arabic at 1623. (Hall-RSA)

16303.0 Unid-US military intelligence training, with messages in CW, FEC, and ASCII, at 2232 (Sevart-KS)

16823.0 OFJ7-Helsinki Radio, Finland, CW marker at 1637. (Boender-Netherlands)

16839.0 UFN-Novorossiysk Radio, Russia, CW marker at 1639. (Boender-Netherlands)

16951.0 RFTTJE-French Navy, Dakar, used to be 6WW, testing RTTY at 2227. (Sevart-KS)

17155.0 Unid-probably Vladivostok Radio, Russia, passing long series of time-stamped datagrams in RTTY, then switched to CW for traffic, at 2220. (Hugh Stegman-CA)

17940.0 Houston Radio-Air traffic control station, taking position and selcal from "flight 253," at 1605. (Perron-MD)

18171.1 QT2-ALE address of unknown station, daily (Chace-PA) *Probably FBI, Quantico -Hugh*

18258.5 HBD32-Swiss Embassy, Brasilia, with coded ARQ traffic for MFA Berne, at 1637. (Hall-RSA)

19131.0 Atlas-DEA, IA, in drug ops with Work Horse (DEA) and Hard Rock (?) at 1302. Atlas working Longhorn at 1503. Wrangler working Longhorn 11, at 1525. (Stern-FL)

20407.0 Fire Ant-US military, working Replenish on "Zulu-305," at 2310. Brimstone working Wiley Fox at 2315. (Bunyan-MO)

20631.0 Croughton-US Air Force Croughton Global, UK, working Thule Global, also 11271, at 1609. (Bunyan-MO)

20659.0 WUK3-US Army Corps of Engineers, CA, working a WUG station (USACE, southeastern US), at 1604. (Bunyan-MO)

22863.0 Unid-FAPSI, Russian intelligence, with 5-letter groups in RTTY, very loud, sounded close, at 1515. (Hall-RSA)

23337.0 Puerto Rico-US Military, in radio check with Andrews AFB, at 1833. (Bunyan-MO)

23872.0 Brimstone-US military, working WAR 46, US Joint Alternate CP, on "Zulu-315," at 2353. (Bunyan-MO)

26441.7 RFGW-French MFA, Paris, with French ARQ-E3 message to "Ecole Ops Securite et Intelligence," at 1608. RFFAAC-French Forces, Guerre Dirtel, Paris, with extensive clear and coded ARQ-E3 flood relief traffic, at 1611. RFFIC-Marine Paris, with coded ARQ-E3 traffic to RFVI, French Navy, Le Port, at 1614. (Hall-RSA)

27870.0 Reach 1160-US Air Mobility Command, working Lajes AB, Azores, after ALE callup, at 1630. 501U-US Military, working Ascension at 1737. (Bunyan-MO)

29897.0 Unid inversion scrambling, at 1605. (Sevart-KS)

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Something for Everyone

HF Electronic Mail

Driven by the ever increasing need to deliver email globally, especially when on the high seas, many new stations have sprung up to catch a ready business opportunity. One of the first on the scene was the New Jersey-based Pin Oak Digital (**http://www.pinoak.com**), which offers primarily maritime users quick and cheap access to email via commerically modified PacTOR modems and special software.

On a slightly different financial tack (sorry, dreadful pun!), Sail Mail Association (**http://www.sailmail.org**) is a non-profit affiliation of like-minded sailors and radio amateurs who maintain the transmitters and infrastructure of WRD719 in California. Berne Radio, using the callsign HEC, also offers HF email services and can be heard with regular traffic lists on a number of frequencies.

WHW462/WPC Pin Oak Digital
Frequencies: 7663.5, 11065.5, 12379.5, 13420.5, 13965.5, and 18868.4 kHz
Settings: 100 bd PacTOR with 200 Hz shift

WRD719 SailMail Association
Frequencies: 2660, 5880, 7968, 10343, 12165, 13971, 13986, and 18624 kHz
Settings: 200 bd PacTOR with 200 Hz shift

HEC Berne Radio
Frequencies: 8071.7, 13991.7, 18231.7 and 20091.7 kHz
Settings: 100 bd SITOR-B with 170 Hz shift

French Forces

Last, but by no means least, no introduction to HF digital listening would be complete without a mention of this hugely prolific global network of stations. Using principally four transmission modes (ARQ-E, ARQ-E3, ARQ-M2 and ARQ-M4) these stations can be heard night and day on upwards of 100 frequencies at any time of the day or year.

Just as in the case of the FAPSI stations or 8BY, the French Forces stations have a strange fascination. Many stay idle for long periods of time, only to briefly spring to life with a link-check or "controle de voie" message – the telltale NATO format giving the sending, relaying and destination stations together with the routing identifier for the circuit in use. Here's a selection of currently active stations:

RFLI, Fort de France
Frequency: 19216.7 kHz
Settings: 96 bd ARQ-E3 with 400 Hz shift and CRC of 8

RFVI, Le Port
Frequency: 20179.7 kHz
Settings: 100 bd ARQ-E3 with 400 Hz shift and CRC of 8

RFQP, Djibouti
Frequency: 16193.2 kHz
Settings: 200 bd ARQ-M4 (TDM-342) with 400 Hz shift and CRC of 4

Oil & Gas Networks

Now on to some more challenging targets (though all utility monitoring can be challenging). Surveying for, and extracting oil and gas can lead to considerable expeditions to remote and often inhospitable areas for many companies. Contact with headquarters is often via HF radio, and there are plenty of examples of such networks audible today. Here are two such networks. We'll feature more in a later issue.

"Waffa"

This network, which was first noted in early 1996, was christened Waffa because of the address most often seen on the telexes and other messages sent. Much investigation by various monitors led to the discovery of a large network, operated chiefly by the Abu Dhabi-based National Petroleum Construction Company (NPCC). The network serves the interests of a number of companies active in the Gulf and Indian Ocean.

Waffa (actually the name of the pipe-laying barge which houses the network's floating operations center), controls over 100 vessels organized into several large flotillas. Each flotilla handles the supply, transport and construction needs of some very large projects off Qatar, Abu Dhabi, the UAE and Mumbai (Bombay), India.

Waffa is active 24 hours/day on the frequencies 8221.5 and 3291.5 kHz. Messages are sent using standard SITOR-A and B, and include daily status reports from the various project managers, position reports for all the flotillas, and other marine and weather information. Selcals used include CSUQ, CVIV, FDFD, FXKV, IPIP, PTXQ, and XUKT.

Hess Oil, Nigeria

Hess Oil's servicing and supply network operates from a number of Nigerian locations including Lagos, Port Harcourt and Warri, and can be heard on 8012.6 kHz using SITOR-A with a shift of 200 Hz.

Messages can be identified by the lead-in "hesnl" or "hessnl," and unusual formatting using "/7" and "/5" to highlight message headers – a feature of the PacTel messaging system in use by Hess and a number of other oil companies. Traffic consists of various operational messages plus very detailed drilling reports.

SELCALs used are HNIA through HNIJ.

ALE Update

Since we published details of the MIL-188-141A software PC-ALE (automatic link establishment) in December, the Internet's monitoring community is literally awash with new ALE identifiers every day. Our own database already consists of over 800 individual ALE IDs.

Networks positively identified include those listed in our previous column, plus US Army Corps of Engineers, US Defense Logistics Agency, Austrian Forces, Canadian Forces, and Algerian Customs and Police. We'll keep you posted with more details and frequencies over the coming months. Meanwhile, two mystery networks in particular are keeping various people busy:

Unidentified ALE Network 1

The ID "BB1" plus a few others including "M73" and "M79" has been heard in the US and Europe on the following frequencies: 6865.6, 10615.6, 10901.6, and 11350.6 kHz

Unidentified ALE Network 2

The IDs "AMM", "CYP", "DKL", "KUW", "RIY", "HSP" and others have been heard on the following frequencies: 7993.6, 10393.6, 11524.6, 12154.6, 14815.6, 17419.6, and 18278.6 kHz. Speculation is that "AMM", "CYP", "KUW" and "RIY" are Amman, Nicosia, Kuwait and Riyahd respectively but the organization behind the network remains unknown.

As with everything published in Digital Digest, we welcome your letters and email with corrections or further information on these networks.

Utility Monitoring Central

Finally, news about a new website being prepared by us. Utility Monitoring Central will specialize in nonbroadcast, digital listening from VLF to HF. As time progresses, the site will hold much of our digital monitoring collateral including in-depth profiles of diplomatic, intelligence, government and military organizations plus frequency and other useful databases. You will find UMC at:
http://www.mindspring.com/~mike.chace/umc.html

Until next time, good digital DX and 73.

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Digital Radio Mondiale

Joe Hanlon in Philadelphia observed that on UT Dec 1, he landed on 9665 kHz at 0131 to hear familiar Radio Netherlands voices Jim Cutler, Jonathan Marks and Diana Janssen talking about the Digital Radio Mondiale tests... then it went into this digital noise he couldn't figure out, until off at 0300. "Coming from Rampisham with good signal but nothing worthwhile to listen to, if noise is all they are doing for test purposes," he said.

Andy Sennitt of Radio Nederland responded to Hanlon's comments as follows: The "noise" is what an analogue receiver makes of digital transmissions. If you have a digital receiver (which is unlikely, as the only prototypes are in the hands of DRM participants) then you should hear a normal-sounding transmission. The main purpose of the tests is to find out how much the bit rate is degraded over long transmission paths and under different conditions. On a digital receiver, this degradation would sound something like a Real Audio feed under less than ideal conditions.

These tests are not intended for the general public, but the announcements are broadcast in analogue to explain the purpose of the transmissions, and to comply with international regulations. As has been noted, the idents were made at Radio Netherlands and encoded as mpeg files. But unless you have an obsession with listening to Jonathan Marks and Diana Janssen on as many stations as possible, I would strongly agree with Joe that there's not much benefit in listening to these transmissions on an analogue receiver :-) (Andy Sennitt, Radio Nederland)

For an extensive schedule of DRM tests via Sackville, Wertachtal, Rampisham, Bonaire, Sines see **http://www.angelfire.com/ok/worldofradio/ghdx9964.txt** This includes 25770 with Deutsche Welle via Sines, 250 kW at different azimuths: 0900-0950, 1000-1050, 1200-1250, 1300-1355 UT (HFCC registration via Wolfgang Büschel)

ARGENTINA Wherever R. Martí goes it leaves a trail of destruction, as our comrades in Habana are too lazy and unsympathetic to confine jammers to the hours really needed: now Nacional is a victim on its longtime 6060 frequency, Cuban jamming bothering it around 0900. The Argentine domestic service relay was better on //15345 with ID at 0932 omitting "Radio": *Desde Buenos Aires, Nacional y sus 40 emisoras...* – but no comparison to Chilean powerhouse on 15375 at the time (gh)

ARMENIA TWR on new 6240 *0012-0100: s/on with TWR IS, 0015 into English religious programming. Site? Via Monaco? Heard past several weeks (Brian Alexander, PA) TWR's English on 6240 at 0015-0045 is via Kamo site here since November, 100 kW at 78, UT Sat and Sun only, a program called *MemCare by Radio* for the benefit of Christians in Central Asia who feel depressed and isolated in Islamic society. The transmission is at 0015-0100 with other segments in Kazak, Kirgiz, Turkmen and Korean depending on day of week (Wolfgang Büschel)

ASIA [non] The B99 schedule for Radio Free Asia is posted on the Asian Broadcasting Institute WWW site. **http://www.246.ne.jp/%7Eabi/rfa.htm** includes transmitter sites. According to this, KNLS in Alaska and Delano, California, are no longer used to broadcast RFA (Jim Moats, OH)

AUSTRIA ORF was interviewing their webmaster for **http://roi.orf.at** He said ORF has some 200 pages on the internet. Now some of them are available in new non-frames version, for the benefit of blind visitors using browsers for reading text only, in German, English, Spanish and French. As far as he knows, ORF is the only station in Europe doing this. Also plans to increase the amount of audio on demand for benefit of blind and all listeners (gh)

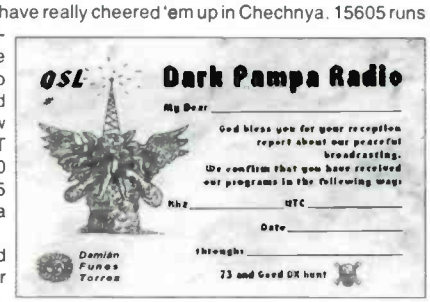
BOLIVIA R. Victoria is new or reactivated on 7053, heard at 2050 UT, announcing twice it is on "41 MHz" SW from Villa Abecia. This is near Camargo in southern Bolivia (Rogildo Fontenelle Aragão, Cochabamba, member of DX Clube Paulista)

R. Juan XXIII, San Ignacio de Velasco, Santa Cruz de la Sierra departamento, which has been on 4965 for 32 years, told me it would move around the end of November to 6055, because most receivers tune the 6 MHz band upwards. Uses slogan *La Voz Católica de la Chiquitania*. Besides pastoral work, it broadcasts news, notices and literacy programs. But still had not changed in mid-December (Rogildo Fontenelle Aragão, Cochabamba, *World Of Radio*)

BRAZIL R. Trans Mundial, São Paulo, changed 11705 to 11735; still on 5965, 9530, all at 0700-0100. Reports for a new QSL card may be sent to C.P. 18300, 04626-970 São Paulo, SP, Brasil; or transmun@dglnet.com.br (Rudolf Grimm, *radioescutas*)

CANADA Openly inspired by the series of the same name on NPR's *All Things Considered*, Fridays between 2135 and 2200 UT, repeated 2-hourly, CBC launched its own *Lost and Found Sound* series Fridays during the hour *This Morning* is also on RCI 9640, 13650 and 17710, such as US MW stations DXed in Greenland 50 years ago (gh)

CHECHNYA [non] The Radiostantsiya Chechnya Svobodnaya schedule last month under RUSSIA quickly outdated with 17665 deleted among other changes. In the 1230-1400 period we had good reception on 11635 and 15605 including after 1315 incongruous American classic movie music such as *Happy Days Are Here Again* sung in English, and *When the Red, Red Robin Comes Bob-, Bob-, Bobbin' Along* which must have really cheered 'em up in Chechnya. 15605 runs to 1401* whilst 11635 continues until 1430* and the two via St. Pete were also audible another day around 0900 (gh) Also via Moscow transmitter: 0300-0600 UT on 5925 kHz, 0630-1400 9470, 1430-2100 7445 (Nikolai Rudnev, Russia, via Kai Ludwig, *BC-DX*)



CHILE Here's a pirate we had not heard about before, nor heard, Dark Pampa Radio, with some interesting QSLs to see: visit their website **http://www.srs.pp.se/fr/darkpampa/index.html** (DPR via gh)

CHINA Since Oct 31, CRI appears to have dropped 6950 for English at 2000 and 2100. According to *The Messenger*, CRI's publication, 6950 is still used, but as China wishes to respect those international broadcasting laws it chooses whilst jamming other stations deemed critical to Beijing, it has not stated that frequency usage between 6900 and 6995 has stopped. The old 6933 which carried central and east Eu languages believed from Xi'an was dropped earlier in 1999 and frequencies in the regular 41m band are

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-99=winter season, Oct-Mar; [non] = Broadcast to or for the listed country, but not necessarily originating there.

now used to make it easier for listeners in those countries to hear what China is saying. The older transmitters are either being redeployed for jamming against increased Radio Free Asia transmissions and other foreign broadcasters or have been taken out of service for scrap or to be used for spare parts on remaining units.

Beijing usually directs its jamming towards these foreign broadcasters: BBC, VOA, RFA and Taiwan in Mandarin, Cantonese, Tibetan and Uighur, but it seems that now Korean from Radio Free Asia is being targeted on 9445 at 1530-1630 with the usual FM domestic service programming overriding RFA. One can conclude that sections of the Chinese Communist Party/government have decided to offer P'yongyang assistance as power shortages or the reliability of NK equipment has made necessary the use of the more powerful Chinese jammers that can be well heard here in Europe 1500-1700 during local winter afternoons.

NK still uses wobble jamming against VOA in Korean and a more modern electronic wobble signal over KBS in Korean 0900-1100 on 13670, which now propagates here.

One could call this jamming assistance "Fraternal Socialist Help" as despite Beijing establishing diplomatic ties with Seoul, there are sections of the party who remain ever friendly and brotherly towards their comrades in P'yongyang. Also there is a Korean community in northeastern China so the government is ever sensitive about the effects of poverty on the NK population and what Koreans in China may do if given a chance (Adrian Childs, Dorchester)

Last month's report of CNR on 15070 appears to be a jammer, but not clear against what (Olle Alm, *BC-DX*) Could be 2 x 7535 (Wolfgang Büschel, *ibid.*)

[non] Tho the Cuban relays have existed since April or May, CRI still does not know about them, or want us to: the closing schedule announcement at 2355 only gave the six broadcasts to E and S Af at 1400, 1500, 1600, 1700, 2000, and 2100. I suppose they tape the 2000 for playback at 2300. So the complete schedule of CRI in English to North America as best we know it, but not known in Beijing is:

1300 9570 Cuba
1400 7405 direct
1500 7405 direct
2300 5990 Cuba
0100 9570 Cuba
0300 9690 Spain
0400 9730 French Guiana
0500 9560 Canada (Glenn Hauser, OK)

Once again this winter 11675 is best frequency for CRI in English [direct] to Asia/Pacific region, at 1200 with great signals here in Philadelphia (Joe Hanlon)

COSTA RICA R. La Fuente Musical, 2599.46, 2 x 1300 harmonic of TILC at 1106-1130, lots of ads and IDs between ranchera vocals. "1300 AM," many mentions of Cartago. Good sustained peak for almost half an hour (Mark Mohrmann, VT)

In late November, RFPI began a new sked of daily 2300-1300 on 6975, 2100-0600 on 15050. And 25930 experimental with USB, 2 kW, high-gain antenna, a fixed log periodic some 40 feet long and wide, on the air approx 1300-2300 or longer. 15050 is currently using a fixed yagi. Board member Scott Wood was bringing a heavy-duty replacement rotor for it to be installed in a few months after the windy season. Streaming audio comes from SW pickup at Annapolis via **http://www.boinklabs.com/ifpi.html** meaning Internet for Peace International.

RFPI's new 25930-USB sometimes held up as late as 0100, and once linked up with a sporadic-E opening which also brought in Mexican TV, until 0215 fade-out (gh, OK)

CUBA I have resumed doing two DX segments in Spanish: *Para los Diexistas*, Sat 0503-0508 on R. Rebelde MW 670, 710 and SW 5025, within the show *Estaciones*; also see my webpage at **http://www.cuba.cu/RRebelde/htm** And on the last Sunday of the month, *Hablando de Diexismo* along with my wife Melena on RHC's *En Contacto* at 1335, 2135 and UT Mon 0135 (Manolo de la Rosa)

Unfortunately my current receivers do not tune above 29999 kHz where broadcast harmonics are now appearing. As a poor substitute we scanned downward from 29999 one afternoon and soon encountered a bubble jammer covering roughly 29863 to 29873 at 2114. Yes, that is Cuba 3 x 9955 against WRMI! Next we found another bubble jammer at 29472-29482, and that is 3 x 9825, another Cuban, against Martí. It seems these particular harmonics are about 3 times as wide as on the fundamentals. Of course, several transmitters could be involved in each case. Harmonics of the victims themselves were not audible. Since the lower one is inside the 10 meter hamband, the intruder watch folk ought to raise a ruckus, if they realize what and whence it is. They were both frequently heard since (gh)

CYPRUS [non] Don't expect anything Middle Eastern from Radio Middle East except the name! Nary an oud nor a muezzin was to be heard during this program floating on WBCQ 7415 one Sat from 2136 tune in until cut off at 2200. We did enjoy the classic rock and pop tunes and the professional style of Nathan Morley, who might as well be doing this from London, but announced P O Box 30582, Ayanapa, Cyprus, and fulfilled a number of requests, including a "live" phone interview with Edward in Lethbridge, Alberta, where it "is" 35 deg C. Somehow I think this was a while ago.

Edward's last name was never mentioned, but I think it must be Kusalik in nearby Coaldale. Isn't it great that the active SWL community is so small that we can guess identities like this? (*Answer: no*). BTW, Morley previously did a show called R. Napa, via Merlin (gh)

ECUADOR HCJB Spanish service continues to be a source of good music. *Música del Ecuador* we found UT Sat 0200-0230 on 15140, Sat and Sun 1100-1130 on 11960 and 6050. Despite a thorough search of the extensive HCJB website, we could never find any basic program schedule for this service! (gh)

GREECE [non] The Sunday evening Greek music show on VOG via VOA 17705 and 17565 at 1900-2000 is live per announcements, and requests may be made to tel. 606-6184 or to the host, who sounds a bit like Tom Meijer, senexus@hotmail.com The feed often suffers from crosstalk, and the Optimod is always pumped way up. With that kind of signal one ought to be able to enjoy hifi music at 15 kHz bandwidth, but no way since it is so clipped: the time pips at 2000 were barely audible, I think because their audio frequency was above the passband imposed upon this. While 17705 is listed as Delano and 17565 as Greenville, the latter transmitter was down for some weeks so both came from Delano, pounding RF into Enid on the first hop, actually aimed on nearby Wichita, splashing up to plus/minus 30 kHz from one, 20 from the other. When the two become unsynchronized, we know two different coasts are involved due to satellite delay (gh)

HONDURAS HRMI was active upon Dec 8 1232 check of 5890, poor but clear on AM, not USB, but maybe a few kW with standard evangelical rhetoric in Spanish, hymn; 1236 mentioning Misiones Internacionales. I am still waiting for signs of any progress in MI's grandiose worldwide SW network project. After all, if it were not for MI, who could ever hear the Word Of God on the radio? Whenever 5890 is in I am also reminded to check for Miskut/Nicaragua on 5770. At 1241, and continuing past 1300 that frequency was blocked by a huge noisy ute (gh)

4960, Radio Buenas Nuevas/HRET, 0002-0035, mix of rustic guitar and various styles of religious music. Numerous IDs as Radio Buenas Nuevas in Puerto Lempira test transmissions (*en prueba*). Religious talk, then into canned kidshow at 0032. Again at 0103, this time with HRET calls, native language. Fair (Don Moore, IA)

INDIA AIR GOS in English at 1745-1945 often puts in a decent transpolar signal on 13750 including news at 1900; French 1945-2030. Trouble is, Dr. Gene Scott is running his CR transmitter about 100 Hz away. After 2000 it's a three way clash as Cuba's European service chimes in another 100 Hz away (gh)

IRELAND [non] New management at RTE decided to consolidate SW operations via the Merlin network only, so relays via WWCR (RTE's original SW outlet) ceased in Dec. RTE is till audible in NAm via Canada, Ascension, England. RTE are not paying any attention to Merlin SW relays, nor watching the clock in Dublin; else they would not be interrupted in mid-sentence when 13640 and 21630 cut off at 1859:30 (gh)

RTE remains via Merlin:
6155 0130-0200 Rampisham 500 kW 275 deg
11740 1000-1030 Singapore 250 135
13640 1830-1900 Sackville 250 277
15315 1800-1830 Skelton 300 110
21630 1830-1900 Ascension 250 085 (*BC-DX*)

ISRAEL Kol Israel added 7510 to English at 2000-2030, and moved Hebrew to Europe and North America from 9390 to 9385 at 1900-2200 and 2359-0500 (Moshe Oren, Bezeq) This was in response to Wolfgang Büschel's complaint that Israel was actually on 9393 hetting Pakistan on 9395 (gh)

Someone pointed out the SW station is referred to on one of their schedules as Israel Radio International, but Yishai El-Dar was still calling it Voice of Israel as I heard him concluding English at 1529 on 17545. (gh) Their website at **http://www.israelradio.org** says Israel Radio International in large type above their logo :-) But aren't most of the English items relays of the domestic service? Those transmissions usually identify as "this is Israel, broadcasting from Jerusalem" or with the Hebrew "Kol Israel." (Andy Sennitt, Netherlands)

Kol Israel observed on 31230 (2 x 15615). Strong here during local daytime (Nikolai Rudnev, Russia, *BC-DX*)

KOREA SOUTH Please visit our web site for "New Logo Songs of Radio Korea International" **http://www.246.ne.jp/~abi/rkisj-e.htm** RKI launched some new logo songs in November and provided the audio files of these to us. (Toru Yamashita, Asian Broadcasting Institute) I hear some of these on 9650; really quite nice (gh)

KURDISTAN V. of the People of Kurdistan is on 4060 from 0345 until 0700; also from 1545 to 1745. Languages are Arabic, and very likely Kurdish and Farsi, each language seems one hour. For me, the signals are strong. *Passport* shows nothing on 4060 (David Crystal, Israel, *World Of Radio*)

V. of Iraqi Kurdistan, main studio in Salah al-Din, on 4085: daily 0350-0400 Kurdish, 0400-0500 Arabic, 0500-0600 Kurdish, 1615-1800 Kurdish, 1800-1900 Arabic with news at 1830; same frequency carries Harim Radio, V. of the Regional Government of Iraqi Kurdistan, daily at 1430-1530 in Kurdish ((c) BBC Monitoring)

Voice of the Struggle of Iranian Kordestan (Kurdish: *Aira Dangi Khabati Kurdistani Iran*) has been observed intermittently since 1988. Programmes are hostile to the Iranian government. Frequencies are subject to variation. Frequencies used in the past include: 7435, 7000, 5080 and 4185 kHz. Now heard on 4290 at 1600-1700 daily in Kurdish (BBC Monitoring)

MEXICO XERTA changed their address [from the Torre Latinoamericana] to Plaza San Juan, 5, piso 2, San Juan de Letrán, México, D.F. and perhaps, the frequency will change from 4800 to 4810 (Julia Serradilla via Elbe, A-DX, via Pypers, *Cumbre DX*) On 4810 they will be using more power. Apparently new schedule will be 1800-1200. Official address: Plaza de San Juan, 5, Esquina con Ayuntamiento, Primer piso, Despacho 2 Centro, 06070 - México, D.F. (Héctor García Bojorge, *Cumbre DX*)

MOLDOVA [non] I received via fax the sked of R. Moldova Int'l [actually via Galbeni, Romania] until March 25: includes English 0430-0455 UT 7520 NAm; 1300-1325 11580 NAm; 2230-2255 7520 UKoGBaNI (Rubén Guillermo Margenet, Argentina) Besides the three English broadcasts given here, confirmed the fourth at 2130 on 7520 to Eu. Re-listening to tape of the announcement, it sounds like 11680 at 1500 rather than 11580 at 1300 (Alan Roe, England)

NEW ZEALAND This page on my website promotes the acquiring of a new RNZI Transmitter. **http://www.hazelnutspread.com/rnzi.htm http://members.tripod.com/~eyreland/rnzi.htm** (M Hackett, webmaster) Says it would pay for itself by renting out time, with dollar projections

PAKISTAN R. Pakistan, English news at 1100-1104 shifted to 21460.25 to avoid HCJB on 21455 (Noël Green, *BC-DX*)

PERÚ R. Amistad at 0000 announced frequency as 4515, and would be transmitting without interruption on SW times converting to 0900-1100, 2300-0400 UT. This is the station formerly on 4575.

Ondas del Rio Marañón, 6522, at 2232-2350, tropical music, *"a través de la onda corta internacional llegando a todo el mundo..."* Reactivated after months off the air with the old name (ex-Radio Impacto) last heard in December 98 (Rafael Rodríguez R., Bogotá)

6522.04, same station from Aramango, La Libertad, 0054 Nov 30, reactivated here with typical Andean programming of huaynos, comunicados, ads, and numerous IDs to informal signoff at 0107. Plagued by utes and fishing boat traffic, but pretty good signal. Thanks to Henrik Klemetz for confirming my transcription of the ID (Jay Novello, NC)

PORTUGAL RDP Int'l in Portuguese to NAm was heard on a Saturday at 1400 on 31080, also audible on fundamental 15540 (Larry Dolan, Québec, CIDX via Sheldon Harvey)

R Portugal to E Timor 0900-1200 on 17725, 2100-2400 changed to 15175; each middle hour in Tetum is also relayed via Taiwan 11550 (*Observer*, Bulgaria)

RUSSIA VOR during B99 is using these frequencies for its special broadcast to the Balkans: 6205 and 7320, but the old summer frequencies of 11980, 12000 and 7350 were still being announced. 20-minute language segments are: 2000 English, 2020 Russian, 2040 German, 2100 French, 2120 Serbian and 2140 Albanian. Each is spoken by the main members of KFOR and the majority Kosovar community. The content of each segment remains anti-NATO and anti-KLA with references to "Albanian gangs" and the environmental damage in the Balkan region (Adrian Childs, Dorset)

SUDAN Sudan National Radio Corporation has web site at: **http://www.sudanradio.net/** (Pentti Lintujarvi, Helsinki, Finland via hard-core-dx)

[non] 6965 was good at 1430-1610v; mainly talk in Arabic on Somalia, Eritrea, Ethiopia and Uganda and Arabic songs of European style (Mahendra Vaghjee, Mauritius) Mahendra sent a RA file of this. It is an anti-Sudanese clandestine, Voice of Freedom and Renewal, which is reportedly based in Eritrea. IDs as *Sowt al-hurriyah wa al-tajdid.* Did hear one new slogan after an ID, *Sowt al-Sudan al-jadid*, Voice of the new Sudan. In east NAm, check out 6965 at 0400 (Hans Johnson, *Cumbre DX*)

V. of Sudan, new 9517.51 at *0400-0415+, s/on with anthem, opening announcements with V. of Sudan ID [in English?], talk in language, local music. Poor to difficult with hets from 9515 and 9520. Much better on // 8000.76 (Brian Alexander, PA)

SURINAME Radio Apintie, 4990.9: From apintie@sr.net station manager Charles Vervuurt, said I was welcome to send a report and brief audio clip via e-mail to him. Two weeks later, I received a partial data e-mail QSL from him, and 6 weeks later a QSL on the station's letterhead arrived. Mr. Vervuurt stated that he would prefer e-mail reception reports as "the mail service is not very reliable to Suriname." (George Maroti, NY, *Cumbre DX*)

TAIWAN [non] Elementary Mandarin numbers lesson for Russians caught my ear on very strong 15695 signal next to *WOR* Tue at 1335, ID at 1340 for Mezhdunarodnaya Radio Taibei, announcer Vasily Mikhailov. Must be WYFR relay now for RTI Russian, too (gh) Is listed as 44 back to Europe from WYFR at 1300 (Wolfgang Büschel)

THAILAND Back in Bangkok they are not monitoring what is going out from Udorn nor watching the clock. Otherwise R. Thailand would have been concluding transmission rather than still doing news when cut off 9810 at 1259:30. Putting the news at the end of their English broadcasts is also a daring departure (gh)

TIBET [non] V. of Tibet keeps moving around, but we don't mind as long as they keep off 15685 when we have *World Of Radio* Sat at 1230 (gh) VOT via Almaty, Kazakhstan 500 kW/135 1220-1255 new 9920 (*Observer*, Bulgaria) and on 15645 ex-15685 via Dushanbe, Tajikistan (Wolfgang Büschel)

UKoGBaNI UnID on 3930.5, 0240-0830+, very weak with Euro-pops. DJ with British accent. Too weak to catch ID. Euro-pirate? (Brian Alexander, PA) That would be Laser Hot Hits, a UK free radio station, playing mainly current pop chart music, but with occasional oldies and even offshore recordings. It has parallels on 6220 and 7460. As far as I know, all three are 24 hours 7 days. Address is PO Box 293, Merlin, Ontario, Canada (Tom Read, Macclesfield, England)

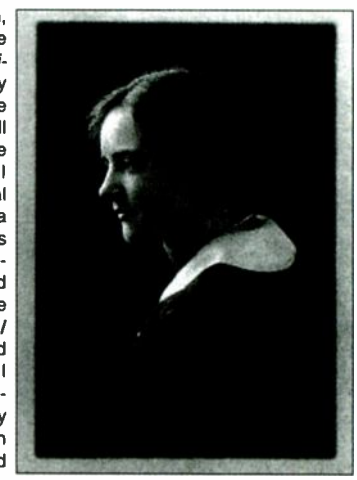
USA George Jacobs takes credit as broker for the sale of TIAWR to the University Network; still available are WRMI, WSHB and WRNO (George Jacobs & Associates annual newsletter)

From *Allan Weiner Worldwide*, UT Sat 0100 on WBCQ 7415: Weiner's malady is a mild case of viral encephalitis, and herbal remedies his M.D. would never even think of prescribing, have been helping. AW would like to fulfill his dream of broadcasting from a ship, by acquiring a vessel to anchor in Boston Harbor next summer. This would be totally legal, originating live programming aboard in US waters and then broadcast via WBCQ. Hopes to get financial partnership with Greenpeace or similar organization.

BTW, the most recent ill-fated radioship, *Electra*, whose destination was indeed St. Kitts, just sank in Rhode Island waters. Someone apparently left a hatch open. It will probably be raised, but the radio equipment still aboard will have been ruined by salt water immersion.

WBCQ-1 is now streamed via **http://www.wbcq.com** WBCQ-2 began testing in Dec on 9340. Plans to operate the 700-foot rhombic bi-directionally, toward Mexico City and Europe at the same time (notes by gh)

New programs on WBCQ-The Planet: *Planet Lavender* Sat 2200-2300, oldies music for lesbians and gay men. *Radio Detective* Tue 2230-2300, with talk of old radios, programs and some music of the period of radio's golden age (1930's). (Allan Weiner, WBCQ)



A friend of mine said, "Marion, your name is in this magazine !" She gave me December's issue of *Monitoring Times*. Glenn, thank you very much for mentioning my shortwave radio show, *Marion's Attic*. I am still on the air at 4:30 PM eastern time every Tuesday [2130 UT on 7415]. I play antique recordings on original equipment up in my attic. I have a pleasurable time recording my shows because I can now share these treasures of long ago. You can see an old picture of me on my own Web Site **http://members.aol.com/marionweb**. A young lady friend helped me with it, my thanks to her. I have found ***MT*** very interesting reading. The radios in there look very different than my Philco Console in the living room. Keep up the good work! Lovingly, (Marion Webster)

After February 1, VOA *Communications World* will be changed from 12 x 8.75 minutes to 6 x 21.75 minutes on *News Now*. This means *NN* listeners will hear all the *CW* they're going to get in one sitting. But total time will be reduced – I'll probably eliminate audience feedback from the *NN* edition. The half-hour edition continues as a 28-minute show and takes on added significance given the abbreviation of the *NN* version. Two new SW transmissions of the half-hour edition of *Communications World* began in Nov via DSB feeders from Greenville to Europe, Saturday 0700-0730 on 6873, Sunday 1400-1430 on 18275, each on both upper and lower sideband but with little carrier. (Kim Andrew Elliott)

The Jack R. Poppele Transmitting Station in Delano verifies reports directly with a beautiful special QSL card from the following address: US Information Agency [*sic*, no longer exists], International Broadcasting Bureau, Delano Relay Station, 11015 Melcher Road, Delano, CA 93215 (Marcelo Cornachioni, Argentina, *Conexion Digital*)

WRMI did not move to 7570 but to 7385 in the 0200-0930 period, including AWR's *Wavescan* DX program at 0830-0900 Tue and Wed, and *Viva Miami* at 0900-0930 UT Tue-Fri, both in the middle of the night for our convenience (gh)

WGTG plans: TX # 1: 5.0 AND 9.0 MHz range; # 2: 6.0 and 12 MHz; # 3: 3.0, 7.4, and 13 MHz; # 4: 2.3, 4.8, 5.9, and 15.6 MHz; # 5: planning stage; I have to fill 7000 sq foot building, more antennas. No employees to feed! Low overhead! (Dave Frantz, WGTG)

WRNO's lawyer Ashton Hardy says the insurance company has denied WRNO's claim for a new transmitter. The old one was destroyed in a fire in December 1998. WRNO will appeal the company's ruling. For the moment, WRNO is on the air with an amateur transmitter rated at 1 kW that is running into their regular antenna. They are having trouble with this unit as well. The station is still for sale for $500,000 (the land is worth $200,000 to $300,000 alone, he says.) (Hans Johnson, (c) *Cumbre DX*)

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

Broadcast Logs

GLOBAL FORUM

Gayle Van Horn

0051 UTC on 11800
ITALY: RAI. Italian president honors the nation's soldiers for their peacekeeping service // 6010, 9675. (Bob Fraser, Cohasset, MA)

0053 UTC on 9705
MEXICO: Radio Mexico Intl. (Tentative) Non-stop Mexican songs, SINPO 23443 until VOA *0100 (via Thailand). Spanish station still audible under VOA. Ethiopia's *0247 on 9704.2 making this one a tough one. (Mark Veldhuis, Borne, Netherlands/*Hard Core DX*)

0100 UTC on 7300
SLOVAKIA: Radio Slovakia Int'l. Freq quote to interval signal, ID, and time pips into national news. (William McGuire, Cheverly, MD; Frank Hillton, Charleston, SC)

0102 UTC on 9730
SRI LANKA: SLBC. Music from Sir Cliff Richard and English greetings to listeners. Country song from Olivia Newton John, strong signal as often 44434. (Veldhuis, NLD/*HCDX*)

0200 UTC on 9510
ROMANIA: Radio Romania Intl. Tough copy for English service, 9505 interference, carrier also noted on 9515 , 9520. (Lee Silvi, Mentor, OH) Noted // this hour 9570, 9690, 11740, 11830, 11940. (Brian Bagwell, St. Louis, MO)

0200 UTC on 11865
CANADA: Radio Canada Intl. Sign on freqs/IDs to *Spectrum* program. Japan's Canadian relay 0517 on 6110 with listener's letters. (Sue Wilden, Noblesville, IN)

0205 UTC on 7180
RUSSIA: Voice of. National news to ID. (McGuire, MD) *Moscow Mailbag* 0315, 7180. (Dan Smith, USA)

0247 UTC on 9704.2
ETHIOPIA: Radio Ethiopia. Sign on with chime interval signal into identification in presumed Amharic, strong signal, very low modulation. (Veldhuis, NLD/*HCDX*)

0259 UTC on 4955
COLOMBIA: Radio Nacional. Spanish. Best to monitor in LSB, several "RDFC" ID versions to ballads. (Harold Frodge, Midland, MI)

0345 UTC on 4990.9
SURINAME: Radio Apintie. First time log for me–very pleased. Clear ID 0419, pop music from Dutch artist Marianne Weber. (Veldhuis, NLD/*HCDX*)

0420 UTC on 11818
SAUDI ARABIA: BSKSA. Arabic. Holy Koran recitations // 15170. (David Yocis, New York, NY/*Cumbre DX*)

0534 UTC on 9785
UKRAINE: Radio Ukraine Int'l. Ukranian service to ID and orchestral music, very good signal. (Yocis, NY/*HCDX*) Noted English service 0100-0200: 6020, 9560, 9810; 0400-0500: 6020 // 9600, 9810. (Tom Banks, Dallas, TX)

0540 UTC on 4815
BURKINA FASO: RTV Burkina. Local music to French talk and listener phone-ins. National anthem 0555 to 0557*. Slow fading, SINPO 23322. (Thomas Roth, Germany, *HCDX*)

0558 UTC on 4835
MALI: RTV Malienne. French. ID on the hour "ici RTV Malienne" to brief musical bridge to "ici Bamako, bon jour", fair signal SINPO 34433. (Roth, Germany/*HCDX*) **CRI Mali** relay 2010 on 15500. 1938-2000+ on 11735, interference from Canada's RCI *2100 for French service 11730. (Frodge, MI)

1105 UTC on 9580
AUSTRALIA: Radio Australia. *Asia Pacific* show featuring regional news. *At Your Request* music show 2245 on 21740. (Fraser, MA)

1110 UTC on 6120
CANADA: Radio Japan relay. News item on Japanese fishermen rally to protest Chinese invasion of their grounds. Canadian relays monitored as; **Radio Korea Int'l** 1140, 9650; **Radio Austria Int'l** 1618, 17865. (Fraser, MA)

1150 UTC on 17500
BULGARIA: Radio Bulgaria. German service for *Radio Bulgaria Calling* // 15700. (Fraser, MA) 0345 on 7375 (Smith, USA) 0150-0200 English economic update to ID. (McGuire, MD) 1952-2000+, 11720 feature on photography. (Harold Frodge, Midland, MI)

1240 UTC on 7185
BANGLADESH: Bangla Betar. National music to "this is the external service of Bangladesh Betar" to 1259*. Poor to fair signal from amateur radio interference. (Joe Talbot, Red Deer, ALB Canada/*HCDX*) 1530 on 4879.2 with weak English news, ID 1536. (Veldhuis, NLD/*HCDX*)

1240 UTC on 15315
UNITED ARAB EMIRATES: UAE Radio-Abu Dhabi. Arabic radio comedy to time pips, ID 1300 with very good signal. (Daniele Canonica, Muggio, Switzerland) UAE **Radio Dubai** English service 1600-1640, 13630, // 13675, 15395, 21605 all to Europe. *-ed.*

1615 UTC on 5005
NEPAL: Radio Nepal. Nepali service to instrumental regional music, clear identification, SIO 343. (Canonica, SUI) 0013-0020, 5005. Interval signal, 0014 chimes, sign-on ID, freq quote to soft Nepali music. (Veldhuis, NLD/*HCDX*)

1800 UTC on 7440
VIETNAM: Voice of. English news on national elections, fund raising by VOV staff for flood victims // 9730 poor quality; 1830 Vietnamese service. (Roth, Germany.*HCDX*) 0330 on 7260 with news broadcasts. (Smith, USA)

1919 UTC on 15190
PHILIPPINES: Radio Philipinas. Tagalog. Commentary to "RP" identification 1923 into sports report. (Frodge, MI)

1935 UTC on 11734
ZANZIBAR: Voice of Tanzania. Swahili. African music to "Radio Zanzibar Tanzania" identification to 2000 time pips, very good signal. (Canonica, SUI) 1830-1915; 11734 with Swahili speech and Taarab music to ID. (Enzio Gehrig, Spain/*HCDX*)

2015 UTC on 15160
ALGERIA: Radio Algiers Int'l. English service IDs to *Press Reviews*. (Frodge, MI) 1600-1700 on 11715af // 15160me -ed.

2030 UTC on 17660
ECUADOR: HCJB. *Inspirational Classics* music program // 21455. (Fraser, MA) 0102, 12015 with *Studio 9* program. (Wilden, IN) Ecuador's **Voz del Upano** 4870, 2302-2317. (Veldhuis, NLD/*HCDX*)

2100 UTC on 6400.2
NORTH KOREA: Pyongyang BS. Station sign-on "Pyongyang Pargsom Inida" into operatic music, good signal with slight fading. 2155-2230 ID on the hour, this may be the service of South Korea. Tentative 6520 **Radio Pyongyang** 2110-2120 with "nine Sori Pargsom," followed by slow music, fair signal with slight fades, weaker than PBS 6400. (Roth, Germany/*HCDX*)

2107 UTC on 4825
BRAZIL: Radio Cacao Nova. Portuguese. Regional ads to lady's chat and ID. Brazil's **Radio Arghanguera** 11830, 2223 with soccer commentary. (Zacharias Liangas, Thessoliniki, Greece)

2135 UTC on 11945
CANADA: Radio Canada Int'l. *Maple Leaf Mailbag*, // 9770. CFRX 6070, 2220 with ads, ID and finance report. (McGuire, MD)

2203 UTC on 4915
GHANA: GBC. National newscast into world news updates and native vocal tunes. (Frodge, MI)

2213 UTC on 9760
CYPRUS: Cyprus BC Corp. Guitar melody interval signal (*Avkoritssa*) to Cypriotic tune. Sign-on identification (// 7205) into lady's program info and preview to announcer's news script. Pop Greek music 2237. *WRTH 1999* listed // as 7105. Station is on Friday, Saturday and Sundays via Limassol. Address: Broadcasting House 4824, 1397 Nicosia, Cyprus. Website: **<www.cybc.com.cy>** (Gayle Van Horn, Brasstown, NC)

2245 UTC on 4875.3
BOLIVIA: Radio Cruz del Sur. Spanish. Male/female duo with correspondents reports of national topics. Short musical bridges, 2305 jingle, station promo, canned ID into Bolivian music. Nice signal. (Veldhuis, NLD/*HCDX*)

2345 UTC on 7345
CZECH REP.: Radio Prague. *40 Years After* featuring descendants of nobility tell of their life there today // 9435. (Fraser, MA; 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

QSLing Brazilians

Brazil is indeed a challenge, but worth it! Brazil offers a plethora of shortwave stations to log and verify. Radiobras in Brasilia verifies regularly and reports are welcomed in English.

For other Brazilian station reporting, never describe your reception using the SINPO (strength-interference-noise-propagation-overall) code, instead use phrases to describe signal conditions. Enclose mint stamps or IRCs (at least two) as well as souvenir postcards of your city, or other small souvenirs. Cassette tapes of programming may be enclosed with your report. Due to reported postal theft, sending report via registered mail could be advantageous.

As with any South American country, use local Brazilian time and not UTC. *World Radio TV Handbook (WRTH)* lists hours for the various time zones, while *Passport to World Band Radio*'s "Addresses Plus-2000" contains over five pages of station addresses, websites and QSLing information.

Boa sorte sobre teu brasilheiro QSLing. (Good luck on your Brazilian QSLing!)

BOLIVIA

Radio Centenario, 4855 kHz. Full data verification letter signed by Napoleon Ardaya-Director, plus station sticker. Received in 40 days for a Spanish report and one U.S. dollar. Station address: Casilla de Correo 818, Santa Cruz, Bolivia. Email: **<mision.eplabol@scbbs-bo.com>** (Daniele Canonica, Muggio, Switzerland)

BRAZIL

Radio Anhanguera, 4915 kHz. Full data verification on station letterhead signed by Tech., plus a station brochure. Received in 30 days after a Portuguese follow up and mint stamps. Station address: Caixa Postal 13, 74823-000 Goiania CO Brazil.(Duane Hadley, Savannah, GA)

Radio Bandeirantes, 6090 kHz. Full data verification on station letterhead plus blue & white station sticker. Received in 42 days for a Portuguese report and mint stamps. Station address: Caixa Postal 372, Rua Radiantes 13, Morumbi, 01059-970 Sao Paulo SP, Brazil. (Gayle Van Horn, Brasstown, NC)

Radio Difusora do Amazonas, 4805 kHz. No data station card signed by Joaquim Marinho. Received in 73 days for a Portuguese report (they also welcome English reports) mint stamps, and a self-addressed envelope (SAE), not used for reply. Station address: Caixa Postal 311, 69000-000 Manaus, AM, Brazil. (Hadley, GA)

Radio Clube Paranaense, 6040 kHz. Verification on station letterhead signed by Superintendente. Received in 35 days for a Portuguese report and mint stamps. Station address: Rua Rockefeller 1311, Prado Velho, 80230-130 Curitiba, Brazil. (Hadley, GA)

Radio Educacao Rural, 4775 kHz. Partial data verification on station letterhead with studio picture signed by Gerente. Received in 45 days for a Portuguese report via registered mail. Station address: Caixa Postal 261, 79002-233 Campo Grande MS, Brazil. (Hadley, GA)

CAMEROON

Cameroon RTV-Radio Yaounde, 4850 kHz. Full data QSL card signed by Eyebe Canga-Directeur Technique. Received in nine months. Station address: Boite Postal 1634, Yaounde, Cameroon. (Canonica, SUI)

CYPRUS

5BA 42RT/Cyprus Radio, 8737 kHz USB. Full data eastern Mediterranean map card with illegible signature. Received in 225 days for an English utility report, one U.S. dollar and souvenir postage of Missouri. Station address: Radiomaritime Service, P.O. Box 24929, Nicosia, Cyprus. (Bill Willkins, Springfield, MO)

GUINEA

RTV Guineenne, 4900 kHz. Full data verification on station letterhead signed by Monsieur Boubacar Yacine Diallo-Directeur General/ORTG. Received in 56 days for a French report, SAE and two mint stamps, both used for reply. Station address: Ministere de la Communication, Republique de Guinee, Direction General de L' Office de Radiodiffusion Television Guinee (ORTG), Boite Postal 391, Conakry, Guinea. (Brian Bagwell, St. Louis, MO)

MALAYSIA

Radio Malaysia Sarawak (Kuching), 5030 kHz. Full data verification on station letterhead signed by Yusof Ally-Director of Broadcasting. Received in two months. Station address: RTM, Broadcasting House, Jalan P. Ramlee, 93614 Kuching, Sarawak, Malaysia. (Feodor Brazhnikov, Russia/*Cumbre DX*)

MEDIUM WAVE

5RN Renmark, Australia, 1062 kHz AM. Full data via email from Neil Wiese-ABC Adelaide. Received in 90 days for an online AM report. Email: **<5AN@your.abc.net.au>** Australian QSL # 216, #2601 MW. (Patrick Martin, Seaside, OR)

WHKT, 1650 kHz AM. Full data verification letter signed by Doug Stewart-Group Marketing. Received for an AM report and two mint stamps. Station address: 2202 Jolliff Rd., Chesapeake, VA 23321. (Paul Ormandy, Oamaru, New Zealand) Station's slogan is *The Big Kat*, this makes by 43rd US state verified from New Zealand.

NIGER

La Voix du Sahel 5020 kHz. Full data station map card unsigned. Received in 72 days after second French follow up report, two mint stamps, SAE (unused) and a local AM bumper sticker souvenir. Station address: O.R.T.N., Boite Postal 361, Niamey, Niger. (Bagwell, MO)

PHILIPPINES

FEBC/Radio Int'l, 11635 kHz. Full data station QSL card unsigned, plus station booklet and schedule. Received in 35 for an English report, two IRCs and two souvenir postcards. P.O. Box 1, Valenzuela, Metro Manila, Philippines 0560. (Mizuno Mitsuaki, Japan/*Cumbre DX*)

Radio Veritas As a, 9670 kHz. Full data verification on station letterhead signed by R. De Galindez, plus schedule and calender. Received in 72 days for an English report, mint stamps and one IRC. Station address: P.O. Box 2642, Quezon City, 1166 Philippines. Email address: **<veritas@mnl.sequel.net>** Website: **<www.radio-veritas.org.ph>** (Sam Wright, Biloxi, MS)

RWANDA

Deutsche Welle relay, 15135 kHz. Full data postcard of Brandenburg Gate signed by Horst Scholz-Transmission Management. Received in 196 days for an English report. Station address: 50588 Koln, Germany. (Randy Stewart, Springfield, MO)

SEYCHELLES

FEBA Radio (Far East Broadcasting Assoc.), 11600 kHz. Full data station card signed by Doreen Dugathe. Received in 120 days for an English report, mint stamps and one U.S. dollar. Station address: 234, Mahe, Seychelles, Indian Ocean. **<www.feba.org.uk>** (Tom Banks, Dallas, TX)

SOLOMON ISLANDS

SIBC (Solomon Islands Broadcasting Corp.) 5020 kHz. Full data verification on station letterhead signed by Silas Hule. Received in two months for an English report and two IRCs. Station address: P.O. Box 654, Honiara, Solomon Islands. (William Stibgen Quakertown, PA)

UNITED STATES

NMO, USCG CAMPSPAC Wahiawa, HI, 8764 kHz USB. Full data eagle's head card signed by K R. Harrison, TC1. Received in 119 days for an English utility report and an SASE (not used for reply), plus schedule and letter. Station address: Radioman-in-Charge, USCG Radio NMO, CAMPSPAC, Wahiawa, HI 96786-3050, response received from NMC, Box 560, Pt. Reyes, CA 94956-0560. (Wilkins, MO)

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NEW! KA-007 Free-Power Radio!

The new Kaito KA-007 is only a fraction of the size and weight of its competitors, yet has even more features. Power it from its hand-cranked generator, or charge it from its high-solar panel, or connect it to an external source of 4.5 to 6 VDC (AC adaptor included), or even run it on three replaceable AA cells! Its fully charged NiMH power plant will run the radio for up to 72 hours!

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Three LEDs assist in station tuning and assessing remaining battery power. AC charger/adaptor, manual, and small wire antenna included.

This multiband radio works anytime, anywhere, on a variety of power sources. Compact and loaded with frequency coverage, it automatically recharges itself in sun or room light. Reliable listening at the right price!

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Sony ICF-B200

The ICF-B200 provides not only quality AM/FM reception in a tiny (6"x3"), lightweight (11 oz.) case, but also never needs batteries or sunlight to operate! That's right, a high efficiency, easy-hand-turned generator provides all the power needed for this radio—one minute's spin gives you a full 15 minutes of play time! And you can even install two AA alkaline batteries for many hours of unattended, extended operation! An LED status indicator alerts you to charge conditions.

The B200 has a built-in emergency guide light, and its display is illuminated as well. A headphone jack allows private listening, or you can call for help with the audible alarm. The bright, safety-orange color quickly locates the radio under all conditions.

Don't be caught without a source of emergency information! Call now to order your lifeline to the community!

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FreePlay FPR2S GSW

The sensational FreePlay FPR2S GSW radio is now available from Grove! Simply wind the generator spring for approximately 30 seconds and enjoy up to 45 minutes of reception! And during daylight, solar power operates the radio non-stop and charges its batteries!

The new FPR2S GSW radio provides 5.8-18 MHz shortwave reception in addition to AM/FM and solar power. Can also be operated using an optional AC power supply.

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828-837-2216 (Fax)
7540 Hwy 64W; Brasstown, NC 28902
web: www.grove-ent.com
e-mail: order@grove-ent.com

How to Use the Shortwave Guide

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

① ② ⑤ ③ ④ ⑥⑦

Convert your time to UTC.

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

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

Find the station you want to hear.

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

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

Day Codes

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

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

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

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

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

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

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
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

Jim Frimmel, Programming Manager

Those of you who are China watchers will appreciate the coverage of China Radio International (CRI) in this month's centerfold listing of selected programs. CRI completely revamped its program lineup just a couple of weeks before we went to press. Gone is the "News about China" segment which followed the news at the top of the hour. "China Snapshots" was replaced by "Life in China"; "Profile" was replaced by "People in the Know." No longer heard is "The Cooking Show" and "Across the Land."

CRI is becoming more in tune with the changing face of China. The return of the Portugese island colony of Macao to China generated the new program "Macao Insights." Technological advancement in China, such as Internet development, has brought about the new program "Wuxi Journal." These programs are so new they were not even mentioned in the Nov-Dec 1999 issue of CRI's slick bimonthy publication *The Messenger*.

One thing CRI still has not gotten right is the URL for their own web site. Both *The Messenger* and on-air announcements give the web address as <english.cri.com.cn>. The correct URL is <www.cri.com.cn/english>. If you have the time, a visit to this web site is worth the effort, especially if you want China's slant on current affairs. You can also hear CRI's news and feature programs in RealAudio. When we visited the site in December, we noted that CRI English Service was advertising for an editor with radio script editing experience. Now there's a clever idea.

In case you haven't noticed or not been listening, China is billing itself as the "New China." Part of this has to do with the fact that they have been celebrating the 50th anniversary of the founding of the People's Republic. They refer to this period as "Fifty Years of Change." Most of the change, however, can be traced back to the days of Richard Nixon. And, with the return of Hong Kong and Macao to China, one can only wonder what will be next. We can't help remembering that Taiwan was once called Formosa.

Now here's an update on the North America front. Radia Canada International's new programs for Africa were not yet known when we mentioned them in last month's listing for the 0400 and 0600 time periods. We now know that the Monday-Friday half-hour programs consist of ten minutes of news followed by "African Eyes," a magazine of features, reports, and music. Frequencies are 9535, 9690 and 11795 at 0400 and 9780, 11710, and 15325 at 0600.

Frequencies

0000-0100	Anguilla,Caribbean Beacon	6090am			
0000-0100 vl	Australia, ABC/Katherine	5025do			
0000-0100 vl	Australia, ABC/Tent Creek	4910do			
0000-0100	Australia, Radio	9660as	12080as	15240as	17580as
		17750as	17795as	21740as	
0000-0100	Bulgaria, Radio	7375na	9400na		
0000-0015	Cambodia, Natl Radio Of	11940as			
0000-0100	Canada, CBC N Quebec Svc	9625do			
0000-0100	Canada, CFRX Toronto	6070do			
0000-0100	Canada, CFVP Calgary	6030do			
0000-0100	Canada, CHNX Halifax	6130do			
0000-0100	Canada, CKZN St John's	6160do			
0000-0100	Canada, CKZU Vancouver	6160do			
0000-0059	Canada, Radio Canada Intl	5960na	9755na		
0000-0029 twhfa	Canada, Radio Canada Intl	6040na	9535am	11865am	
0000-0100	Costa Rica,RF Peace Intl	6975va	15050va		
0000-0100	Ecuador, HCJB	9745na	12015na	21455na	
0000-0030	Egypt, Radio Cairo	9900am			
0000-0100 vl	Guatemala, Radio Cultural	3300do			
0000-0045	India, All India Radio	7410as	9705as	9950as	11620as
		13625as			
0000-0015	Japan, Radio/NHK	6050eu	6155eu	9665af	11705na
		11815as	13650as		
0000-0100	Kiribati, Radio	9810do			
0000-0100	Liberia,LCN/R Liberia Int	5100do			
0000-0100	Malaysia, Radio	7295do			
0000-0100	Malaysia, RTM Sarawak	7160do			
0000-0100 vl	Malaysia,RTM KotaKinabalu	5980do			
0000-0030	Mexico, Radio Mexico Intl	9705am			
0000-0100	Namibia, NBC	3270af	3289af		
0000-0100	Netherlands, Radio	6165na	9845na		
0000-0100	New Zealand, R NZ Intl	17675va			
0000-0056	North Korea, R Pyongyang	4405va	11710na	13760na	15180na
0000-0100 vl	Papua New Guinea, NBC	9675do			
0000-0100	Philippines, FEBC R Intl	15175do			
0000-0100	Singapore,RCorp Singapore	6150do			
0000-0100	Spain, R Exterior Espana	6055na			
0000-0030	Thailand, Radio	9655af	9680va	11905af	

0000-0100	UK, BBC World Service	3915as	5965as	5975na	6175na
		6195as	7110as	9410as	9590am
		9915eu	11945as	11955as	12095sa
		15280as	15310as	15360as	17615as
		17790as			
0000-0100 vl	UK, IBC Tamil	9355va			
0000-0100 f	UK, Merlin Network One	3985eu	6180eu	7165eu	
0000-0100	USA, Armed Forces Network	4278am	6458am	12689am	
0000-0100	USA, KAIJ Dallas TX	5835va			
0000-0100	USA, KJES Vado NM	7555na			
0000-0100	USA, KTBN Salt Lk City UT	7510na			
0000-0100	USA, KWHR Naalehu HI	17510as			
0000-0030	USA, Voice of America	7215as	9890as	11760as	15185as
		15290as	17735as	17820as	
0000-0100 twhfa	USA, Voice of America	5995am	6130ca	7405am	9455af
		9775am	11695ca	13740am	
0000-0100	USA, WBCQ Monticello ME	7415na			
0000-0100	USA, WEWN Birmingham AL	5825na	9355eu		
0000-0100	USA, WGTG McCaysville GA	5085va	6890am		
0000-0100	USA, WHRA Greenbush ME	7580na			
0000-0100	USA, WHRI Noblesville IN	5745na	7315na		
0000-0100	USA, WINB Red Lion PA	11950am			
0000-0100	USA, WJCR Upton KY	7490na	13595na		
0000-0100	USA, WRNO New Orleans LA	7355na			
0000-0100	USA, WSHB Cypress Crk SC	7535na	9430am	15285ca	
0000-0100	USA, WTJC Newport NC	9370na			
0000-0100	USA, WWBS Macon GA	11900na			
0000-0100	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0000-0100	USA, WYFR Okeechobee FL	6085na	9505na		
0000-0030 vl	Vanuatu, Radio	4960do			
0010-0020	Kyrgyzstan, Kyrgyz Radio	4010eu	4050eu		
0015-0045 as	Armenia, Trans World R	6240eu			
0015-0100	Japan, Radio/NHK	6050eu	6155eu	9665af	11705na
0015-0045 as	Monaco, Trans World Radio	6240as			
0030-0100	Iran, VOIRI	9022am	9795ca	11970na	
0030-0100	Lithuania, Radio Vilnius	6120na			
0030-0100 vl	Solomon Islands, SIBC	5020do			
0030-0100	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0030-0100	Thailand, Radio	9655as	11905as	13695na	
0050-0100	Germany, Int l BC Tamil	7150na	7460na		
0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

Selected Programs

Sundays

0000 Radio Mexico Intl: Eternally Mexico. New program - no information available.
0030 VOA (Special English): News (Special English). Five or ten minutes of news in slow English.
0040 VOA (Special English): Words and their Stories (Special English). The origin and use of common words and phrases in American English.
0045 VOA (Special English): People in America (Special English). Stories about famous Americans.

Mondays

0000 Radio Mexico Intl: DXperience. See S 0400.
0030 VOA (Special English): News (Special English). See S 0030.
0040 VOA (Special English): Development Report (Special English). Helpful information for developing nations.
0045 VOA (Special English): This is America (Special English). Informative reports on life in the United States.
0055 UK, BBC London (AE): Visionaries. Five-minute programs that are part of the series "The Essential Guide to the 21st Century."

Tuesdays

0000 Radio Mexico Intl: The Sounds of Mexico. See S 0000
0030 VOA (Special English): News (Special English). See S 0030.
0040 VOA (Special English): Agriculture Report (Special English). Developments and reports on farming and agriculture.
0045 VOA (Special English): Science in the News (Special English). Recent scientific developments.
0055 UK, BBC London (AE): Visionaries. See M 0055.

Wednesdays

0000 Radio Mexico Intl: DXperience. See S 0400.
0030 VOA (Special English): News (Special English). See S 0030.
0040 VOA (Special English): Science Report (Special English). Developments in the world of science and technology.
0045 VOA (Special English): Exploration (Special English). Steve Ember and Shirley Griffith report on space news.
0055 UK, BBC London (AE): Visionaries. See M 0055.

Thursdays

0000 Radio Mexico Intl: Regional Roots and Rhythms. See S 1500.
0030 VOA (Special English): News (Special English). See S 0030.
0040 VOA (Special English): Science Report (Special English). See W 0040.
0045 VOA (Special English): The Making of a Nation (Special English). Chapters from U.S. history in special English.
0055 UK, BBC London (AE): Visionaries. See M 0055.

Fridays

0000 Radio Mexico Intl: Mirror of Mexico. See S 2300.
0030 VOA (Special English): News (Special English). See S 0030.
0040 VOA (Special English): Environment Report (Special English). A five-minute report on a specific environmental subject.
0045 VOA (Special English): American Mosaic (Special English). Reports about music, books, movies, and student life in the USA.
0055 UK, BBC London (AE): Visionaries. See M 0055.

Saturdays

0000 Radio Mexico Intl: The Sounds of Mexico. See S 0000.
0030 VOA (Special English): News (Special English). See S 0030.
0040 VOA (Special English): In the News (Special English). Focus on a person, organization, or issue in news reports.
0045 VOA (Special English): American Stories (Special English). Readings of short stories by American authors in slow English.

Frequencies

0100-0200	Anguilla,Caribbean Beacon	6090am			
0100-0200 vl	Australia, ABC/Katherine	5025do			
0100-0200 vl	Australia, ABC/Tent Creek	4910do			
0100-0200	Australia, Radio	9660as	12080as	15240as	15415as
		17580as	17750as	17795as	21725as
0100-0200	Canada, CBC N Quebec Svc	9625do			
0100-0200	Canada, CFRX Toronto	6070do			
0100-0200	Canada, CFVP Calgary	6030do			
0100-0200	Canada, CHNX Halifax	6130do			
0100-0200	Canada, CKZN St John's	6160do			
0100-0200	Canada, CKZU Vancouver	6160do			
0100-0156	China, China Radio Intl	9570na			
0100-0200	Costa Rica,RF Peace Intl	6975va	15050va		
0100-0200	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0100-0127	Czech Rep, R Prague Intl	7345na	9665na		
0100-0200	Ecuador, HCJB	9745na	12015na	21455va	
0100-0145	Germany, Deutsche Welle	6040na	6145am	9640am	9700na
0100-0130 s	Germany, Universal Life	9495as			
0100-0130 m	Germany, V O Deliverance	6120na			
0100-0200 s	Germany,Good News World R	9855eu			
0100-0200	Germany,Overcomer Ministr	9470as			
0100-0200 vl	Guatemala, Radio Cultural	3300do			
0100-0200	Indonesia, Voice of	9525va			
0100-0130	Iran, VOIRI	9022am	9795ca	11970na	
0100-0110	Italy, RAI Intl	6010na	9675na	11800na	
0100-0200	Japan, Radio/NHK	9660me	11860as	11870me	15325as
		15590as	17685au	17835sa	21670pa
0100-0200	Kenya, Kenya BC Corp	4885do			
0100-0130	Kiribati, Radio	9810do			
0100-0200	Liberia,LCN/R Liberia Int	5100do			
0100-0200	Malaysia, Radio	7295do			
0100-0200 vl	Malaysia,RTM KotaKinabalu	5980do			
0100-0200	Namibia, NBC	3270af	3289af		
0100-0125	Netherlands, Radio	6165na	9845na		
0100-0200	New Zealand, R NZ Intl	17675va			
0100-0156	North Korea, R Pyongyang	3560va	11735va	15229va	17734va
0100-0200 vl	Papua New Guinea, NBC	9675do			
0100-0200	Philippines, FEBC R Intl	15175as			
0100-0130	Serbia, Radio Yugoslavia	7115na			
0100-0200	Singapore,RCorp Singapore	6150do			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300ca	9440sa	
0100-0200 vl	Solomon Islands, SIBC	5020do			
0100-0200	Spain, R Exterior Espana	6055na			
0100-0200	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0100-0130	Switzerland, Swiss R Intl	9885am	9905am		
0100-0200	UK, BBC World Service	5965as	5975na	6175na	6195as
		9410as	9590am	9915am	11955as
		12095sa	15280as	15310as	15360as
		17790as			
0100-0200 f	UK, Merlin Network One	3985eu	6180eu	7165eu	
0100-0200	Ukraine, R Ukraine Intl	5905eu	6020va	6030na	6080eu
		7205eu	7420eu	9560eu	9610eu
		9785na	9810va		
0100-0200	USA, Armed Forces Network	4278am	6478am	12689am	
0100-0200	USA, KAIJ Dallas TX	5835va			
0100-0200	USA, KJES Vado NM	7555na			
0100-0200	USA, KTBN Salt Lk City UT	7510na			
0100-0200	USA, KWHR Naalehu HI	17510as			
0100-0200	USA, Voice of America	7115as	7200as	11705as	15250as
		15300as	17740as	17820as	
0100-0200 twhfa	USA, Voice of America	5995am	6130am	7405am	9455af
		9775am	13740am		
0100-0200	USA, WBCQ Monticello ME	7415na			
0100-0200	USA, WEWN Birmingham AL	5825na	9355eu		
0100-0200	USA, WGTG McCaysville GA	5085va	6890am		
0100-0200	USA, WHRA Greenbush ME	7580na			
0100-0200	USA, WHRI Noblesville IN	5745na	7315na		
0100-0200	USA, WINB Red Lion PA	11950am			
0100-0200	USA, WJCR Upton KY	7490na	13595na		
0100-0145 m	USA, WRMI/R Miami Intl	9955am			
0100-0200	USA, WRNO New Orleans LA	7355na			
0100-0200	USA, WSHB Cypress Crk SC	7535na	9430am	15285ca	
0100-0200	USA, WTJC Newport NC	9370na			
0100-0200 as	USA, WWBS Macon GA	11900na			
0100-0200	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	11750as	15165as
0100-0130	Uzbekistan, R Tashkent	5955as	5975as	7105as	7285as
		9540as			
0100-0127	Vietnam, Voice of	5940na			
0115-0145 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0130-0145	Albania, R Tirana Intl	6115na	7160na		
0130-0200	Swecen, Radio	9495as			
0130-0200	UK, RTE Radio	6155eu			
0140-0200	Vatican City, Vatican R	7335au	9650au		
0145-0200 twhfa	USA, WRMI/R Miami Intl	9955am			

Selected Programs

Sundays

0100 China, China Radio Intl: News. A 15-minute summary of world news.
0100 Switzerland, Swiss R Intl: World Radio Switzerland. The latest news and analysis from Switzerland and around the world.
0104 Switzerland, Swiss R Intl: Swiss Scene. SRI's weekly quarter-hour feature program.
0112 Switzerland, Swiss R Intl: Capital Letters (2/4). SRI's bimonthly mailbag and listener contact program.
0112 Switzerland, Swiss R Intl: Sounds Good (3/5). Music from Switzerland and the people who make it.
0112 Switzerland, Swiss R Intl: The Name Game (1). A chance for you to test your knowledge of Switzerland and win prizes.
0117 China, China Radio Intl: Report on Developing Countries. A report on projects in the Third World.
0129 China, China Radio Intl: China Scrapbook. Zhao Jianfu offers snippets of facts about China's past and present.
0135 China, China Radio Intl: Music from China. Chinese music from traditional to pop to annual music festivals.

Mondays

0100 China, China Radio Intl: News. See S 0100.
0100 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
0111 China, China Radio Intl: Cultural Information. See S 1211.
0112 Switzerland, Swiss R Intl: Swiss Scene. See S 0104.
0119 China, China Radio Intl: People in the Know. See S 1219.
0140 China, China Radio Intl: On the Road. See S 1240.
0145 China, China Radio Intl: Listeners' Letterbox. See S 1245.

Tuesday-Saturday

0100 China, China Radio Intl: News. See S 0100.
0100 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
0117 China, China Radio Intl: Current Affairs. See M 1217.
0130 VOA (Special English): News (Special English). See S 0030.

Tuesdays

0128 China, China Radio Intl: Press Clippings. See M 1228.
0134 China, China Radio Intl: Macao Insights. See M 1234.
0140 China, China Radio Intl: Wuxi Journal. See M 1240.
0140 VOA (Special English): Agriculture Report (Special English). See T 0040.
0145 China, China Radio Intl: Idioms and Their Stories. See M 1245.
0145 VOA (Special English): Science in the News (Special English). See T 0045.

Wednesdays

0128 China, China Radio Intl: Press Clippings. See M 1228.
0132 China, China Radio Intl: Changzhou Reports. See T 1232.
0137 China, China Radio Intl: Orient Arena. See T 1237.
0140 VOA (Special English): Science Report (Special English). See W 0040.
0145 China, China Radio Intl: Opera House. See T 1245.
0145 VOA (Special English): Exploration (Special English). See W 0045.

Thursdays

0130 China, China Radio Intl: Press Clippings. See M 1228.
0135 China, China Radio Intl: Voices from Other Lands. See W 1235.
0140 VOA (Special English): Science Report (Special English). See W 0040.
0145 China, China Radio Intl: Learn to Speak Chinese. See W 1245.
0145 VOA (Special English): The Making of a Nation (Special English). See H 0045.

Fridays

0134 China, China Radio Intl: Press Clippings. See M 1228.
0138 China, China Radio Intl: Focus. See H 1238.
0140 VOA (Special English): Environment Report (Special English). See F 0040.
0145 China, China Radio Intl: Cultural Spectrum. See H 1245.
0145 VOA (Special English): American Mosaic (Special English). See F 0045.

Saturdays

0130 China, China Radio Intl: Press Clippings. See M 1228.
0136 China, China Radio Intl: Life in China. See F 1236.
0140 VOA (Special English): In the News (Special English). See A 0040.
0144 China, China Radio Intl: Global Review. See F 1244.
0145 VOA (Special English): American Stories (Special English). See A 0045.

Frequencies

0200-0300	Anguilla,Caribbean Beacon	6090am			
0200-0300 twhfa	Argentina, RAE	11710am			
0200-0300 vl	Australia, ABC/Katherine	5025do			
0200-0300 vl	Australia, ABC/Tent Creek	4910do			
0200-0300	Australia, Radio	9660as	12080as	15240as	15415as
		15515as	17580as	17750as	21725as
0200-0210	Bangladesh, Bangla Betar	4880as			
0200-0300	Canada, CBC N Quebec Svc	9625do			
0200-0300	Canada, CFRX Toronto	6070do			
0200-0300	Canada, CFVP Calgary	6030do			
0200-0300	Canada, CHNX Halifax	6130do			
0200-0300	Canada, CKZN St John's	6160do			
0200-0300	Canada, CKZU Vancouver	6160do			
0200-0300	Canada, Radio Canada Intl	6155am	9535am	9755am	9780am
		11865am			
0200-0300	Costa Rica,RF Peace Intl	6975va	15050va		
0200-0205	Croatia, Croatian Radio	7280al	9925na		
0200-0300	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0200-0227	Czech Rep, R Prague Intl	6200na	7345na		
0200-0300	Ecuador, HCJB	9745na	12015na	21455va	
0200-0300	Egypt, Radio Cairo	9475am			
0200-0245	Germany, Deutsche Welle	7285as	9615as	9765as	11965as
0200-0230	Hungary, Radio Budapest	9835na			
0200-0300	Kenya, Kenya BC Corp	4935do			
0200-0300	Malaysia, Radio	7295do			
0200-0230	Myanmar, Radio	7185do			
0200-0300	Namibia, NBC	3270af	3289af		
0200-0300	New Zealand, R NZ Intl	17675va			
0200-0256	North Korea, R Pyongyang	11845va	13650va		
0200-0300 vl	Papua New Guinea, NBC	9675do			
0200-0256	Romania, R Romania Intl	9510as	9570na	9690as	11740as
		11830as	11940as		
0200-0300	Russia,Voice of Russia WS	7180na	12020na	13665na	15470na
0200-0230	Serbia, Radio Yugoslavia	7130na			
0200-0300	Singapore,RCorp Singapore	6150do			
0200-0300 vl	Solomon Islands, SIBC	5020do			
0200-0300	South Korea, R Korea Intl	7275as	11725sa	11810sa	15575na
0200-0300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0200-0300	Taiwan, Radio Taiwan Intl	5950na	9680na	11825pa	15345as
0200-0300	UK, BBC World Service	5975na	6135am	6175na	6185am
		9410as	9770af	9915eu	11955as
		12095sa	15280as	15310as	17790as
0200-0206 a	UK, BBC World Service	6195as			
0200-0300	USA, Armed Forces Network	4278am	6458am	12689am	
0200-0300	USA, KAIJ Dallas TX	5835na			
0200-0230	USA, KJES Vado NM	7555na			
0200-0300	USA, KTBN Salt Lk City UT	7510na			
0200-0300	USA, KWHR Naalehu HI	17510as			
0200-0300	USA, Voice of America	7115as	7200as	9740as	9850as
		11705as	15250as	15300as	17740as
		17820as			
0200-0300	USA, WBCQ Monticello ME	7415na			
0200-0300	USA, WEWN Birmingham AL	5825na			
0200-0300	USA, WGTG McCaysville GA	5085va	6890am		
0200-0300	USA, WHRA Greenbush ME	7580na			
0200-0300	USA, WHRI Noblesville IN	5745na	7315as		
0200-0300	USA, WINB Red Lion PA	11950am			
0200-0300	USA, WJCR Upton KY	7490na	13595na		
0200-0300 mtwnfa	USA, WRMI/R Miami Intl	7385am			
0200-0300	USA, WRNO New Orleans LA	7355na			
0200-0300	USA, WSHB Cypress Crk SC	5850na	7535ca	9430na	
0200-0300	USA, WTJC Newport NC	9370na			
0200-0300	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0215-0220	Nepal, Radio	3230as	5005as		
0230-0300	Austria, R Austria Intl	7325na			
0230-0245	Pakistan, Radio	9640as	15485as	17660as	17895as
0230-0300 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0230-0300	Sweden, Radio	7290na			
0230-0257	Vietnam, Voice of	5940na			
0250-0300	Vatican City, Vatican R	7305am	9605am		

Selectec Programs

Sundays

0200 Russia, Voice of: News. Every hour on the hour.
0211 Russia, Voice of: Commonwealth Update. Comments on the latest developments in the CIS, in-depth analyses of current events, and major issues of home policies.
0230 Russia, Voice of: News in Brief. Ninety seconds news summary every hour on the half-hour.
0232 Russia, Voice of: Moscow Yesterday and Today. Sit back and enjoy a great program about Russian history with magnificent sound effects.

Mondays

0200 Russia, Voice of: News. See S 0200.
0211 Russia, Voice of: Sunday Panorama. See S 1511.
0220 Russia, Voice of: Russia in Personalities. See S 1515.
0230 Russia, Voice of: News in Brief. See S 0230.
0230 UK, BBC London (AE): The Essential Guide to the 21st Century. A new season of programs running five days a week for the first eight weeks of 2000.
0230 UK, BBC London (AF/AS): Joe Strummer's London Calling (7th,14th). See H 0230.
0232 Russia, Voice of: Timelines. Estelle Winters hosts a variety program with an upbeat flair and an insight into Moscow life.

Tuesdays

0200 Russia, Voice of: News. See S 0200.
0211 Russia, Voice of: Commonwealth Update. See S 0211.
0230 Russia, Voice of: News in Brief. See S 0230.
0230 UK, BBC London (AE): The Essential Guide to the 21st Century. See M 0230.
0232 Russia, Voice of: Folk Box. See M 1532.

Wednesdays

0200 Russia, Voice of: News. See S 0200.
0211 Russia, Voice of: Commonwealth Update. See S 0211.
0230 Russia, Voice of: News in Brief. See S 0230.
0230 UK, BBC London (AE): The Essential Guide to the 21st Century. See M 0230.
0232 Russia, Voice of: The Jazz Show. See M 0532.

Thursdays

0200 Russia, Voice of: News. See S 0200.
0211 Russia, Voice of: Commonwealth Update. See S 0211.
0230 Russia, Voice of: News in Brief. See S 0230.
0230 UK, BBC London (AE): The Essential Guide to the 21st Century. See M 0230.
0232 Russia, Voice of: Russian Musical Highlights of the 20th Century. See T 0632.
0250 Russia, Voice of: Russia in Personalities. See S 1515.

Fridays

0200 Russia, Voice of: News. See S 0200.
0211 Russia, Voice of: Commonwealth Update. See S 0211.
0230 Russia, Voice of: News in Brief. See S 0230.
0230 UK, BBC London (AE): The Essential Guide to the 21st Century. See M 0230.
0232 Russia, Voice of: Yours for the Asking. See T 0532.
0245 Russia, Voice of: Music at Your Request. See T 1545.

Saturdays

0200 Russia, Voice of: News. See S 0200.
0211 Russia, Voice of: Commonwealth Update. See S 0211.
0230 Russia, Voice of: News in Brief. See S 0230.
0232 Russia, Voice of: A Christian Message from Moscow. See S 0432.

Hauser's Highlights

Deutsche Telekom, Jülich, to CROATIA

Dec. 1 schedule showed Croatian Radio Zagreb staying on 9925 to Americas; no mention of previous plan to move inside 40 meter hamband, effective until March 26:

Freq	On	Off	Zone*	Deg
9925	0000	0159	11 16	230
9925	0200	0359	6- 0	300
9925	0400	0559	2- 0	325
11880	0600	0759	55 59,60	230
13820	0800	0959	58 59,60	270
11605	2100	2159	38 39,52,53,57	160

Listed as HIC = Hrvatska Informativini Centar (via Wolfgang Büschel)
*The numbers after the times are CIRAF Zones. A list of them is at **http://www.trsc.com/ciraf_zones.html** (Ludo Maes, Belgium) Also at **www.grove-ent.com/mtciraf.html** and **www.grove-ent.com/images/ciraf.gif**

0300 UTC SHORTWAVE GUIDE

10:00 PM EST
9:00 PM CST
7:00 PM PST

Frequencies

0300-0400	Anguilla,Caribbean Beacon	6090am			
0300-0400 vl	Australia, ABC/Katherine	5025do			
0300-0400 vl	Australia, ABC/Tent Creek	4910do			
0300-0400	Australia, Radio	9660as	12080as	15240as	15415as
		15515as	17580as	17750as	21725as
0300-0330 smwfa	Belarus, R Minsk	6070eu	7210eu		
0300-0400 vl	Botswana, Radio	4820do	7255do		
0300-0400	Bulgaria, Radio	7375na	9400na		
0300-0400	Canada, CBC N Quebec Svc	9625do			
0300-0400	Canada, CFRX Toronto	6070do			
0300-0400	Canada, CFVP Calgary	6030do			
0300-0400	Canada, CHNX Halifax	6130do			
0300-0400	Canada, CKZN St John's	6160do			
0300-0400	Canada, CKZU Vancouver	6160do			
0300-0329	Canada, Radio Canada Intl	6155na	9755na	9780na	
0300-0356	China, China Radio Intl	9690am			
0300-0400	Costa Rica,RF Peace Intl	6975va	15050va		
0300-0305	Croatia, Croatian Radio	7280al	9925na		
0300-0400	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0300-0400	Ecuador, HCJB	9745na	12015na	21455va	
0300-0330	Egypt, Radio Cairo	9475am			
0300-0330	Finland, YLE/R Finland	9655na	11665na		
0300-0320 m	Finland, YLE/R Finland	9655eu	11665eu		
0300-0345	Germany, Deutsche Welle	6045na	9535na	9640na	9700am
		11750na			
0300-0400	Germany,Overcomer Ministr	11710af			
0300-0310 mtwhf	Greece, Voice of	7450na	9375na	9420na	12105na
0300-0400 vl	Guatemala, Radio Cultural	3300do			
0300-0400 irreg	Iraq, Radio Iraq Intl	9685va	11787va		
0300-0400	Japan, Radio/NHK	17825ca	21610pa		
0300-0400	Kenya, Kenya BC Corp	4885do	4935do		
0300-0400 vl	Lesotho, Radio	4800do			
0300-0400	Malaysia, Radio	7295do			
0300-0400	Malaysia, Voice of	6175as	9750as	15295as	
0300-0400	Namibia, NBC	3270af	3289af		
0300-0400	New Zealand, R NZ Intl	17675va			
0300-0400	Oman, Radio Sultanate ofm	15355va			
0300-0330	Pakistan, Radio	6070do			
0300-0400 vl	Papua New Guinea, NBC	9675do			
0300-0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0300-0400	Russia,Voice of Russia WS	5940na	7180na	12020na	13665na
		15470na			
0300-0330	S Africa, AWR Africa	9835af			
0300-0330	S Africa, Channel Africa	9525af			
0300-0400	Singapore,RCorp Singapore	6150do			
0300-0400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0300-0400	Taiwan, Radio Taiwan Intl	5950na	9680na	11745as	11825as
		15345as			
0300-0330	Thailand, Radio	9655am	11905am	15460na	
0300-0400	Uganda, Radio	4976do			
0300-0400	UK, BBC World Service	3255af	5975na	6005af	6135am
		6175na	6190af	6195eu	7160af
		9410eu	11730af	11760me	11765af
		11955as	12095af	15310as	15360as
		17760as	17790as	21660as	
0300-0400 smtwhf	UK, BBC World Service	15280as			
0300-0400	USA, Armed Forces Network	4278am	6458am	12689am	
0300-0400	USA, KAIJ Dallas TX	5835va			
0300-0400	USA, KTBN Salt Lk 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	6035af	6080af	7105af	7290af
		7340af	7415af	9575af	9885af
0300-0330 mtwh	USA, Voice of America	4960af			
0300-0400	USA, WBCQ Monticello ME	7415na			
0300-0400	USA, WEWN Birmingham AL	5825na			
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, WINB Red Lion PA	11950am			
0300-0400	USA, WJCR Upton KY	7490na	13595na		
0300-0400	USA, WRNO New Orleans LA	7395na			
0300-0400	USA, WSHB Cypress Crk SC	5850na	7535eu		
0300-0400	USA, WTJC Newport NC	9370na			
0300-0400	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0300-0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0310	Vatican City, Vatican R	7305am	9605am		
0300-0400	Zambia, Natl BC Corp	6165do	6265do		
0300-0400 vl	Zimbabwe, Zimbabwe BC	3396do			
0305-0320 mtwhfa	UK, BBC World Service	15360as			
0310-0315 thfa/vl	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0310-0340	Vatican City, Vatican R	9660af			
0329-0359 sm	Canada, Radio Canada Intl	6155na	9755na	9780na	
0330-0400	Albania, R Tirana Intl	6115na	7160na		
0330-0400	Hungary, Radio Budapest	9835na			
0330-0350 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0330-0355	Moldova, R Moldova Intl	7500na			
0330-0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0330-0357	Russia,Voice of Russia WS	7260na			
0330-0400	Sweden, Radio	9495na			
0330-0400	Tanzania, Radio	5050af			
0330-0400	UAE, Radio Dubai	12005na	13675na	15400na	21485na
0330-0357	Vietnam, Voice of	7260sa			
0345-0400	Tajikistan, Radio	7245as	9905as	11620as	
0359-0400	Zambia, Christian Voice	6065do			

Selected Programs

Sundays

0300 China, China Radio Intl: News. See S 0100.
0300 Russia, Voice of: News. See S 0200.
0311 Russia, Voice of: Moscow Mailbag. Joe Adamov answers 15-20 listener questions every week.
0317 China, China Radio Intl: Report on Developing Countries. See S 0117.
0329 China, China Radio Intl: China Scrapbook. See S 0129.
0330 Russia, Voice of: News in Brief. See S 0230.
0332 Russia, Voice of: Songs from Russia. New program.
0335 China, China Radio Intl: Music from China. See S 0135.
0345 Russia, Voice of: You Write to Moscow. A program based on listeners' letters, what they think about the programs, their opinions on events, and info on contests, DXing, stamp collecting, cooking, etc.

Mondays

0300 China, China Radio Intl: News. See S 0100.
0300 Russia Voice of: News. See S 0200.
0311 Russia Voice of: Moscow Mailbag. See S 0311.
0316 China, China Radio Intl: People in the Know. See S 1219.
0330 Russia, Voice of: News in Brief. See S 0230.
0332 Russia, Voice of: This is Russia. A program which helps you to get to know Russia, the Russians, and it's ethnic minorities better.
0340 China, China Radio Intl: On the Road. See S 1240.
0345 China, China Radio Intl: Listeners' Letterbox. See S 1245.

Tuesday-Saturday

0300 China, China Radio Intl: News. See S 0100.
0300 Russia, Voice of: News. See S 0200.
0317 China, China Radio Intl: Current Affairs. See M 1217.
0330 Russia, Voice of: News in Brief. See S 0230.

Tuesdays

0311 Russia, Voice of: Science and Engineering in the Commonwealth. See S 0611.
0328 China, China Radio Intl: Press Clippings. See M 1228.
0332 Russia, Voice of: Kaleidoscope. See S 1532.
0334 China, China Radio Intl: Macao Insights. See M 1234.
0340 China, China Radio Intl: Wuxi Journal. See M 1240.
0345 China, China Radio Intl: Idioms and Their Stories. See M 1245.

Wednesdays

0311 Russia, Voice of: Newmarket. This program tells where and how to invest in Russia, how to sell your product or start a business, and news about Russia's involvement in international business.
0328 China, China Radio Intl: Press Clippings. See M 1228.
0332 China, China Radio Intl: Changzhou Reports. See T 1232.
0332 Russia, Voice of: Russian Musical Highlights of the 20th Century. See T 0632.
0337 China, China Radio Intl: Orient Arena. See T 1237.
0345 China, China Radio Intl: Opera House. See T 1245.
0345 Russia, Voice of: Russia in Personalities. See S 1515.

Thursdays

0311 Russia, Voice of: Moscow Mailbag. See S 0311.
0332 Russia, Voice of: Moscow Yesterday and Today. See S 0232.
0334 China, China Radio Intl: Press Clippings. See M 1228.
0335 China, China Radio Intl: Voices from Other Lands. See W 1235.
0345 China, China Radio Intl: Learn to Speak Chinese. See W 1245.

Fridays

0311 Russia, Voice of: Science and Engineering in the Commonwealth. See S 0611.
0332 Russia, Voice of: Russian by Radio. See S 1632.
0334 China, China Radio Intl: Press Clippings. See M 1228.
0338 China, China Radio Intl: Focus. See H 1238.
0345 China, China Radio Intl: Cultural Spectrum. See H 1245.

Saturdays

0311 Russia, Voice of: Newmarket. See W 0311.
0330 China, China Radio Intl: Press Clippings. See M 1228.
0332 Russia, Voice of: Audio Book Club. See S 0632.
0336 China, China Radio Intl: Life in China. See F 1236.
0344 China, China Radio Intl: Global Review. See F 1244.

Frequencies

0400-0500	Anguilla,Caribbean Beacon	6090am			
0400-0500 vl	Australia, ABC/Katherine	5025do			
0400-0500 vl	Australia, ABC/Tent Creek	4910do			
0400-0500	Australia, Radio	9660as	12080as	15240as	15415as
		15515as	17580as	17750as	21725as
0400-0430	Belgium,R Vlaanderen Intl	11980am			
0400-0500 vl	Botswana, Radio	4820do	7255do		
0400-0500	Canada, CBC N Quebec Svc	9625do			
0400-0500	Canada, CFRX Toronto	6070do			
0400-0500	Canada, CFVP Calgary	6030do			
0400-0500	Canada, CHNX Halifax	6130do			
0400-0500	Canada, CKZN St John's	6160do			
0400-0500	Canada, CKZU Vancouver	6160do			
0400-0429 as	Canada, Radio Canada Intl	9505me	9645me		
0400-0429 mtwhf	Canada, Radio Canada Intl	9535af	9690af	11795af	
0400-0456	China, China Radio Intl	9730na			
0400-0500	Costa Rica,RF Peace Intl	6975va	15050va		
0400-0405	Croatia, Croatian Radio	7285al	9925na		
0400-0500	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0400-0427	Czech Rep, R Prague Intl	7345na	7465na	9435na	
0400-0500	Ecuador, HCJB	9745na	12015na	21455va	
0400-0445	Germany, Deutsche Welle	7280af	9565af	9765af	11785af
		11965af			
0400-0500	Germany,Overcomer Ministr	15225me			
0400-0500	Kenya, Kenya BC Corp	4885do	4935do		
0400-0500 vl	Lesotho, Radio	4800do			
0400-0410 vl/m-f	Malawi, MBC	5993do			
0400-0500	Malaysia, Radio	7295do			
0400-0430 stwh'a	Mexico, Radio Mexico Intl	9705am			
0400-0500	Namibia, NBC	3270af	3289af		
0400-0500	New Zealand, R NZ Intl	17675va			
0400-0500 vl	Papua New Guinea, NBC	9675do			
0400-0456	Romania, R Romania Intl	9570na	11830as	15335as	17735as
0400-0500	Russia,Voice of Russia WS	7125na	7180na	12010na	12020na
		15470na	15595na	17595na	17660na
0400-0500	S Africa, Channel Africa	5955af			
0400-0500	Singapore,RCorp Singapore	6150do			
0400-0430	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0400-0500	Switzerland, Swiss R Intl	9885am	9905am		
0400-0430	Tanzania, Radio	5050af			
0400-0500	Turkey, Voice of	6010va	7240as	21715as	
0400-0500	Uganda, Radio	4976do			
0400-0500	UK, BBC World Service	3255af	3955eu	5975na	6005af
		6135am	6175na	6190af	6195eu
		7160af	9410eu	11760me	11765af
		11955as	12095af	15310as	15420af
		15575as	17760as	17790as	21660as
0400-0500	Ukraine, R Ukraine Intl	4820eu	6020va	6030na	6080eu
		7205eu	7420eu	9600eu	9610eu
		9785va	9810va		
0400-0500	USA, Armed Forces Network	4278am	6458am	12689am	
0400-0500	USA, KAIJ Dallas TX	5835va			
0400-0500	USA, KTBN Salt Lk 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	6035af	6080af	7170af	7290af
		7415af	9575af	9775af	9885af
0400-0500	USA, WBCQ Monticello ME	7415na			
0400-0500	USA, WEWN Birmingham AL	5825na			
0400-0500	USA, WGTG McCaysville GA	5085va	6890am		
0400-0500	USA, WHRA Greenbush ME	7580na			
0400-0500	USA, WHRI Noblesville IN	5745na	7315sa		
0400-0500	USA, WINB Red Lion PA	11950am			
0400-0500	USA, WJCR Upton KY	7490na	13595na		
0400-0500	USA, WRMI/R Miami Intl	7385na			
0400-0500	USA, WRNO New Orleans LA	7395na			
0400-0500	USA, WSHB Cypress Crk SC	7535eu	9840af	12020af	
0400-0500	USA, WTJC Newport NC	9370na			
0400-0500	USA, WWCR Nashville TN	2390na	3215na	5070na	5935na
0400-0500	USA, WYFR Okeechobee FL	6065na	9505na	9985na	
0400-0500	Zambia, Christian Voice	6065do			
0400-0500	Zambia, Natl BC Corp	6165do	6265do		
0400-0500 vl	Zimbabwe, Zimbabwe BC	3396do			
0425-0440	Italy, RAI Intl	5975af	7120af		
0430-0500 mtwhf	Canada, Radio Canada Intl	9690af	11795af		
0430-0457	Czech Rep, R Prague Intl	9865va	11600va		
0430-0455	Moldova, R Moldova Intl	7520na			
0430-0500	Netherlands, Radio	6165na	9590na		
0430-0500 vl	Nigeria, Radio/Ibadan	6050do			
0430-0500 vl	Nigeria, Radio/Kaduna	4770do			
0430-0500	Nigeria, Radio/Lagos	3326do			
0430-0500	Swaziland, Trans World R	3200af	4775af		
0455-0500	Malaysia, Voice of	6175as	9750as	15295as	
0455-0500	Nigeria, Voice of	7255af	15120va		

Selected Programs

Daily

0400 China, China Radio Intl: News. See S 0100.
0400 Russia, Voice of: News. See S 0200.
0400 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
0430 Russia, Voice of: News in Brief. See S 0230.

Tuesday-Saturday

0400 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
0411 Russia, Voice of: News and Views. See S 0411.
0417 China, China Radio Intl: Current Affairs. See M 1217.
0430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.

Monday-Friday

0400 Canada, RCI Montreal, RCI Montreal: News. News from either the Canadian Broadcasting Corporation (CBC) or Radio Canada International (RCI).
0410 Canada, RCI Montreal, RCI Montreal: African Eyes. A 20-minute magazine of features, reports, and music.

Sundays

0400 Radio Mexico Intl: DXperience. Radio Mexico's new program for the shortwave listener/ham with background music in the foreground, talk in the background, and DX in the underground.
0404 Switzerland, Swiss R Intl: Swiss Scene. See S 0104.
0411 Russia, Voice of: News and Views. Russian views on news developments.
0412 Switzerland, Swiss R Intl: Capital Letters (2/4). See S 0112.
0412 Switzerland, Swiss R Intl: Sounds Good (3/5). See S 0112.
0412 Switzerland, Swiss R Intl: The Name Game (1). See S 0112.
0417 China, China Radio Intl: Report on Developing Countries. See S 0117.
0429 China, China Radio Intl: China Scrapbook. See S 0129.
0430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. A relaxing blend of music and interviews
0432 Russia, Voice of: A Christian Message from Moscow. The history of the Russian Orthodox Church and related topics are described together with ecclesiastical background music.
0435 China, China Radio Intl: Music from China. See S 0135.

Mondays

0411 China, China Radio Intl: Cultural Information. See S 1211.
0411 Russia, Voice of: Sunday Panorama. See S 1511.
0412 Switzerland, Swiss R Intl: Swiss Scene. See S 0104.
0419 China, China Radio Intl: People in the Know. See S 1219.
0420 Russia, Voice of: Russia in Personalities. See S 1515.
0430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
0432 Russia, Voice of: Audio Book Club. See S 0632.
0440 China, China Radio Intl: On the Road. See S 1240.
0445 China, China Radio Intl: Listeners' Letterbox. See S 1245.

Tuesdays

0428 China, China Radio Intl: Press Clippings See M 1228.
0432 Russia, Voice of: The 20th Century-Year After Year. See S 0332.
0434 China, China Radio Intl: Macao Insights. See M 1234.
0440 China, China Radio Intl: Wuxi Journal. See M 1240.
0445 China, China Radio Intl: Idioms and Their Stories. See M 1245.

Wednesdays

0428 China, China Radio Intl: Press Clippings. See M 1228.
0432 China, China Radio Intl: Changzhou Reports. See T 1232.
0432 Russia, Voice of: Alternative Programs. An interview or any of the music or feature programs of Voice of Russia.
0437 China, China Radio Intl: Orient Arena. See T 1237.
0445 China, China Radio Intl: Opera House. See T 1245.

Thursdays

0432 Russia, Voice of: The 20th Century-Year After Year. See S 0332.
0434 China, China Radio Intl: Press Clippings. See M 1228.
0435 China, China Radio Intl: Voices from Other Lands. See W 1235.
0445 China, China Radio Intl: Learn to Speak Chinese. See W 1245.

Fridays

0432 Russia, Voice of: Alternative Programs. See W 0432.
0434 China, China Radio Intl: Press Clippings. See M 1228.
0438 China, China Radio Intl: Focus. See H 1238.
0445 China, China Radio Intl: Cultural Spectrum. See H 1245.

Saturdays

0430 China, China Radio Intl: Press Clippings. See M 1228.
0432 Russia, Voice of: Science and Engineering in the Commonwealth. See S 0611.
0436 China, China Radio Intl: Life in China. See F 1236.
0444 China, China Radio Intl: Global Review. See F 1244.

Frequencies

0500-0600	Anguilla,Caribbean Beacon	6090am			
0500-0600 vl	Australia, ABC/Katherine	5025do			
0500-0600 vl	Australia, ABC/Tent Creek	4910do			
0500-0600	Australia, Radio	9660as	12080as	15240as	15515as
		17580as	21725as		
0500-0600 as	Australia, Radio	15415as	17750as		
0500-0600 vl	Botswana, Radio	4820do	7255do		
0500-0600	Canada, CBC N Quebec Svc	9625do			
0500-0600	Canada, CFRX Toronto	6070do			
0500-0600	Canada, CFVP Calgary	6030do			
0500-0600	Canada, CHNX Halifax	6130do			
0500-0600	Canada, CKZN St John's	6160do			
0500-0600	Canada, CKZU Vancouver	6160do			
0500-0556	China, China Radio Intl	9560na			
0500-0600	Costa Rica,RF Peace Intl	6975va	15050va		
0500-0505	Croatia, Croatian Radio	7285al	9925na		
0500-0600	Cuba, Radio Havana	9550na	9820na	9830na	
0500-0600	Ecuador, HCJB	9745na	12015na	21455va	
0500-0545	Germany, Deutsche Welle	6100na	6120na	9670na	11795na
0500-0515	Israel, Kol Israel	9435va	11605va	17715au	
0500-0600	Japan, Radio/NHK	6110na	7230eu	9835eu	11715as
		11760as	11840as	11850pa	15230pa
		15590as			
0500-0600	Kenya, Kenya BC Corp	4885do	4935do		
0500-0600	Kuwait, Radio	15110as			
0500-0600 vl	Lesotho, Radio	4800do			
0500-0600	Liberia,LCN/R Liberia Int	5100do			
0500-0510 vl/m-f	Malawi, MBC	5993do			
0500-0600	Malaysia, Radio	7295do			
0500-0600	Malaysia, RTM Sarawak	7160do			
0500-0600	Malaysia, Voice of	6175as	9750as	15295as	
0500-0530 twhfa	Mexico, Radio Mexico Intl	9705am			
0500-0525	Netherlands, Radio	6165na	9590na		
0500-0600	New Zealand, R NZ Intl	17675va			
0500-0600 vl	Nigeria, Radio/Ibadan	6050do			
0500-0600 vl	Nigeria, Radio/Kaduna	4770do			
0500-0600	Nigeria, Radio/Lagos	3326do			
0500-0600	Nigeria, Voice of	7255af	15120va		
0500-0600	North Korea, R Pyongyang	3560eu	11710eu	13790eu	
0500-0504	Pakistan, Radio	11725me	15175me	17555me	
0500-0600 vl	Papua New Guinea, NBC	9675do			
0500-0600	Russia,Voice of Russia WS	7125na	7180na	7570as	12010na
		12020na	15470na	15595na	17595na
		17660na			
0500-0530	S Africa, AWR Africa	5960af	6010af		
0500-0600	S Africa, Channel Africa	15215af			
0500-0600	Singapore,RCorp Singapore	6150do			
0500-0600 vl	Solomon Islands, SIBC	5020do			
0500-0600	Spain, R Exterior Espana	6055na			
0500-0505	Swaziland, Trans World R	3200af	4775af		
0500-0530	Switzerland, Swiss R Intl	9655eu			
0500-0600	Uganda, Radio	4976do			
0500-0600	UK, BBC World Service	3255af	3955eu	5975na	6005af
		6175am	6190af	6195eu	7160af
		9410eu	9740as	11760me	11765af
		11955pa	12095eu	15310as	15360as
		15420af	15575as	17640af	17760as
		17790as	17885af	21660as	
0500-0600	USA, Armed Forces Network	4278am	6458am	12689am	
0500-0600	USA, KAIJ Dallas TX	5835va			
0500-0600	USA, KTBN Salt Lk City UT	7510na			
0500-0600 vl	USA, KVOH Los Angeles CA	9975am			
0500-0600	USA, KWHR Naalehu HI	17780as			
0500-0600	USA, Voice of America	5970af	6035af	6080af	7170af
		7295af	9700af	9775af	11825eu
		12080af	15205as		
0500-0600	USA, WBCQ Monticello ME	7415na			
0500-0600	USA, WEWN Birmingham AL	5825na			
0500-0600	USA, WGTG McCaysville GA	5085va	6890am		
0500-0600	USA, WHRA Greenbush ME	7435af			
0500-0600	USA, WHRI Noblesville IN	5745na	7315sa		
0500-0600	USA, WINB Red Lion PA	11950am			
0500-0600	USA, WJCR Upton KY	7490na	13595na		
0500-0600 stwhfa	USA, WRMI/R Miami Intl	7385na			
0500-0600	USA, WRNO New Orleans LA	7395na			
0500-0600	USA, WSHB Cypress Crk SC	7535eu	9840af	12020af	
0500-0600	USA, WTJC Newport NC	9370na			
0500-0505	USA, WWCR Nashville TN	2390na	5070na	5935na	
0500-0505 as	USA, WWCR Nashville TN	3210na			
0500-0505 mtwhf	USA, WWCR Nashville TN	3215na			
0500-0600	USA, WYFR Okeechobee FL	5985na	9985na	11550eu	
0500-0530	Vatican City, Vatican R	9660af	11625af	15570af	
0500-0600	Zambia, Christian Voice	6065do			
0500-0600	Zambia, Natl BC Corp	6165do	6265do		
0500-0530 vl	Zimbabwe, Zimbabwe BC	3396do			
0505-0600	Swaziland, Trans World R	3200af	4775af	9500af	
0505-0600	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0515-0555 vl	Honduras, HRMI	5890am			
0520-0600 vl	Ghana, Ghana BC Corp	3366do	4915do		
0530-0600	Austria, R Austria Intl	6015na	6155va	13730na	15410eu
0530-0600	Kiribati, Radio	9810do			
0530-0600 a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0530-0600	UAE Radio Dubai	15435au	17830au	21605au	21700au
0530-0600 vl	Zimbabwe, Zimbabwe BC	5975do			

Selected Programs

Daily

0500 Russia, Voice of: News. See S 0200.
0500 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
0530 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
0530 Russia, Voice of: News in Brief. See S 0230.

Sundays

0511 Russia, Voice of: Program Preview. A review of programs to be featured in the coming week.
0532 Russia, Voice of: Moscow Yesterday and Today. See S 0232.

Mondays

0511 Russia, Voice of: Program Preview. See S 0511.
0532 Russia, Voice of: The Jazz Show. The world of Russian jazz.

Tuesdays

0500 Radio Mexico Intl: Regional Roots and Rhythms. See S 1500.
0511 Russia, Voice of: Moscow Mailbag. See S 0311.
0532 Russia, Voice of: Yours for the Asking. A 30-minute musical request program.
0545 Russia, Voice of: Moscow Yesterday and Today. See S 0232.

Wednesdays

0500 Radio Mexico Intl: Mail Box. See S 1600.
0511 Russia, Voice of: Science and Engineering in the Commonwealth. See S 0611.
0532 Russia, Voice of: Russian Musical Highlights of the 20th Century. See T 0632.
0545 Russia, Voice of: Russia in Personalities. See S 1515.

Thursdays

0500 Radio Mexico Intl: The Sounds of Mexico. See S 0000.
0511 Russia, Voice of: Newmarket. See W 0311.
0530 UK, BBC London (AE): Joe Strummer's London Calling (2nd,9th,16th). The former frontman of British rock group, The Clash, returns to BBC World Service.
0530, UK, BBC London (AS): Joe Strummer's London Calling (3rd,10th,17th). See H 0230.
0532 Russia, Voice of: Folk Box. See M 1532.

Fridays

0500 Radio Mexico Intl: Eternally Mexico. See S 0000.
0511 Russia, Voice of: Moscow Mailbag. See S 0311.
0532 Russia, Voice of: Audio Book Club. See S 0632.

Saturdays

0500 Radio Mexico Intl: Mail Box. See S 1600.
0511 Russia, Voice of: Science and Engineering in the Commonwealth. See S 0611.
0532 Russia, Voice of: Timelines. See M 0232.

Hauser's Highlights

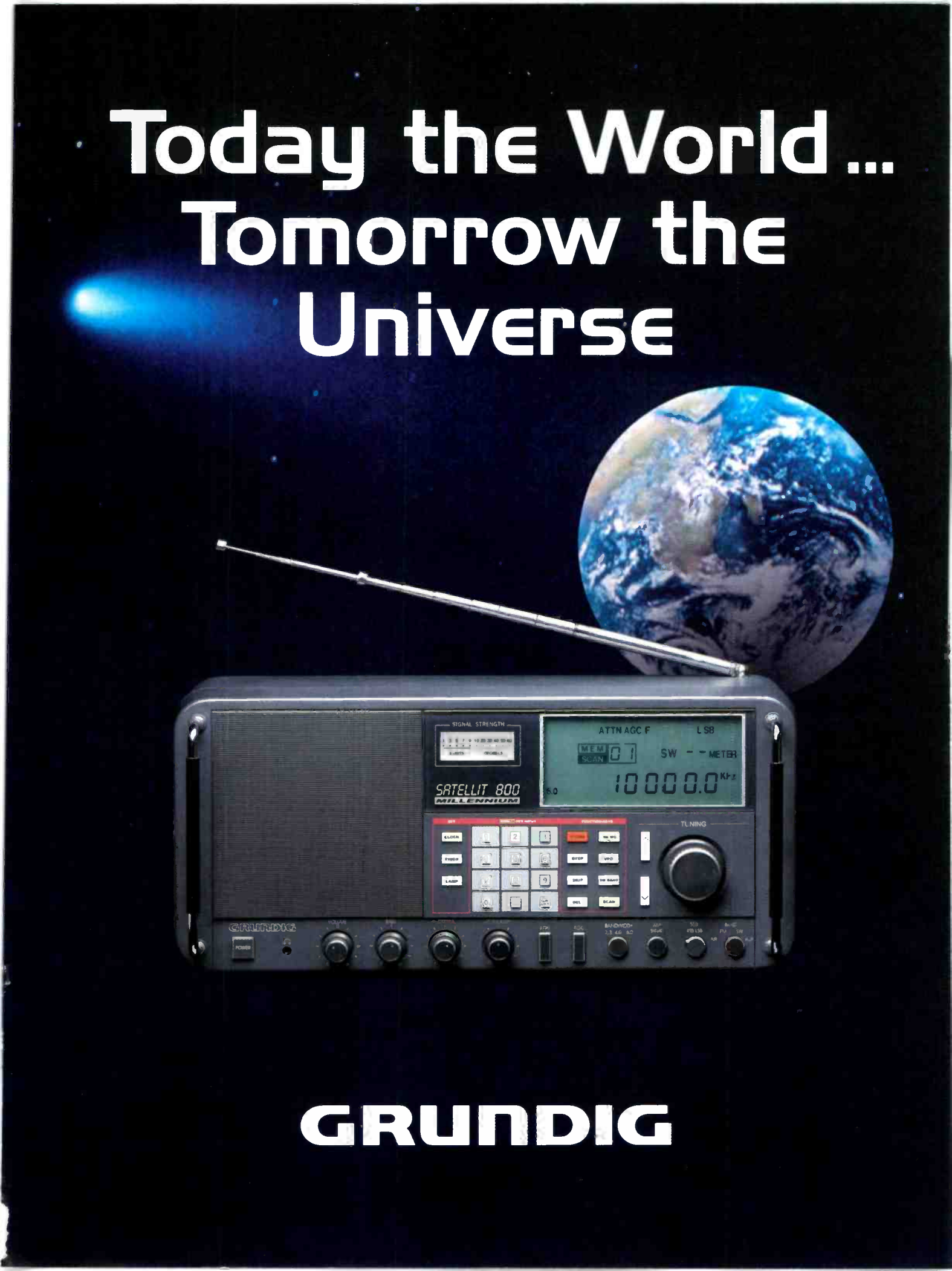
KOREA NORTH: Radio Pyongyang

English
1200-1300 13650 11335 9975 9850 9640 3560
1500-1600 13760 11710 9335 6575 4405
1600-1700 9975 9600 6520 3560
1900-2000 13760 11710 9335 6575 4405
0000-0100 15180 13760 11710 4405
0100-0200 17735 15230 11735 3560
0200-0300 13650 11845

(Shigenori Aoki, *Electronic DX Press*)

This matches a schedule from BBCM, except they did not have 13760 and 11710 at 1500. David Zantow and I had been trying to copy the schedules announced at the end of each broadcast; they only give half the info at any one time and never the 3 and 4 MHz feeders. We first noticed the new 17735.4 at 0100, always with an "ommmmm" suitable for meditation (gh)

Today the World ... Tomorrow the Universe



GRUNDIG

GRUNDIG Tunes in the

The Millennium begins. The wait is over. The Grundig Satellit Legend continues. The Satellit 800 Millennium is your assurance of staying in touch with the world... Access radio programs the world over... fast-breaking news from the farthest corners of the globe... music from faraway countries.

CUTTING EDGE IN SPACE TECHNOLOGY

- You'll appreciate the smooth flowing design and functional control panel.
- Superbly appointed, fold away, easy grip handle for portability.
- Enter any station on the key pad, then tune up or down frequency or search specific meter bands.
- The tuner receives AM/FM and all shortwave frequencies from 100 to 30,000 KHz, FM from 87 to 108 MHz and VHF aircraft 118 to 137 MHz and locks onto broadcasts with digital accuracy...

World

- Receives FM stereo with the included high-quality headphones.
- Superior audio quality for which Grundig is known.
- A direct input digital key pad combined with manual tuning.
- 70 user-programmable memories.
- Upper and lower sideband capability (USB/LSB).
- A large 6" by 3½" multifunction LCD.
- Last station memory.
- Synchronous detector for superior AM and shortwave reception.
- Multi voltage (110, 220 V) AC adapter.
- Dual clocks.
- Low battery indicator.

Whether you are cruising offshore, enjoying the cottage, or relaxing on an extended vacation in some distant land, the Satellit 800 Millennium is the most powerful and precise radio in the World. Search the globe, you can discover the hottest news first hand... listen to and witness the ongoing fascination with our evolving world today... tomorrow the universe.

by GRUNDIG

The Ultimate in Digital Technology

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.

The Tuning Controls
- For the traditionalist: a smooth, precise tuning knob, produces no audio muting during use. 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 Technology
Today's latest engineering:
- Dual conversion superheterodyne circuitry.
- PLL synthesized tuner.

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

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 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 Power Supply
A multi voltage (110, 220V) AC adapter is included. 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
Shortwave Hotlines (US) 1-800-872-2228 (CN) 1-800-637-1648 • Web: *www.grundigradio.net*

Frequencies

0600-0700	Anguilla,Caribbean Beacon	6090am			
0600-0700 vl	Australia, ABC/Katherine	5025do			
0600-0700 vl	Australia, ABC/Tent Creek	4910do			
0600-0700	Australia, Radio	9660as	12080as	15240as	15415as
		15515as	17580as	17750as	21725as
0600-0700 vl	Botswana, Radio	4820do	4830do	7255do	
0600-0700 vl	Canada, CBC N Quebec Svc	9625do			
0600-0700	Canada, CFRX Toronto	6070do			
0600-0700	Canada, CFVP Calgary	6030do			
0600-0700	Canada, CHNX Halifax	6130do			
0600-0700	Canada, CKZN St John's	6160do			
0600-0700	Canada, CKZU Vancouver	6160do			
0600-0629	Canada, Radio Canada Intl	5960na	6045va	6150eu	9670na
		9780af	11905af		
0600-0629 mtwhf	Canada, Radio Canada Intl	11710af	15325af		
0600-0700	Costa Rica,RF Peace Intl	6975va			
0600-0605	Croatia, Croatian Radio	11880au	13820al		
0600-0700	Cuba, Radio Havana	9550na	9820na	9830na	
0600-0700	Ecuador, HCJB	9745na	12015na	21455va	
0600-0645	Germany, Deutsche Welle	6140eu	7225af	9565af	11785af
0600-0700	Germany,Overcomer Ministr	13810au			
0600-0700 vl	Ghana, Ghana BC Corp	3366do	4915do		
0600-0700 vl	Italy, IRRS	3985va			
0600-0700	Japan, Radio/NHK	5975eu	7230eu	9835na	11740as
		11840as	11850pa		
0600-0700	Kenya, Kenya BC Corp	4885do	4935do		
0600-0700	Kiribati, Radio	9810do			
0600-0700	Kuwait, Radio	15110as			
0600-0700 vl	Lesotho, Radio	4800do			
0600-0700	Liberia,LCN/R Liberia Int	5100do			
0600-0700	Malaysia, Radio	7295do			
0600-0700	Malaysia, RTM Sarawak	7160do			
0600-0700	Malaysia, Voice of	6175as	9750as	15295as	
0600-0700	Namibia, NBC	7165af			
0600-0700	New Zealand, R NZ Intl	17675va			
0600-0700 vl	Nigeria, Radio/Ibadan	6050do			
0600-0700 vl	Nigeria, Radio/Kaduna	4770do			
0600-0700	Nigeria, Radio/Lagos	3326do			
0600-0700	Nigeria, Voice of	7255af	15120va		
0600-0700 vl	Papua New Guinea, NBC	9675do			
0600-0700	Romania, R Romania Intl	9530na	11830na		
0600-0700	Russia,Voice of Russia WS	15460au	15470au	15525au	17570au
		21790au			
0600-0630	S Africa, Channel Africa	15215af			
0600-0700	Sierra Leone, SLBS	3316do			
0600-0700	Singapore,RCorp Singapore	6150do			
0600-0700 vl	Solomon Islands, SIBC	5020do			
0600-0605	Swaziland, Trans World R	4775af	9500af		
0600-0630	Switzerland, Swiss R Intl	9655eu			
0600-0700	UK, BBC World Service	3955eu	6005af	6175am	6190af
		6195eu	7160af	9410eu	9580pa
		9740as	11750me	11765af	11940af
		11955pa	12095eu	15310as	15360as
		15420af	15575as	17640af	17760as
		17790as	17885af	21660as	
0600-0700	USA, Armed Forces Network	4278am	6458am	12689am	
0600-0700	USA, KAIJ Dallas TX	5835va			
0600-0700	USA, KTBN Salt Lk City UT	7510na			
0600-0700	USA, KWHR Naalehu HI	17780as			
0600-0700	USA, Voice of America	5970af	5995af	6035af	6080af
		7170af	7295af	11805af	11825af
		11930af	12080af	15205as	15600af
0600-0700	USA, WBCQ Monticello ME	7415na			
0600-0700	USA, WEWN Birmingham AL	5825na			
0600-0700	USA, WGTG McCaysville GA	5085va	6890am		
0600-0700	USA, WHRA Greenbush ME	7435af			
0600-0700	USA, WHRI Noblesville IN	5745na	7315sa		
0600-0700	USA, WJCR Upton KY	7490na	13595na		
0600-0700	USA, WRMI/R Miami Intl	7385na			
0600-0700	USA, WRNO New Orleans LA	7395na			
0600-0700	USA, WSHB Cypress Crk SC	7535af			
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	4960do			
0600-0620	Vatican City, Vatican R	4005eu	5880eu	7250eu	
0600-0700	Yemen, Rep of Yemen Radio	9780me			
0600-0700	Zambia, Christian Voice	9865do			
0600-0700	Zambia, Natl BC Corp	6165do	6265do		
0600-0700 vl	Zimbabwe, Zimbabwe BC	5975do			
0605-0700	Swaziland, Trans World R	4775af	6100af	9500af	
0610-0615 mtwhf	Greece, Voice of	7475eu	11645au	15630eu	
0630-0700	Austria, R Austria Intl	6015na			
0630-0700	Georgia, Georgian Radio	11910eu			
0630-0700 mtwhfa	Malta, VO Mediterranean	7155eu			
0630-0700	Vatican City, Vatican R	11625af	13765af	15570af	
0641-0656	Romania, R Romania Intl	7105eu	9510eu	11775eu	15105eu
0645-0700	Germany, Deutsche Welle	6140eu			

Selected Programs

Daily

0600 Russia, Volce of: News. See S 0200.
0600 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
0630 Russia, Voice of: News in Brief. See S 0230.

Sundays

0611 Russia, Volce of: Science and Engineering In the Commonwealth. The latest developments in science and technology.
0632 Russia, Voice of: Audio Book Club. The best of Russian classic and contemporary literature.

Mondays

0600 Canada, RCI Montreal, RCI Montreal: News. See M 0400.
0610 Canada, RCI Montreal, RCI Montreal: African Eyes. See M 0410.
0611 Russia, Voice of: Moscow Mailbag. See S 0311.
0630 UK, BBC London (AS): Visionaries. See M 0055.
0632 Russia, Voice of: This is Russia. See M 0332.

Tuesdays

0600 Canada, RCI Montreal, RCI Montreal: News. See M 0400.
0610 Canada, RCI Montreal, RCI Montreal: African Eyes. See M 0410.
0611 Russia, Voice of: Focus on Asia and the Pacific. See M 1611.
0630 UK, BBC London (AS): Visionaries. See M 0055.
0632 Russia, Voice of: Russian Musical Highlights of the 20th Century. A classical music program.
0645 Russia, Voice of: Russia In Personalities. See S 1515.

Wednesdays

0600 Canada, RCI Montreal, RCI Montreal: News. See M 0400.
0610 Canada, RCI Montreal, RCI Montreal: African Eyes. See M 0410.
0611 Russia, Voice of: Focus on Asia and the Pacific. See M 1611.
0630 UK, BBC London (AS): Visionaries. See M 0055.
0632 Russia, Voice of: Russian by Radio. See S 1632.

Thursdays

0600 Canada, RCI Montreal, RCI Montreal: News. See M 0400.
0610 Canada, RCI Montreal, RCI Montreal: African Eyes. See M 0410.
0611 Russia, Voice of: Focus on Asia and the Pacific. See M 1611.
0630 UK, BBC London (AS): Visionaries. See M 0055.
0632 Russia, Voice of: Moscow Yesterday and Today. See S 0232.

Fridays

0600 Canada, RCI Montreal, RCI Montreal: News. See M 0400.
0610 Canada, RCI Montreal, RCI Montreal: African Eyes. See M 0410.
0611 Russia, Voice of: Focus on Asia and the Pacific. See M 1611.
0630 UK, BBC London (AS): Visionaries. See M 0055.
0632 Russia, Voice of: This is Russia. See M 0332.

Saturdays

0611 Russia, Volce of: Focus on Asia and the Pacific. See M 1611.
0632 Russia, Voice of: A Christian Message from Moscow. See S 0432.

FREQUENCIES

0700-0800	Anguilla,Caribbean Beacon	6090am			
0700-0800 vl	Australia, ABC/Katherine	5025do			
0700-0800 vl	Australia, ABC/Tent Creek	4910do			
0700-0800	Australia, Radio	9660as	12080as	15240as	15415as
		15515as	17580as	17750as	21725as
0700-0800 vl	Botswana, Radio	4820do	4830do	7255do	
0700-0800	Canada, CFRX Toronto	6070do			
0700-0800	Canada, CFVP Calgary	6030do			
0700-0800	Canada, CHNX Halifax	6130do			
0700-0800	Canada, CKZN St John's	6160do			
0700-0800	Canada, CKZU Vancouver	6160do			
0700-0800	Costa Rica,RF Peace Intl	6975va			
0700-0705	Croatia, Croatian Radio	11880eu	13820al		
0700-0800	Ecuador, HCJB	9780eu	11755pa	21455va	
0700-0800	Eqt Guinea, Radio Africa	15186af			
0700-0800	Germany, Deutsche Welle	6140eu			
0700-0800	Germany, Voice of Hope	5975eu			
0700-0800 s	Germany,Good News World R	13740au			
0700-0715 vl	Ghana, Ghana BC Corp	3366do	4915do		
0700-0800 vl	Italy, IRRS	7120va			
0700-0800	Kenya, Kenya BC Corp	4885do	4935do		
0700-0800	Kiribati, Radio	9810do			
0700-0800	Kuwait, Radio	15110as			
0700-0800 vl	Lesotho, Radio	4800do			
0700-0715	Liberia,LCN/R Liberia Int	5100do			
0700-0800	Malaysia, Radio	7295do			
0700-0800	Malaysia, RTM Sarawak	7160do			
0700-0800	Malaysia, Voice of	6175as	9750as	15295as	
0700-0800	New Zealand, R N Z Intl	17675va			
0700-0800 vl	Nigeria, Radio/Ibadan	6050do			
0700-0800 vl	Nigeria, Radio/Kaduna	4770do			
0700-0800 vl	Nigeria, Voice of	7255af	15120va		
0700-0800	Palau, KHBN/Voice of Hope	9965as	9985as	15725as	
0700-0730 vl	Papua New Guinea, NBC	9675do			
0700-0800	Romania, R Romania Intl	17720af	21480af		
0700-0800	Russia,Voice of Russia WS	15460au	15470au	15525au	17495au
		17570au	21790au		
0700-0800	Sierra Leone, SLBS	3316do			
0700-0800	Singapore,RCorp Singapore	6150do			
0700-0730	Slovakia, R Slovakia Intl	11990au	15460au	21705au	
0700-0800 vl	Solomon Islands, SIBC	5020do			
0700-0705	Swaziland, Trans World R	4775af	6100af	9500af	
0700-0800	Taiwan, Radio Taiwan Intl	5950na			
0700-0800	UK, BBC World Service	6005af	6175am	6190af	6195eu
		9410eu	9580pa	9740as	11760me
		11765af	11940af	11955pa	12095eu
		15310as	15400af	15485eu	15565eu
		17640eu	17760as	17790as	17830af
		21660as			
0700-0715 as	UK, BBC World Service	17885af			
0700-0800	USA, Armed Forces Network	4278am	6458am	12689am	
0700-0800	USA, KAIJ Dallas TX	5835va			
0700-0800	USA, KTBN Salt Lk City UT	7510na			
0700-0800	USA, KWHR Naalehu HI	11565as	17780as		
0700-0800	USA, WBCQ Monticello ME	7415na			
0700-0800	USA, WEWN Birmingham AL	5825na			
0700-0800	USA, WHRA Greenbush ME	7435af			
0700-0800	USA, WHRI Noblesville IN	5745na	7315sa		
0700-0800	USA, WJCR Upton KY	7490na	13595na		
0700-0800	USA, WRMI/R Miami Intl	7385na			
0700-0800	USA, WRNO New Orleans LA	7395na			
0700-0800	USA, WSHB Cypress Crk SC	7535af			
0700-0800	USA, WTJC Newport NC	9370na			
0700-0800	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0700-0800	USA, WYFR Okeechobee FL	7355eu	7520eu	9985va	
0700-0800 vl	Vanuatu, Radio	4960do			
0700-0800	Zambia, Christian Voice	9865do			
0700-0800	Zambia, Natl BC Corp	6165do	6265do		
0700-0800 vl	Zimbabwe, Zimbabwe BC	5975do			
0705-0710 mtwhfa	Croatia, Croatian Radio	6165eu	7365eu	9830eu	
0710-0715 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0715-0800 as	UK, BBC World Service	15575as	17885af		
0725-0800	Myanmar, Radio	9730do			
0730-0800	Finland, YLE/R Finland	9840va	21670as		
0730-0800 as	Guam, TWR/KTWR	15200as			
0730-0800 vl	Papua New Guinea, NBC	4890do			
0730-0800	Switzerland, Swiss R Intl	9885va	13635af	17665af	
0730-0745 mtwhf	Vatican City, Vatican R	4005eu	5880eu	6185eu	7250eu
		9645eu	11740eu	15595af	
0740-0750	Greece, Voice of	7425eu	7475eu	9420na	11645au
		15630eu			
0740-0800 as	Guam, TWR/KTWR	15200as			
0745-0800 as	Albania, Trans World R	9870eu	12070eu		
0745-0755 as	Monaco, Trans World Radio	9870eu			
0750-0800 as	Greece, Voice of	9775au			
0755-0800 mtwhf	Albania, Trans World R	9870eu	12070eu		
0755-0800 mtwhf	Monaco, Trans World Radio	9870eu			
0800-0900	Albania, Trans World R	9870eu	12070eu		
0800-0900	Anguilla,Caribbean Beacon	6090am			
0800-0830 vl	Australia, ABC/Katherine	5025do			
0800-0830 vl	Australia, ABC/Tent Creek	4910do			
0800-0830	Australia, Radio	5995as	9710as	12080as	13605as
		15515as	21725as		
0800-0830 as	Australia, Radio	15415as	17750as		
0800-0830	Belgium,R Vlaanderen Intl	5985am			
0800-0900 vl	Botswana, Radio	4820do	4830do	7255do	
0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFVP Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZN St John's	6160do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0900	Costa Rica,RF Peace Intl	6975va			
0800-0805	Croatia, Croatian Radio	13820au			
0800-0827	Czech Rep, R Prague Intl	11600eu	15255eu		
0800-0900	Ecuador, HCJB	9780eu	11755pa	21455va	
0800-0900	Eqt Guinea, Radio Africa	15186af			
0800-0900	Germany, Deutsche Welle	6140eu			
0800-0900	Germany, Voice of Hope	5975eu			
0800-0900	Germany,Overcomer Ministr	13810au			
0800-0900 vl	Ghana, Ghana BC Corp	3366do	4915do		
0800-0900 as	Guam, TWR/KTWR	15200as			
0800-0900	Guam, TWR/KTWR	15300au			
0800-0900	Indonesia, Voice of	9525va			
0800-0815 vl	Italy, IRRS	7120va			
0800-0900	Kenya, Kenya BC Corp	4885do	4935do		
0800-0900	Kiribati, Radio	9810do			
0800-0900 vl	Lesotho, Radio	4800do			
0800-0900	Liberia,LCN/R Liberia Int	5100do			
0800-0900	Malaysia, Radio	7295do			
0800-0825	Malaysia, Voice of	6175as	9750as	15295as	
0800-0900 vl	Malaysia,RTM KotaKinabalu	5980do			
0800-0900 mtwhf	Monaco, Trans World Radio	9870eu			
0800-0830	Myanmar, Radio	9730do			
0800-0900	N Marianas, KFBS Saipan	11650as	15380as		
0800-0900	New Zealand, R NZ Intl	17675va			
0800-0900 vl	Nigeria, Radio/Ibadan	6050do			
0800-0900 vl	Nigeria, Radio/Kaduna	4770do			
0800-0900	Nigeria, Radio/Lagos	3326do			
0800-0900	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
0800-0900 vl	Papua New Guinea, NBC	4890do			
0800-0900	Russia,Voice of Russia WS	9905au	15460au	15470au	17495au
		21740au			
0800-0900	Sierra Leone, SLBS	5980do			
0800-0900	Singapore,RCorp Singapore	6150do			
0800-0900	South Korea, R Korea Intl	9570au	13870eu		
0800-0900	UK, BBC World Service	6190af	9410eu	9580pa	9740as
		11940af	11955pa	12095eu	15310as
	15360as	15400af	15485eu	15565eu	17640eu
	17760as	17790as	17830af	21660as	21830as
0800-0900 as	UK, BBC World Service	15575as	17885af		
0800-0900	USA, Armed Forces Network	4278am	6458am	12689am	
0800-0900	USA, KAIJ Dallas TX	5835va			
0800-0900	USA, KNLS Anchor Point AK	9615as			
0800-0900	USA, KTBN Salt Lk City UT	7510na			
0800-0900	USA, KWHR Naalehu HI	11565as	17780as		
0800-0900	USA, Voice of America	11995as	13650as	15150as	
0800-0900	USA, WBCQ Monticello ME	7415na			
0800-0900	USA, WEWN Birmingham AL	5825na			
0800-0900	USA, WHRA Greenbush ME	7435af			
0800-0900	USA, WHRI Noblesville IN	5745na	7315sa		
0800-0900	USA, WJCR Upton KY	7490na	13595na		
0800-0900 twhfa	USA, WRMI/R Miami Intl	7385na			
0800-0900	USA, WRNO New Orleans LA	7395na			
0800-0900	USA, WSHB Cypress Crk SC	7535eu	9845pa		
0800-0900	USA, WTJC Newport NC	9370na			
0800-0900	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0800-0900 vl	Vanuatu, Radio	4960do			
0800-0900	Zambia, Christian Voice	9865do			
0800-0900	Zambia, Natl BC Corp	6165do	6265do		
0800-0900 vl	Zimbabwe, Zimbabwe BC	5975do			
0804-0820	Pakistan, Radio	15530eu	17835eu		
0805-0810 s	Croatia, Croatian Radio	6165eu	7185eu	7365eu	9830eu
0815-0900 as/vl	Italy, IRRS	7120va			
0815-0900 f	Seychelles, FEBA Radio	15460as			
0830-0900 vl	Australia, ABC/Alice Spgs	2310do			
0830-0900 vl	Australia, ABC/Katherine	2485do			
0830-0900 vl	Australia, ABC/Tent Creek	2325do			
0830-0900	Australia, Radio	5995as	9710as	12080as	13605as
		15415as	15515as	17750as	21725as
0830-0900 a	Austria, R Austria Intl	21650as	21765as		
0830-0900	Georgia, Georgian Radio	11910eu			
0830-0900 vl	Solomon Islands, SIBC	5020do			
0830-0900	Switzerland, Swiss R Intl	9885au	13685au		

Frequencies

0900-0920	Albania, Trans World R	9870eu	12070eu		
0900-1000	Anguilla,Caribbean Beacon	6090am			
0900-1000 vl	Australia, ABC/Alice Spgs	2310do			
0900-1000 vl	Australia, ABC/Katherine	2485do			
0900-1000 vl	Australia, ABC/Tent Creek	2325do			
0900-1000	Australia, Radio	11880as	13605as	17750as	21820as
0900-1000 vl	Botswana, Radio	4820do	4830do	7255do	
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZN St John's	6160do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-0956	China, China Radio Intl	11730pa	15210pa		
0900-1000	Costa Rica,RF Peace Intl	6975va			
0900-0905	Croatia, Croatian Radio	13820au			
0900-1000	Ecuador, HCJB	11775pa	21455va		
0900-1000	Eqt Guinea, Radio Africa	15186af			
0900-0945	Germany, Deutsche Welle	6140eu	6160pa	11785af	12055as
		15105as	15410af	17800af	17820as
		17860af	21600af		
0900-1000	Germany, Voice of Hope	5975eu			
0900-1000 a	Germany,Good News World R	5995eu			
0900-1000 s	Germany,Good News World R	13800va			
0900-0915	Ghana, Ghana BC Corp	4915do	6130do		
0900-0915 as	Guam, TWR/KTWR	15200as			
0900-0930	Guam, TWR/KTWR	15300au			
0900-1000 as/vl	Italy, IRRS	7120va			
0900-1000	Kenya, Kenya BC Corp	4935do			
0900-0930	Kiribati, Radio	9810do			
0900-1000 vl	Lesotho, Radio	4800do			
0900-0915	Liberia,LCN/R Liberia Int	5100do			
0900-1000	Malaysia, Radio	7295do			
0900-1000 vl	Malaysia,RTM KotaKinabalu	5980do			
0900-1000 s	Malta, VO Mediterranean	11770eu			
0900-0920 mtwhf	Monaco, Trans World Radio	9870eu			
0900-1000	N Marianas, KFBS Saipan	9495as	11650as	15380as	
0900-1000	N Marianas, KHBI Saipan	11725as			
0900-1000	New Zealand, R NZ Intl	17675va			
0900-1000 vl	Nigeria, Radio/Ibadan	6050do			
0900-1000 vl	Nigeria, Radio/Kaduna	4770do			
0900-1000	Nigeria, Radio/Lagos	3326do			
0900-1000	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Russia,Voice of Russia WS	9905eu	15460au	15470au	17495au
0900-1000	Sierra Leone, SLBS	5980do			
0900-1000	Singapore,RCorp Singapore	6150do			
0900-1000 vl	Solomon Islands, SIBC	5020do			
0900-1000	Tanzania, Radio	5050af			
0900-1000	UK, BBC World Service	6190af	6195va	7245as	9740as
		11760me	11765as	11940af	11945as
		11955pa	12095eu	15190sa	15310as
		15360as	15400af	15485eu	15565eu
		15575as	17640eu	17760as	17790as
		17830af	17885af	21470af	21660as
0900-1000	USA, Armed Forces Network	4278am	6458am	12689am	
0900-1000	USA, KAIJ Dallas TX	5835va			
0900-1000	USA, KTBN Salt Lk City UT	7510na			
0900-1000	USA, KWHR Naalehu HI	11565as	17780as		
0900-1000	USA, Voice of America	11995as	13650as	15150as	
0900-1000	USA, WBCQ Monticello ME	7415na			
0900-1000	USA, WEWN Birmingham AL	5825na			
0900-1000	USA, WHRA Greenbush ME	7435af			
0900-1000	USA, WHRI Noblesville IN	5745na	7315na		
0900-1000	USA, WJCR Upton KY	7490na	13595na		
0900-1000 twhf	USA, WRMI/R Miami Intl	7385na			
0900-1000	USA, WRNO New Orleans LA	7395na			
0900-1000	USA, WSHB Cypress Crk SC	7535eu	9455sa	11725as	
0900-1000	USA, WTJC Newport NC	9370na			
0900-1000	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0900-1000	Zambia, Christian Voice	9865do			
0900-1000	Zambia, Natl BC Corp	6165do	6265do		
0900-1000 vl	Zimbabwe, Zimbabwe BC	5975do			
0920-0950 s	Albania, Trans World R	9870eu	12070eu		
0920-0930 t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0920-0950 s	Monaco, Trans World Radio	9870eu			
0920-0950 as	UK, BBC World Service	6195as	9740as	11955pa	15360as
		17760as	21660as		
0930-1000	Austria, R Austria Intl	21650as	21765au		
0930-1000	Georgia, Georgian Radio	11910me			
0930-1000	Italy, AWR Europe	7230eu			
0930-1000	Lithuania, Radio Vilnius	9710eu			
0930-1000	Netherlands, Radio	7260as	9790as	12065as	
0930-1000	Philippines, FEBC R Intl	11635as			
0945-1000	Germany, Deutsche Welle	6140eu			
0953-1000	Australia, Def Forces R	11140as			
1000-1100	Anguilla,Caribbean Beacon	11775am			
1000-1030 s	Armenia, Voice of	4810eu	15270eu		
1000-1100 vl	Australia, ABC/Alice Spgs	2310do			
1000-1100 vl	Australia, ABC/Katherine	2485do			
1000-1100 vl	Australia, ABC/Tent Creek	2325do			
1000-1100	Australia, Radio	11880as	13605as	17750as	21820as
1000-1100 as	Bhutan, Bhutan BC Service	5030do			
1000-1100 vl	Botswana, Radio	4820do	4830do	7255do	
1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
1000-1100	Canada, CFRX Toronto	6070do			
1000-1100	Canada, CFVP Calgary	6030do			
1000-1100	Canada, CHNX Halifax	6130do			
1000-1100	Canada, CKZN St John's	6160do			
1000-1100	Canada, CKZU Vancouver	6160do			
1000-1056	China, China Radio Intl	11730pa	15210pa		
1000-1100	Costa Rica,RF Peace Intl	6975va			
1000-1029	Czech Rep, R Prague Intl	17485af	21745va		
1000-1100	Ecuador, HCJB	11755pa	21455va		
1000-1100	Eqt Guinea, Radio Africa	15186af			
1000-1100	Germany, Deutsche Welle	6140eu			
1000-1100	Germany, Voice of Hope	5975eu			
1000-1100	India, All India Radio	11585as	13700as	15020as	17840as
		17845au	17895au		
1000-1100 as/vl	Italy, IRRS	7120va			
1000-1100	Japan, Radio/NHK	9695as	11850pa	15590as	
1000-1100	Kenya, Kenya BC Corp	4935do			
1000-1100 vl	Lesotho, Radio	4800do			
1000-1100	Malaysia, Radio	7295do			
1000-1100 vl	Malaysia,RTM KotaKinabalu	5980do			
1000-1100	N Marianas, KFBS Saipan	9495as	11650as	15380as	
1000-1100	N Marianas, KHBI Saipan	11840as			
1000-1100	Netherlands, Radio	7260as	9790as	12065as	
1000-1005	New Zealand, R NZ Intl	17675va			
1000-1100 vl	Nigeria, Radio/Ibadan	6050do			
1000-1100 vl	Nigeria, Radio/Kaduna	4770do			
1000-1100 vl	Nigeria, Voice of	7255af	15120va		
1000-1100	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC R Intl	11635as			
1000-1100	Sierra Leone, SLBS	5980do			
1000-1030	Singapore, RTE Radio	11740as			
1000-1100	Singapore,RCorp Singapore	6150do			
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1030	Tanzania, Radio	5050af			
1000-1100	UK, BBC World Service	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 Network	4278am	6458am	12689am	
1000-1100	USA, KAIJ Dallas TX	5835va			
1000-1100	USA, KTBN Salt Lk City UT	7510na			
1000-1100	USA, KWHR Naalehu HI	9930as	11565as		
1000-1100	USA, Voice of America	5985pa	6165am	7370am	9590am
		11720as	15250as	15425as	
1000-1100	USA, WBCQ Monticello ME	7415na			
1000-1100	USA, WEWN Birmingham AL	5825na	7425eu		
1000-1100	USA, WHRI Noblesville IN	6040na	9495am		
1000-1100	USA, WJCR Upton KY	7490na	13595na		
1000-1100 mtwh	USA, WRMI/R Miami Intl	7385na			
1000-1100	USA, WRNO New Orleans LA	7395na			
1000-1100	USA, WSHB Cypress Crk SC	6095am	9455sa		
1000-1100	USA, WTJC Newport NC	9370na			
1000-1100 as	USA, WWBS Macon GA	11900na			
1000-1100	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
1000-1100	USA, WYFR Okeechobee FL	5950na			
1000-1027	Vietnam, Voice of	9840as	12020as		
1000-1100	Zambia, Christian Voice	9865do			
1000-1100	Zambia, Natl BC Corp	6165do	6265do		
1000-1100 vl	Zimbabwe, Zimbabwe BC	5975do			
1006-1058	Australia, Def Forces R	11140as			
1030-1100	Ethiopia, Radio	5990do	7110do	9705do	
1030-1100	Guam, AWR/KSDA	11660as	11795as		
1030-1100	Malaysia, RTM Sarawak	7160do			
1030-1100 as	Tanzania, Radio	5050af			
1030-1100	UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu

Just a quick note to tell you how much I appreciate you posting the updated allocations (Service Search) to the Grove web page for free download in the MT section. While I subscribe to MT, it is of course much easier to deal with as virtual text. This will be a major updating of all of my personal records. I don't think most people in the hobby appreciate what a great resource this is and how much time and effort the Grove staff volunteer for the sake of the hobby. Great work, please keep it going!!!

-Ted Moran / Chgo Area Radio Monitoring Association

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 Spgs	2310do			
1100-1200 vl	Australia, ABC/Katherine	2485do			
1100-1200 vl	Australia, ABC/Tent Creek	2325do			
1100-1200	Australia, Radio	5995as	6020as	9580as	12080as
		13605as	21820as		
1100-1200 vl	Botswana, Radio	4820do	4830do	7255do	
1100-1200	Canada, CFRX Toronto	6070do			
1100-1200	Canada, CFVP Calgary	6030do			
1100-1200	Canada, CHNX Halifax	6130do			
1100-1200	Canada, CKZN St John's	6160do			
1100-1200	Canada, CKZU Vancouver	6160do			
1100-1200	Costa Rica,RF Peace Intl	6975va			
1100-1200	Ecuador, HCJB	12005am	15115am	21455va	
1100-1200	Eqt Guinea, Radio Africa	15186af			
1100-1145	Germany, Deutsche Welle	6140eu	15410af	17800af	21780af
1100-1200	Germany,Overcomer Ministr	5850eu			
1100-1200 as	Ghana, Ghana BC Corp	4915do	6130do		
1100-1200	Iran, VOIRI	13710as	15255pa	15430me	17565as
		21470as	21510as		
1100-1200 as/vl	Italy, IRRS	7120va			
1100-1200	Japan, Radio/NHK	6120na	9695as	15590as	
1100-1200	Jordan, Radio	11690eu			
1100-1200	Kenya, Kenya BC Corp	4935do			
1100-1110 fa	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
1100-1200 vl	Lesotho, Radio	4800do			
1100-1110	Liberia,LCN/R Liberia Int	5100do			
1100-1200	Malaysia, Radio	7295do			
1100-1200 vl	Malaysia,RTM KotaKinabalu	5980do			
1100-1200	N Marianas, KFBS Saipan	9495as	11650as	15380as	
1100-1125	Netherlands, Radio	7260as	9790as	12065as	
1100-1200 vl	Nigeria, Radio/Ibadan	6050do			
1100-1200 vl	Nigeria, Radio/Kaduna	4770do			
1100-1200 vl	Nigeria, Voice of	7255af	15120va		
1100-1104	Pakistan, Radio	7110do	11835do	15530do	17835eu
		21460eu			
1100-1200	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1100-1200 vl	Papua New Guinea, NBC	4890do			
1100-1200	Sierra Leone, SLBS	5980do			
1100-1200	Singapore,R Singapore Int	6150as	9590as		
1100-1130 vl	Solomon Islands, SIBC	5020do			
1100-1130	Switzerland, Swiss R Intl	9535eu			
1100-1200	Switzerland, Swiss R Intl	9540as	21770as		
1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200 as	Tanzania, Radio	5050af			
1100-1130 mtwhf	UK, BBC Caribbean Report	6195am	15220am		
1100-1200	UK, BBC World Service	5965na	6190af	6195as	9580as
		9740as	11760me	11940af	11955as
		12095eu	15280as	15310as	15400af
		15485eu	15565eu	15575as	17640eu
		17705as	17790sa	17830af	17885af
		21470af			
1100-1130 as	UK, BBC World Service	6195na	15190sa	15220am	
1100-1200	USA, Armee Forces Network	4278am	6458am	12689am	
1100-1200	USA, KAIJ Dallas TX	5835va			
1100-1200	USA, KTBN Salt Lk City UT	7510na			
1100-1200	USA, KWHR Naalehu HI	9930as	11565as		
1100-1200	USA, Voice of America	5985pa	6110as	9645as	9760as
		11705as	11720as	15250as	15425as
1100-1130 mtwhf	USA, Voice of America	13675af	15510af	17650af	17750af
		21705af			
1100-1200	USA, WEWN Birmingham AL	5825na	15745eu		
1100-1200	USA, WHRI Noblesville IN	6040na	9495am		
1100-1200	USA, WJCR Upton KY	7490na	13595na		
1100-1200	USA, WRNO New Orleans LA	7395na			
1100-1200	USA, WSHB Cypress Crk SC	6095am	11660sa		
1100-1200	USA, WTJC Newport NC	9370na			
1100-1200 as	USA, WWBS Macon GA	11900na			
1100-1200	USA, WWCR Nashville TN	2390na	5070na	5935na	12160na
1100-1200	USA, WYFR Okeechobee FL	5950na	7355na	11830na	
1100-1127	Vietnam, Voice of	7285as			
1100-1200	Zambia, Christian Voice	9865do			
1100-1200	Zambia, Natl BC Corp	6165do	6265do		
1100-1200 vl	Zimbabwe, Zimbabwe BC	5975do			
1104-1120	Pakistan, Radio	15530eu	17835eu		
1105-1200 occsnal	New Zealand, R NZ Intl	6105va			
1115-1145	Nepal, Radio	3230as	5005as		
1115-1130 mtwhf	Vatican City, Vatican R	5880eu	9645eu	11740eu	15595eu
		21850af			
1130-1157	Czech Rep, R Prague Intl	11640eu	21745af		
1130-1135	Israel, Kol Israel	15640va	17535va		
1130-1200 vl	Libya, Voice of Africa	15235va	15415va	15435va	
1130-1200	Netherlands, Radio	6045eu	9855eu		
1130-1200	South Korea, R Korea Intl	9650na			
1130-1200 as	UK, BBC World Service	15310as	17705as		
1130-1200 f	Vatican City, Vatican R	15595af	17515af		
1145-1200	Germany, Deutsche Welle	6140eu			

Selected Programs

Sundays

1100 Japan, NHK/Radio: News. World news from NHK International.
1100 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1110 Japan, NHK/Radio: Hello from Tokyo. The weekend magazine program with letters from listeners and short features.
1130 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.

Mondays

1100 Japan, NHK/Radio: News. See S 1100.
1100 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1115 Japan, NHK/Radio: Asian Top News. The most important stories of the past week from other Asian media organizations are summarized in a 10-minute format.
1125 Japan, NHK/Radio: Music Reflections. Music from around the world which shares a common theme (35 min).
1130 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1130 UK, BBC London (AS): The Essential Guide to the 21st Century. See M 0230.

Tuesdays

1100 Japan, NHK/Radio: News. See S 1100.
1100 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1115 Japan, NHK/Radio: Asian Top News. See M 1115.
1125 Japan, NHK/Radio: Enjoy Japanese. Learn and practice the Japanese language.
1130 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1130 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1130 UK, BBC London (AS): The Essential Guide to the 21st Century. See M 0230.

Wednesdays

1100 Japan, NHK/Radio: News. See S 1100.
1100 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1115 Japan, NHK/Radio: Asian Top News. See M 1115.
1125 Japan, NHK/Radio: Music Reflections. See M 1125.
1130 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1130 UK, BBC London (AS): The Essential Guide to the 21st Century. See M 0230.

Thursdays

1100 Japan, NHK/Radio: News. See S 1100.
1100 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1115 Japan, NHK/Radio: Asian Top News. See M 1115.
1125 Japan, NHK/Radio: My Japan Diary. Interview and travels around Japan.
1130 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1130 UK, BBC London (AS): The Essential Guide to the 21st Century. See M 0230.

Fridays

1100 Japan, NHK/Radio: News. See S 1100.
1100 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1115 Japan, NHK/Radio: Asian Top News. See M 1115.
1125 Japan, NHK/Radio: Music Beat. The top ten countdown of popular Japanese music.
1130 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1130 UK, BBC London (AS): The Essential Guide to the 21st Century. See M 0230.

Saturdays

1100 Japan, NHK/Radio: News. See S 1100.
1100 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1110 Japan, NHK/Radio: Asia Weekly. A magazine of news from other Asian broadcasters, Asian people in Japan, music, Asia hotline, short story, and music.
1110 Switzerland, Swiss R Intl: Capital Letters (2/4). See S 0112.
1110 Switzerland, Swiss R Intl: Sounds Good (3/5). See S 0112.
1110 Switzerland, Swiss R Intl: The Name Game (1). See S 0112.
1130 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.

Frequencies

1200-1300	Anguilla,Caribbean Beacon	11775am			
1200-1300 vl	Australia, ABC/Alice Spgs	2310do			
1200-1300 vl	Australia, ABC/Katherine	2485do			
1200-1300 vl	Australia, ABC/Tent Creek	2325do			
1200-1300	Australia, Radio	5995as	6020as	9580as	11650as
		21820as			
1200-1300 mtwhf	Bhutan, Bhutan BC Service	5030do			
1200-1300 vl	Botswana, Radio	4820do	4830do	7255do	
1200-1300	Brazil, R Nacional Bras	15445am			
1200-1300	Bulgaria, Radio	15700eu	17500eu		
1200-1215	Cambodia, Natl Radio Of	11940as			
1200-1300 vl	Canada, CBC N Quebec Svc	9625do			
1200-1300	Canada, CFRX Toronto	6070do			
1200-1300	Canada, CFVP Calgary	6030do			
1200-1300	Canada, CHNX Halifax	6130do			
1200-1300	Canada, CKZN St John's	6160do			
1200-1300	Canada, CKZU Vancouver	6160do			
1200-1229	Canada, Radio Canada Intl	6150as	11730as		
1200-1300 mtwhf	Canada, Radio Canada Intl	9640na	13650na	17710na	
1200-1256	China, China Radio Intl	7265pa	9715as	11675pa	11980as
		15415as			
1200-1300	Costa Rica,RF Peace Intl	6975va	25930va		
1200-1300	Ecuador, HCJB	12005am	15115am	21455va	
1200-1300	Eqt Guinea, Radio Africa	15186af			
1200-1300	France, Radio France Intl	11670as	15155eu	15195eu	15540af
1200-1300	Germany, Deutsche Welle	6140eu			
1200-1300	Germany,Overcomer Ministr	5850eu			
1200-1230	Iran, VOIRI	13710as	15255pa	15430me	17565as
		21510as			
1200-1300 as/vl	Italy, IRRS	7120va			
1200-1300	Jordan, Radio	11690eu			
1200-1220 fa	Kazakhstan, R Almaty	9620eu	11840as		
1200-1300	Kenya, Kenya BC Corp	4935do			
1200-1215 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
1200-1300 vl	Lesotho, Radio	4800do			
1200-1300	Malaysia, Radio	7295do			
1200-1300 vl	Malaysia,RTM KotaKinabalu	5980do			
1200-1230	Mongolia, Voice of	12085au			
1200-1300	N Marianas, KFBS Saipan	11650as	15380as		
1200-1300	Netherlands, Radio	6045eu	9855eu		
1200-1300 occsnal	New Zealand, R NZ Intl	6105va			
1200-1300 vl	Nigeria, Radio/Ibadan	6050do			
1200-1300 vl	Nigeria, Radio/Kaduna	4770do			
1200-1256	North Korea, R Pyongyang	3560af	9640va	9850va	9975af
		11335va	13650va		
1200-1300	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
1200-1300 m-a/vl	Papua New Guinea, NBC	4890do			
1200-1300	Sierra Leone, SLBS	5980do			
1200-1300	Singapore,R Singapore Int	6150as	9590as		
1200-1300	Taiwan, Radio Taiwan Intl	7130as	9610au		
1200-1300 as	Tanzania, Radio	5050af			
1200-1300	UK, BBC World Service	5965na	6190af	6195va	9515na
		9580as	9740as	11760me	11940af
		11955as	12095eu	15220am	15280as
		15310as	15485af	15565eu	15575as
		17640eu	17830af	17885af	21470af
1200-1300	Ukraine, R Ukraine Intl	9870na	15520na	21510na	
1200-1300	USA, Armed Forces Network	4278am	6458am	12689am	
1200-1300	USA, KAIJ Dallas TX	5835va			
1200-1300	USA, KTBN Salt Lk City UT	7510na			
1200-1300	USA, KWHR Naalehu HI	9930as	11565as		
1200-1300	USA, Voice of America	6110as	9645as	9760as	9780as
		11705as	11715as	15425as	
1200-1300	USA, WEWN Birmingham AL	5825na	15745eu		
1200-1300	USA, WHRI Noblesville IN	6040na	9495am		
1200-1300	USA, WJCR Upton KY	7490na	13595na		
1200-1300	USA, WRNO New Orleans LA	7395na			
1200-1300	USA, WSHB Cypress Crk SC	6095am	11660ca		
1200-1300	USA, WTJC Newport NC	9370na			
1200-1300	USA, WWCR Nashville TN	5070na	5935na	7435na	12160na
1200-1300	USA, WYFR Okeechobee FL	5950na	7355na	11830na	11970na
1200-1230	Uzbekistan, R Tashkent	5060as	5975as	6025as	9715as
1200-1300	Zambia, Christian Voice	9865do			
1200-1300	Zambia, Natl BC Corp	6165do	6265do		
1200-1300 vl	Zimbabwe, Zimbabwe BC	5975do			
1204-1216 as	UK, BBC World Service	6195na	15220am		
1204-1216 mtwhf	UK,BBC Caribbean Report	6195am	15220am		
1215-1245	Albania, R Tirana Intl	7130eu	9540eu		
1215-1300	Egypt, Radio Cairo	17595as			
1220-1220 w	Kazakhstan, R Almaty	9620eu	11840eu		
1230-1300	Bangladesh, Bangla Betar	7185as	9548as		
1230-1300	Belgium,R Vlaanderen Intl	9925eu			
1230-1257	Czech Rep, R Prague Intl	6055eu	21745au		
1230-1300	Guam, AWR/KSDA	15225as			
1230-1300	Italy, AWR Europe	7230eu			
1230-1300	South Korea, R Korea Intl	9570as	9640om		
1230-1300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1230-1300	Sweden, Radio	18960na	21810am		
1230-1300	Thailand, Radio	9655as	9810as	11905as	
1230-1257	Vietnam, Voice of	9840as	12020as		
1240-1300 t	Kazakhstan, R Almaty	9620eu	11840eu		

Selected Programs

Sundays

1200 China, China Radio Intl: News. See S 0100.
1211 China, China Radio Intl: Cultural Information. A look at happening in and around Beijing.
1219 China, China Radio Intl: People In the Know. Li Ling interviews personalities both home and abroad.
1240 China, China Radio Intl: On the Road. Travel to the more remote destinations in and around China with Ian Provan.
1245 China, China Radio Intl: Listeners' Letterbox. Listener letters and information about China.

Mondays

1200 China China Radio Intl: News. See S 0100.
1217 China China Radio Intl: Current Affairs. An in-depth look at events and happenings in China.
1228 China China Radio Intl: Press Clippings. Yao Yongmei presents items from the Chinese press.
1234 China, China Radio Intl: Macao Insights. A report on the return of this Portugese island to China.
1240 China, China Radio Intl: Wuxi Journal. Technological advances such as Internet development.
1245 China, China Radio Intl: Idioms and Their Stories. A regular feature for students studying Chinese.

Tuesdays

1200 China, China Radio Intl: News. See S 0100.
1217 China, China Radio Intl: Current Affairs. See M 1217.
1228 China, China Radio Intl: Press Clippings. See M 1228.
1232 China, China Radio Intl: Changzhou Reports. A look at this industrial city in East China's Jiangsu Province and the people who live and work there.
1237 China, China Radio Intl: Orient Arena. Focus on sporting events and Chinese sports personalities.
1245 China, China Radio Intl: Opera House. Denise explores the world of traditional Chinese theater.

Wednesdays

1200 China, China Radio Intl: News. See S 0100.
1217 China, China Radio Intl: Current Affairs. See M 1217.
1234 China, China Radio Intl: Press Clippings. See M 1228.
1235 China, China Radio Intl: Voices from Other Lands. A cultural program about the world and its people hosted by Tian Wei.
1245 China, China Radio Intl: Learn to Speak Chinese. Chinese language lessons for English speakers.

Thursdays

1200 China, China Radio Intl: News. See S 0100.
1217 China, China Radio Intl: Current Affairs See M 1217.
1234 China, China Radio Intl: Press Clippings. See M 1228.
1238 China, China Radio Intl: Focus. Zhao Jianfu looks at an issue of significance to China's development.
1245 China, China Radio Intl: Cultural Spectaum. The rich cultural heritage of China in literature, music and art.

Fridays

1200 China, China Radio Intl: News. See S 0100.
1217 China, China Radio Intl: Current Affairs. See M 1217.
1230 China, China Radio Intl: Press Clippings. See M 1228.
1236 China, China Radio Intl: Life In China. Li Ningjing with a focus on an aspect of everyday living.
1244 China, China Radio Intl: Global Review. News about developing nations.

Saturdays

1200 China, China Radio Intl: News. See S 0100.
1217 China, China Radio Intl: Report on Developing Countries. See S 0117.
1229 China, China Radio Intl: China Scrapbook. See S 0129.
1235 China, China Radio Intl: Music from China. See S 0135.

MT is one of my favorites. If every publisher put the kind of care and effort into their work as you all do, I'd be buying a lot more magazines. Every issue is packed with info!

-Michael Lijewski

Frequencies

1300-1400	Anguilla,Caribbean Beacon	11775am			
1300-1400 vl	Australia, ABC/Alice Spgs	2310do			
1300-1400 vl	Australia, ABC/Katherine	2485do			
1300-1400 vl	Australia, ABC/Tent Creek	2325do			
1300-1400	Australia, Radio	5995as	6020as	9445as	9580as
		11650as	11660as	21820as	
1300-1400 vl	Botswana, Radio	4820do	4830do	7255do	
1300-1320	Brazil, R Nacional Bras	15445am			
1300-1400 vl	Canada, CBC N Quebec Svc	9625do			
1300-1400	Canada, CFRX Toronto	6070do			
1300-1400	Canada, CFVP Calgary	6030do			
1300-1400	Canada, CHNX Halifax	6130do			
1300-1400	Canada, CKZN St John's	6160do			
1300-1400	Canada, CKZU Vancouver	6160do			
1300-1330	Canada, Radio Canada Intl	9640na	13650na	17710na	
1300-1356	China, China Radio Intl	7405as	9570na	11675pa	11900pa
		11980as	15180as		
1300-1400	Costa Rica,RF Peace Intl	25930va			
1300-1400	Ecuador, HCJB	12005am	15115am	21455va	
1300-1330	Egypt, Radio Cairo	17595as			
1300-1400	Eqt Guinea, Radio Africa	15186af			
1300-1329	Germany, Deutsche Welle	6140eu			
1300-1330 s	Germany, Universal Life	9955na			
1300-1400 a	Germany,Good News World R	15330as			
1300-1400	Germany,Overcomer Ministr	5850eu			
1300-1400	Ghana, Ghana BC Corp	4915do	6130do		
1300-1400	Jordan, Radio	11690eu			
1300-1400	Kenya, Kenya BC Corp	4935do			
1300-1400	Lebanon, Voice of Hope	6280me	11530va		
1300-1400	Lebanon, Voice of Hope	6280me	11530va		
1300-1400 vl	Lesotho, Radio	4800do			
1300-1310	Liberia,LCN/R Liberia Int	5100do			
1300-1400	Malaysia, Radio	7295do			
1300-1400 vl	Malaysia,RTM KotaKinabalu	5980do			
1300-1325	Moldova, R Moldova Intl	11580na			
1300-1400	N Marianas, KFBS Saipan	9670as	11650as		
1300-1400	N Marianas, KHBI Saipan	11550as			
1300-1325	Netherlands, Radio	6045eu	9855eu		
1300-1400 occasnal	New Zealand, R NZ Intl	6105va			
1300-1400 vl	Nigeria, Radio/Ibadan	6050do			
1300-1400 vl	Nigeria, Radio/Kaduna	4770do			
1300-1400	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1300-1400 vl	Papua New Guinea, NBC	4890do			
1300-1400	Philippines, FEBC R Intl	11995as			
1300-1355	Poland, Radio Polonia	6095eu	7270eu	9525eu	11820eu
1300-1356	Romania, R Romania Intl	11940eu	15335na	15390eu	17805na
1300-1400 as	S Africa, Channel Africa	11720af	17780af	21530af	
1300-1400	Sierra Leone, SLBS	5980do			
1300-1400	Singapore,R Singapore Int	6150as	9590as		
1300-1400	South Korea, R Korea Intl	9570as	9640om	13670as	
1300-1400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1300-1330	Switzerland, Swiss R Intl	9535eu			
1300-1400 as	Tanzania, Radio	5050af			
1300-1400	Uganda, Radio	4976do			
1300-1400	UK, BBC World Service	5965na	5990as	6190af	6195va
		9515na	9590na	9740as	11760me
		11940af	12095eu	15220am	15310as
		15420af	15485eu	15565eu	15575as
		17640eu	17705as	17830af	17885af
		21470af			
1300-1400 f	UK, Merlin Network One	9750eu	12035eu	15235eu	
1300-1400	USA, Armed Forces Network	4278am	6458am	12689am	
1300-1400	USA, KAIJ Dallas TX	5835va			
1300-1400	USA, KJES Vado NM	11715na			
1300-1400	USA, KNLS Anchor Point AK	7365as			
1300-1400	USA, KTBN Salt Lk City UT	7510na			
1300-1400	USA, KWHR Naalehu HI	9930as	11565as		
1300-1400	USA, Voice of America	6110as	9355as	9645as	9760as
		11705as	11715as	15425as	
1300-1400	USA, WEWN Birmingham AL	11875na	15745eu		
1300-1400	USA, WGTG McCaysville GA	9400va	12170am		
1300-1400	USA, WHRI Noblesville IN	6040na	15105am		
1300-1400	USA, WJCR Upton KY	7490na	13595na		
1300-1315 smtwhf	USA, WRMI/R Miami Intl	9955am			
1300-1400	USA, WRNO New Orleans LA	7395na			
1300-1400	USA, WSHB Cypress Crk SC	9430na	9455ca		
1300-1400	USA, WTJC Newport NC	9370na			
1300-1400	USA, WWCR Nashville TN	5070na	5935na	7435na	15685na
1300-1400	USA, WYFR Okeechobee FL	11550as	11740na	11830na	11970na
		13695na			
1300-1400	Zambia, Christian Voice	9865do			
1300-1400	Zambia, Natl BC Corp	6165do	6265do		
1300-1400 vl	Zimbabwe, Zimbabwe BC	5975do			
1305-1310	Croatia, Croatian Radio	6165eu	7185eu	7365eu	9830eu
1315-1400	Germany, Voice of Hope	15715as			
1315-1400 s	USA, WRMI/R Miami Intl	9955am			
1325-1340 f	Greece, Voice of	15630as			
1330-1400	Austria, R Austria Intl	6155eu	13730am	21650am	21765am
1330-1400	Canada, Radio Canada Intl	6150as	9535as	9640na	13650na
		17710na			
1330-1400	Guam, AWR/KSDA	11755as	15225as		
1330-1400	India, All India Radio	9545as	11620as	13710as	
1330-1400	Serbia, Radio Yugoslavia	11835au			
1330-1400	Sweden, Radio	9425as	17870as		
1330-1400	Turkey, Voice of	15295as	17815eu		
1330-1400	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1330-1400	Uzbekistan, R Tashkent	5060as	5975as	6025as	9715as
		11905as	15295as	17775as	
1330-1357	Vietnam, Voice of	7145eu	9730eu		
1345-1400	Vatican City, Vatican R	15510au	17515au		

Selected Programs

Sundays

1300 China, China Radio Intl: News. See S 0100.
1300 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1311 China, China Radio Intl: Cultural Information. See S 1211.
1319 China, China Radio Intl: People in the Know. See S 1219.
1340 China, China Radio Intl: On the Road. See S 1240.
1345 China, China Radio Intl: Listeners' Letterbox. See S 1245.

Mondays

1300 China, China Radio Intl: News. See S 0100.
1300 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1317 China, China Radio Intl: Current Affairs. See M 1217.
1328 China, China Radio Intl: Press Clippings. See M 1228.
1334 China, China Radio Intl: Macao Insights. See M 1234.
1340 China, China Radio Intl: Wuxi Journal. See M 1240.
1345 China, China Radio Intl: Idioms and Their Stories. See M 1245.

Tuesdays

1300 China, China Radio Intl: News. See S 0100.
1300 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1317 China, China Radio Intl: Current Affairs. See M 1217.
1328 China, China Radio Intl: Press Clippings. See M 1228.
1332 China, China Radio Intl: Changzhou Reports. See T 1232.
1337 China, China Radio Intl: Orient Arena. See T 1237.
1345 China, China Radio Intl: Opera House. See T 1245.

Wednesdays

1300 China, China Radio Intl: News. See S 0100.
1300 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1317 China, China Radio Intl: Current Affairs. See M 1217.
1334 China, China Radio Intl: Press Clippings. See M 1228.
1335 China, China Radio Intl: Voices from Other Lands. See W 1235.
1345 China, China Radio Intl: Learn to Speak Chinese. See W 1245.

Thursdays

1300 China, China Radio Intl: News. See S 0100.
1300 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1317 China, China Radio Intl: Current Affairs. See M 1217.
1334 China, China Radio Intl: Press Clippings. See M 1228.
1338 China, China Radio Intl: Focus. See H 1238.
1345 China, China Radio Intl: Cultural Spectrum. See H 1245.

Fridays

1300 China, China Radio Intl: News. See S 0100.
1300 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1317 China, China Radio Intl: Current Affairs. See M 1217.
1330 China, China Radio Intl: Press Clippings. See M 1228.
1336 China, China Radio Intl: Life in China. See F 1236.
1344 China, China Radio Intl: Global Review. See F 1244.

Saturdays

1300 China, China Radio Intl: News. See S 0100.
1300 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1315 Switzerland, Swiss R Intl: Capital Letters (2/4). See S 0112.
1315 Switzerland, Swiss R Intl: Sounds Good (3/5). See S 0112.
1315 Switzerland, Swiss R Intl: The Name Game (1). See S 0112.
1317 China, China Radio Intl: Report on Developing Countries. See S 0117.
1329 China, China Radio Intl: China Scrapbook. See S 0129.
1335 China, China Radio Intl: Music from China. See S 0135.

Frequencies

1400-1500	Anguilla,Caribbean Beacon	11775am			
1400-1500 vl	Australia, ABC/Alice Spgs	2310do			
1400-1500 vl	Australia, ABC/Katherine	2485do			
1400-1500 vl	Australia, ABC/Tent Creek	2325do			
1400-1500	Australia, Radio	5995as	6180as	9445as	9550as
		9580as	11650as	11660as	
1400-1500 vl	Botswana, Radio	4820do	4830do	7255do	
1400-1500 vl	Canada, CBC N Quebec Svc	9625do			
1400-1500	Canada, CFRX Toronto	6070do			
1400-1500	Canada, CFVP Calgary	6030do			
1400-1500	Canada, CHNX Halifax	6130do			
1400-1500	Canada, CKZN St John's	6160do			
1400-1500	Canada, CKZU Vancouver	6160do			
1400-1500 smtwhf	Canada, Radio Canada Intl	9640na	17710na		
1400-1430 mtwhf	Canada, Radio Canada Intl	13650na			
1400-1456	China, China Radio Intl	7405as	9700as	11675as	11825as
		13685af	15110as	15125af	15360af
1400-1500	Costa Rica,RF Peace Intl	25930va			
1400-1429	Czech Rep, R Prague Intl	21745va			
1400-1500	Ecuador, HCJB	12005am	15115am	21455va	
1400-1500	Eqt Guinea, Radio Africa	15186af			
1400-1500	France, Radio France Intl	11610as	17560va	17620as	
1400-1500	Germany, RTE Radio	15625eu			
1400-1430 s	Germany, Universal Life	9710eu			
1400-1500	Germany, Voice of Hope	15715as			
1400-1500	Germany,Overcomer Ministr	5850eu	13810eu		
1400-1500	Ghana, Ghana BC Corp	4915do	6130do		
1400-1500	India, All India Radio	9545as	11620as	13710as	
1400-1500	Japan, Radio/NHK	9505na	11730as	11880me	
1400-1500	Jordan, Radio	11690eu			
1400-1500	Kenya, Kenya BC Corp	4935do			
1400-1500	Lebanon, Voice of Hope	6280me	11530va		
1400-1500 vl	Lesotho, Radio	4800do			
1400-1500	Malaysia, Radio	7295do			
1400-1500	Malaysia, RTM Sarawak	7160do			
1400-1500 vl	Malaysia,RTM KotaKinabalu	5980do			
1400-1500	N Marianas, KFBS Saipan	9465as	9495as	9670as	
1400-1500 occsnal	New Zealand, R NZ Intl	6105va			
1400-1500 vl	Nigeria, Radio/Ibadan	6050do			
1400-1500 vl	Nigeria, Radio/Kaduna	4770do			
1400-1500	Oman, Radio Sultanate of	15140eu			
1400-1415	Pakistan, Radio	11570me	15170me	15465me	
1400-1500	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1400-1500 vl	Papua New Guinea, NBC	4890do			
1400-1500	Philippines, FEBC R Intl	11995as			
1400-1455 as	S Africa, Channel Africa	11720af	17780af	21530af	
1400-1500	Sierra Leone, SLBS	5980do			
1400-1500	Singapore,RCorp Singapore	6150do			
1400-1500	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1400-1500	Switzerland, Swiss R Intl	12010as	15185as		
1400-1500 as	Tanzania, Radio	5050af			
1400-1430	Thailand, Radio	9530as	9655as	11905as	
1400-1430	Turkey, Voice of	15295as	17815eu		
1400-1500	Uganda, Radio	4976do			
1400-1500	UK, BBC World Service	5990as	6190af	6195as	9515na
		9590na	9740as	11940af	12095eu
		15220na	15310as	15485eu	15565eu
		15575as	17630as	17640eu	17830af
		17840am	21470af	21660af	
1400-1500 a	UK, Merlin Network One	9605eu	13640eu	15510eu	
1400-1500	USA, Armed Forces Network	4278am	6458am	12689am	
1400-1500	USA, KAIJ Dallas TX	13815va			
1400-1500	USA, KJES Vado NM	11715na			
1400-1500	USA, KTBN Salt Lk City UT	7510na			
1400-1500	USA, KWHR Naalehu HI	9930as	11565as		
1400-1500	USA, Voice of America	6110as	7125as	7215as	9645as
		9760as	11705as	15205as	15395as
		15425as			
1400-1500	USA, WEWN Birmingham AL	11875na	15745eu		
1400-1500	USA, WGTG McCaysville GA	9400va	12170am		
1400-1500	USA, WHRI Noblesville IN	6040na	15105am		
1400-1500	USA, WJCR Upton KY	7490na	13595na		
1400-1500 irreg	USA, WMLK Bethel PA	9465am			
1400-1500 s	USA, WRMI/R Miami Intl	9955am			
1400-1500	USA, WRNO New Orleans LA	7395na			
1400-1500	USA, WTJC Newport NC	9370na			
1400-1500	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1400-1500	USA, WYFR Okeechobee FL	11550as	11740na	11830na	17760na
1400-1405	Vatican City, Vatican R	15500au	17515au		
1400-1500	Zambia, Christian Voice	9865do			
1400-1500	Zambia, Natl BC Corp	6165do	6265do		
1400-1500 vl	Zimbabwe, Zimbabwe BC	5975do			
1410-1420 as	Greece, Voice of	9425eu	15630eu		
1415-1420	Nepal, Radio	3230as	5005as		
1430-1500	Canada, Radio Canada Intl	11980va	17820af		
1430-1500 mtwhf	Canada, Radio Canada Intl	9640na	13650na	17710na	
1430-1500 s	Canada, Radio Canada Intl	13655na			
1430-1440 mtwhf	Greece, Voice of	9425eu	15630am		
1430-1500	Guam, AWR/KSDA	9835as			
1430-1500	Guam, TWR/KTWR	15330as			
1430-1500	Myanmar, Radio	5985do			
1430-1500	Netherlands, Radio	12070as	12090as	15590as	
1430-1500	S Africa, RTE Radio	21745af			
1430-1500	Sweden, Radio	13800va	18960na	21810am	

Selected Programs

Sundays

1400 China, China Radio Intl: News. See S 0100.
1400 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1411 China, China Radio Intl: Cultural Information. See S 1211.
1412 Switzerland, Swiss R Intl: Swiss Scene. See S 0104.
1419 China, China Radio Intl: People In the Know. See S 1219.
1430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1440 China, China Radio Intl: On the Road. See S 1240.
1445 China, China Radio Intl: Listeners' Letterbox. See S 1245

Mondays

1400 China, China Radio Intl: News. See S 0100.
1400 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1417 China, China Radio Intl: Current Affairs. See M 1217.
1428 China, China Radio Intl: Press Clippings. See M 1228.
1430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1434 China, China Radio Intl: Macao Insights. See M 1234.
1440 China, China Radio Intl: Wuxi Journal. See M 1240.
1445 China, China Radio Intl: Idioms and Their Stories. See W 1245.

Tuesdays

1400 China, China Radio Intl: News. See S 0100.
1400 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100
1417 China, China Radio Intl: Current Affairs. See M 1217.
1428 China, China Radio Intl: Press Clippings. See M 1228.
1430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1432 China, China Radio Intl: Changzhou Reports. See T 1232.
1437 China, China Radio Intl: Orient Arena. See T 1237.
1445 China, China Radio Intl: Opera House. See T 1245.

Wednesdays

1400 China, China Radio Intl: News. See S 0100.
1400 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1417 China, China Radio Intl: Current Affairs. See M 1217.
1430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1434 China, China Radio Intl: Press Clippings. See M 1228.
1435 China, China Radio Intl: Voices from Other Lands. See W 1235.
1445 China, China Radio Intl: Learn to Speak Chinese. See W 1245.

Thursdays

1400 China, China Radio Intl: News. See S 0100.
1400 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1417 China, China Radio Intl: Current Affairs. See M 1217.
1430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1434 China, China Radio Intl: Press Clippings. See M 1228.
1438 China, China Radio Intl: Focus. See H 1236.
1445 China, China Radio Intl: Cultural Spectrum. See H 1245.

Fridays

1400 China, China Radio Intl: News. See S 0100.
1400 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1417 China, China Radio Intl: Current Affairs. See M 1217.
1430 China, China Radio Intl: Press Clippings. See M 1228.
1430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1436 China, China Radio Intl: Life in China. See F 1236.
1444 China, China Radio Intl: Global Review. See F 1244.

Saturdays

1400 China, China Radio Intl: News. See S 0100.
1400 Switzerland, Swiss R Intl: World Radio Switzerland. See S 0100.
1415 Switzerland, Swiss R Intl: Capital Letters (2/4). See S 0112.
1415 Switzerland, Swiss R Intl: Sounds Good (3/5). See S 0112.
1415 Switzerland, Swiss R Intl: The Name Game (1). See S 0112.
1417 China, China Radio Intl: Report on Developing Countries. See S 0117.
1429 China, China Radio Intl: China Scrapbook. See S 0129.
1430 Switzerland, Swiss R Intl: Rendezvous with Switzerland. See S 0430.
1435 China, China Radio Intl: Music from China. See S 0135.

Frequencies

1500-1600	Anguilla,Caribbean Beacon	11775am			
1500-1600 vl	Australia, ABC/Alice Spgs	2310do			
1500-1600 vl	Australia, ABC/Katherine	2485do			
1500-1600 vl	Australia, ABC/Tent Creek	2325do			
1500-1600	Australia, Radio	5995as	6180as	9580as	11650as
		11660as			
1500-1600 vl	Botswana, Radio	4820do	4830do	7255do	
1500-1600 vl	Canada, CBC N Quebec Svc	9625do			
1500-1600	Canada, CFRX Toronto	6070do			
1500-1600	Canada, CFVP Calgary	6030do			
1500-1600	Canada, CHNX Halifax	6130do			
1500-1600	Canada, CKZN St John's	6160do			
1500-1600	Canada, CKZU Vancouver	6160do			
1500-1600	Canada, Radio Canada Intl	6185as			
1500-1600 s	Canada, Radio Canada Intl	9640na	13655na	17710na	
1500-1556	China, China Radio Intl	7160as	7405as	9785as	13685af
		15125af			
1500-1600	Costa Rica,RF Peace Intl	25930va			
1500-1600	Ecuador, HCJB	12005am	15115am	21455va	
1500-1600	Eqt Guinea, Radio Africa	15186af			
1500-1600	Germany, Voice of Hope	15715as			
1500-1600	Germany,Overcomer Ministr	5850eu	13810eu		
1500-1600	Guam, TWR/KTWR	15330as			
1500-1530	Israel, Kol Israel	15650va	17535va		
1500-1600	Japan, Radio/NHK	7200as	9505na	9750as	11730as
1500-1600	Jordan, Radio	11690eu			
1500-1600	Kenya, Kenya BC Corp	4935do			
1500-1600	Lebanon, Voice of Hope	6280me	11530va		
1500-1600 vl	Lesotho, Radio	4800do			
1500-1510	Liberia,LCN/R Liberia Int	5100do			
1500-1600	Malaysia, Radio	7295do			
1500-1600	Malaysia, RTM Sarawak	7160do			
1500-1600 vl	Malaysia,RTM KotaKinabalu	5980do			
1500-1530	Mexico, Radio Mexico Intl	9705am			
1500-1600	N Marianas, KFBS Saipan	9465as	9495as	9670as	
1500-1600	Netherlands, Radio	12070as	12090as	15590as	
1500-1600 occsnal	New Zealand, R NZ Intl	6145va			
1500-1600 vl	Nigeria, Radio/Ibadan	6050do			
1500-1600 vl	Nigeria, Radio/Kaduna	4770do			
1500-1600 vl	Nigeria, Voice of	7255af	15120va		
1500-1556	North Korea, R Pyongyang	4405va	6574na	9335na	11710na
		13760na			
1500-1600	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1500-1600 vl	Papua New Guinea, NBC	4890do			
1500-1600	Russia,Voice of Russia WS	9800as	9875as	11500as	11695as
1500-1530	S Africa, Channel Africa	17770af			
1500-1600	Seychelles, FEBA Radio	11600as			
1500-1600	Sierra Leone, SLBS	5980do			
1500-1600	Singapore,RCorp Singapore	6150do			
1500-1600	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1500-1600 as	Tanzania, Radio	5050af			
1500-1600	Uganda, Radio	4976do			
1500-1600	UK, BBC World Service	5975as	5990as	6190af	6195as
		9410eu	9515na	9590na	9740as
		11860af	12095eu	15220na	15310as
		15400af	15420af	15485eu	15565eu
		17630as	17830af	17840am	21470af
		21490af	21860af		
1500-1600 a	UK, Merlin Network One	9605eu	13640eu	15510eu	
1500-1600	USA, Armed Forces Network	4278am	6458am	12689am	
1500-1600	USA, KAIJ Dallas TX	13815na			
1500-1600	USA, KJES Vado NM	11715na			
1500-1600	USA, KTBN Salt Lk City UT	7510na			
1500-1600	USA, KWHR Naalehu HI	9930as			
1500-1600	USA Voice of America	7125as	7215as	9575as	9645as
		15205as	15395as		
1500-1600	USA, WEWN Birmingham AL	11875na	15745eu		
1500-1600	USA, WGTG McCaysville GA	9400va	12170am		
1500-1600	USA, WHRI Noblesville IN	6040sa	15105na		
1500-1600	USA, WJCR Upton KY	7490na	13595na		
1500-1600 irreg	USA, WMLK Bethel PA	9465am			
1500-1600	USA WRNO New Orleans LA	7395na			
1500-1600	USA, WTJC Newport NC	9370na			
1500-1600	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1500-1600	USA, WYFR Okeechobee FL	11830na	17760na		
1500-1600	Zambia, Christian Voice	9865do			
1500-1600	Zambia, Natl BC Corp	6165do	6265do		
1500-1600 vl	Zimbabwe, Zimbabwe BC	5975do			
1530-1540	Bangladesh, Bangla Betar	4880as	15520as		
1530-1600	Iran, VOIRI	7250as	11680as	13605as	15150as
1530-1600	Mongolia, Voice of	9720as	12085as		
1530-1600	Tanzania, Radio	5050af			
1545-1600 sh	Bangladesh, Bangla Betar	4880as	15520as		
1550-1600	Vatican City, Vatican R	9865au	13765au	15500au	

Selected Programs

Daily

1500 China, China Radio Intl: News. See S 0100.
1500 Russia, Voice of: News. See S 0200.
1530 Russia, Voice of: News in Brief. See S 0230.

Monday-Friday

1500 Radio Mexico Intl: Antenna Radio Summary. A 15-minute magazine of news, finance, and culture.
1511 Russia, Voice of: News and Views. See S 0411.
1517 China, China Radio Intl: Current Affairs. See M 1217.

Sundays

1500 Radio Mexico Intl: Regional Roots and Rhythms. The history and music of Mexico.
1511 China, China Radio Intl: Cultural Information. See S 1211.
1511 Russia, Voice of: Sunday Panorama. A magazine program focusing on life and times in Russia.
1515 Russia, Voice of: Russia in Personalities. Focus on the story of a famous Russian.
1519 China, China Radio Intl: People in the Know. See S 1219.
1532 Russia, Voice of: Kaleidoscope. A variety of topics ranging from science and ecology to cultural matters.
1540 China, China Radio Intl: On the Road. See S 1240.
1545 China, China Radio Intl: Listeners' Letterbox. See S 1245.

Mondays

1528 China, China Radio Intl: Press Clippings. See M 1228.
1530 Russia, Voice of: News in Brief. See S 0230.
1532 Russia, Voice of: Folk Box. One of the top ten entertainment programs (Passport to World Band Radio).
1534 China, China Radio Intl: Macao Insights. See M 1234.
1540 China, China Radio Intl: Wuxi Journal. See M 1240.
1545 China, China Radio Intl: Idioms and Their Stories. See M 1245.

Tuesdays

11528 China, China Radio Intl: Press Clippings. See M 1228.
1532 China, China Radio Intl: Changzhou Reports. See T 1232.
1532 Russia, Voice of: Yours for the Asking. See T 0532.
1537 China, China Radio Intl: Orient Arena. See T 1237.
1545 China, China Radio Intl: Opera House. See T 1245.
1545 Russia, Voice of: Music at Your Request. Carl Watts presents music as requested by listeners.

Wednesdays

1532 Russia, Voice of: The Jazz Show. See M 0532.
1534 China, China Radio Intl: Press Clippings. See M 1228.
1535 China, China Radio Intl: Voices from Other Lands. See W 1235.
1545 China, China Radio Intl: Learn to Speak Chinese. See W 1245.

Thursdays

1532 Russia, Voice of: Yours for the Asking. See T 0532.
1534 China, China Radio Intl: Press Clippings. See M 1228.
1538 China, China Radio Intl: Focus. See H 1238.
1545 China, China Radio Intl: Cultural Spectrum. See H 1245.
1545 Russia, Voice of: Music at Your Request. See T 1545.

Fridays

1530 China, China Radio Intl: Press Clippings. See M 1228.
1532 Russia, Voice of: Moscow Yesterday and Today. See S 0232.
1536 China, China Radio Intl: Life in China. See F 1236.
1544 China, China Radio Intl: Global Review. See F 1244.

Saturdays

1500 Radio Mexico Intl: Mirror of Mexico. See S 2300.
1511 Russia, Voice of: News and Views. See S 0411.
1517 China, China Radio Intl: Report on Developing Countries. See S 0117.
1529 China, China Radio Intl: China Scrapbook. See S 0129.
1532 Russia, Voice of: Timelines. See M 0232.
1535 China, China Radio Intl: Music from China. See S 0135.

I should write every month to say how pleased I still am with every issue of Monitoring Times since the early 1980s, but what happens is that I drop the magazine and pick up a Sony or a Kenwood to look for new things. Thanks for a fascinating magazine — the only one in our mail deliveries that gets read instantly, every time.

-Robert Compton

Frequencies

1600-1700	Algeria, R Algiers Intl	11715af	15160me		
1600-1700	Anguilla,Caribbean Beacon	11775am			
1600-1700 vl	Australia, ABC/Alice Spgs	2310do			
1600-1700 vl	Australia, ABC/Katherine	2485do			
1600-1700 vl	Australia, ABC/Tent Creek	2325do			
1600-1700	Australia, Radio	5995as	6180as	9500as	9580as
		11650as	11660as		
1600-1630	Austria, R Austria Intl	17865na			
1600-1700 vl	Botswana, Radio	4820do	4830do	7255do	
1600-1700 vl	Canada, CBC N Quebec Svc	9625do			
1600-1700	Canada, CFRX Toronto	6070do			
1600-1700	Canada, CFVP Calgary	6030do			
1600-1700	Canada, CHNX Halifax	6130do			
1600-1700	Canada, CKZN St John's	6160do			
1600-1700	Canada, CKZU Vancouver	6160do			
1600-1659 s	Canada, Radio Canada Intl	9640na	13655na	17710na	
1600-1656	China, China Radio Intl	9565af	9870af		
1600-1700	Costa Rica,RF Peace Intl	25930va			
1600-1630	Ecuador, HCJB	12005am	15115am	21455va	
1600-1700	Eqt Guinea, Radio Africa	15186af			
1600-1700	Ethiopia, Radio	7165af	9560af		
1600-1700	France, Radio France Intl	11615af	11995af	12015af	15210af
		17850af			
1600-1645	Germany, Deutsche Welle	6140eu	6170as	7225as	9735af
	11785as	15145af	15380as	17800af	17810as
1600-1630 s	Germany, Universal Life	15105af			
1600-1630	Germany, Voice of Hope	15715as			
1600-1700 a	Germany,Good News World R	15105af			
1600-1700	Germany,Overcomer Ministr	6010eu	13810me		
1600-1700	Guam, AWR/KSDA	9355as			
1600-1630 as	Guam, TWR/KTWR	15330as			
1600-1630	Iran, VOIRI	7250as	11680as	13605as	15150as
1600-1700	Jordan, Radio	11690eu			
1600-1700	Kenya, Kenya BC Corp	4935do			
1600-1700	Lebanon, Voice of Hope	6280me	11530va		
1600-1700 vl	Lesotho, Radio	4800do			
1600-1700	Malaysia, Radio	7295do			
1600-1630	Mexico, Radio Mexico Intl	9705am			
1600-1700	N Marianas, KFBS Saipan	9465as	9495as		
1600-1625	Netherlands, Radio	12070as	12090as	15590as	
1600-1650 occsnal	New Zealand, R NZ Intl	6145va			
1600-1700 vl	Nigeria, Radio/Ibadan	6050do			
1600-1700 vl	Nigeria, Radio/Kaduna	4770do			
1600-1700	Nigeria, Voice of	7255af	15120va		
1600-1656	North Korea, R Pyongyang	3560va	6540va	9600va	9975va
1600-1630	Pakistan, Radio	7230do	11570me	15320af	15465me
		17510me	17720af		
1600-1700	Palau, KHBN/Voice of Hope	9955as	9965as		
1600-1700 vl	Papua New Guinea, NBC	4890do			
1600-1700	Russia,Voice of Russia WS	4940me	4965me	7305as	12055me
1600-1630	S Africa, Channel Africa	9525af			
1600-1700	Sierra Leone, SLBS	5980do			
1600-1700	South Korea, R Korea Intl	5975om	9515af	9870af	
1600-1700	Swaziland, Trans World R	9500af			
1600-1615	Switzerland, Swiss R Intl	12010as	15185as		
1600-1700	Tanzania, Radio	5050af			
1600-1640	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1600-1700	Uganda, Radio	4976do			
1600-1700	UK, BBC World Service	3195as	5975as	5990as	6190af
	6195as	7160as	9410eu	9515na	9740as
	11940af	12095eu	15310as	15400af	15565eu
	17630as	17830af	17840am	21470af	21660af
1600-1700 a	UK, Merlin Network One	3965eu	13640eu		
1600-1700	UK, Merlin Network One	9655eu			
1600-1700	UK, Merlin Network One	9655eu			
1600-1700	USA, Armed Forces Network	4278am	6458am	12689am	
1600-1700	USA, KAIJ Dallas TX	13815va			
1600-1700	USA, KJES Vado NM	11715na			
1600-1700	USA, KTBN Salt Lk City UT	15590na			
1600-1700	USA, KWHR Naalehu HI	9930as			
1600-1700	USA, Voice of America	6035af	6110as	7125as	7215as
	9575as	9645as	9760as	11920af	12040af
	13710af	15205as	15225af	15240af	15395as
1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600-1700	USA, WGTG McCaysville GA	9400va	12170am		
1600-1700	USA, WHRA Greenbush ME	17650af			
1600-1700	USA, WHRI Noblesville IN	13760na	15105sa		
1600-1700	USA, WJCR Upton KY	7490na	13595na		
1600-1700	USA, WRNO New Orleans LA	7395na	15420va		
1600-1700	USA, WSHB Cypress Crk SC	18915af			
1600-1700	USA, WTJC Newport NC	9370na			
1600-1700	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1600-1700	USA, WYFR Okeechobee FL	11830na	15215na	15695eu	17510eu
		17760na	21525af		
1600-1610	Vatican City, Vatican R	9865au	13765au	15500au	
1600-1700	Zambia, Christian Voice	4965do			
1600-1700	Zambia, Natl BC Corp	6165do	6265do		
1600-1630 vl	Zimbabwe, Zimbabwe BC	5975do			
1605-1615 mtwhf	UK, BBC World Service	5990as			
1615-1630 a	UK, BBC World Service	11860af			
1630-1659 s	Canada, Radio Canada Intl	9640na	13655na	17710na	
1630-1645	Egypt, Radio Cairo	11875af	15255af		
1630-1700	Georgia, Georgian Radio	6180me			
1630-1700 s	Seychelles, FEBA Radio	11605as			
1630-1645 a	UK, BBC World Service	9515na	11860af		
1630-1657	Vietnam, Voice of	7145eu	9730eu		
1630-1700 vl	Zimbabwe, Zimbabwe BC	4828do			
1645-1700	Egypt, Radio Cairo	15255af			
1645-1700	Germany, Deutsche Welle	6140eu			
1645-1700 a	UK, BBC World Service	9515na			
1645-1700 smwfa	UK, BBC World Service	11860af			
1650-1700 mtwhf	New Zealand, R NZ Intl	11675va			

Selected Programs

Daily

1600 China, China Radio Intl: News. See S 0100.
1600 Russia, Voice of: News. See S 0200.
1630 Russia, Voice of: News In Brief. See S 0230.

Monday-Friday

1611 Russia, Voice of: Focus on Asia and the Pacific. News and comments on events in the region.
1617 China, China Radio Intl: Current Affairs. See M 1217.

Sundays

1600 Radio Mexico Intl: Mail Box. A typical mailbag program in which letters from English-speaking listeners are discussed on the air.
1611 China, China Radio Intl: Cultural Information. See S 1211.
1611 Russia, Voice of: Program Preview. See S 0511.
1619 China, China Radio Intl: People in the Know. See S 1219.
1632 Russia, Voice of: Russian by Radio. A course in the Russian language.
1640 China, China Radio Intl: On the Road. See S 1240.
1645 China, China Radio Intl: Listeners' Letterbox. See S 1245.

Mondays

1600 Radio Mexico Intl: Mirror of Mexico. See S 2300
1628 China, China Radio Intl: Press Clippings. See M 1228.
1632 Russia, Voice of: This is Russia. See M 0332.
1634 China, China Radio Intl: Macao Insights. See M 1234.
1640 China, China Radio Intl: Wuxi Journal. See M 1240.
1645 China, China Radio Intl: Idioms and Their Stories. See M 1245.

Tuesdays

1600 Radio Mexico Intl: Eternally Mexico. See S 0000.
1628 China, China Radio Intl: Press Clippings. See M 1228.
1632 China, China Radio Intl: Changzhou Reports. See T 1232.
1632 Russia, Voice of: Moscow Yesterday and Today. See S 0232.
1637 China, China Radio Intl: Orient Arena. See T 1237.
1645 China, China Radio Intl: Opera House. See T 1245.

Wednesdays

1600 Radio Mexico Intl: Mail Box. See S 1600.
1615 UK, BBC London (AS): Joe Strummer's London Calling (2nd,9th,13th). See H 0230.
1632 Russia, Voice of: Audio Book Club. See S 0632.
1634 China, China Radio Intl: Press Clippings. See M 1228.
1635 China, China Radio Intl: Voices from Other Lands. See W 1235.
1645 China, China Radio Intl: Learn to Speak Chinese. See W 1245.

Thursdays

1600 Radio Mexico Intl: DXperience. See S 0400.
1632 Russia, Voice of: Folk Box. See M 1532.
1634 China, China Radio Intl: Press Clippings. See M 1228.
1638 China, China Radio Intl: Focus. See H 1238.
1645 China, China Radio Intl: Cultural Spectrum. See H 1245.

Fridays

1600 Radio Mexico Intl: Eternally Mexico. See S 0000.
1630 China, China Radio Intl: Press Clippings. See M 1228.
1632 Russia, Voice of: Songs from Russia. See S 0332.
1636 China, China Radio Intl: Life in China. See F 1236.
1644 China, China Radio Intl: Global Review. See F 1244.
1645 Russia, Voice of: You Write to Moscow. See S 0345.

Saturdays

1600 Radio Mexico Intl: The Sounds of Mexico. See S 0000.
1611 Russia, Voice of: Newmarket. See W 0311.
1617 China, China Radio Intl: Report on Developing Countries. See S 0117.
1629 China, China Radio Intl: China Scrapbook. See S 0129.
1632 Russia, Voice of: Kaleidoscope. See S 1532.
1635 China, China Radio Intl: Music from China. See S 0135.

FREQUENCIES

1700-1730	Afghanistan, VO Shariah	4774do	7077do		
1700-1800	Anguilla,Caribbean Beacon	11775am			
1700-1800 vl	Australia, ABC/Alice Spgs	2310do			
1700-1800 vl	Australia, ABC/Katherine	2485do			
1700-1800 vl	Australia, ABC/Tent Creek	2325do			
1700-1800	Australia, Radio	5995as	6180as	9500as	9580as
		9660as	11880as		
1700-1800 vl	Botswana, Radio	4820do	4830do	7255do	
1700-1800 vl	Canada, CBC N Quebec Svc	9625do			
1700-1800	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZN St John's	6160do			
1700-1800	Canada, CKZU Vancouver	6160do			
1700-1756	China, China Radio Intl	5220af	7405af	9570af	9745af
		11910af	15300af		
1700-1800	Costa Rica,RF Peace Intl	25930va			
1700-1727	Czech Rep, R Prague Intl	5930eu	17485af		
1700-1800	Egypt, Radio Cairo	15255af			
1700-1800	Eqt Guinea, Radio Africa	15186af			
1700-1730	France, Radio France Intl	11615af	15210af		
1700-1800	Germany, Deutsche Welle	6140eu			
1700-1800	Germany, Voice of Hope	11725as			
1700-1800 a	Germany,Good News World R	11795me			
1700-1800	Germany,Overcomer Ministr	3965eu			
1700-1800 vl	Ghana, Ghana BC Corp	4915do			
1700-1800	Japan, Radio/NHK	9825eu	12000na	15355af	
1700-1730	Jordan, Radio	11690eu			
1700-1800	Kenya, Kenya BC Corp	4935do			
1700-1800	Lebanon, Voice of Hope	6280me	11530va		
1700-1800 vl	Lesotho, Radio	4800do			
1700-1800	Malaysia, Radio	7295do			
1700-1800	N Marianas, KFBS Saipan	9465as			
1700-1758 mtwh	New Zealand, R NZ Intl	11675va			
1700-1800 vl	Nigeria, Radio/Ibadan	6070do			
1700-1800 vl	Nigeria, Radio/Kaduna	4770do			
1700-1800	Nigeria, Radio/Lagos	3326do			
1700-1800	Palau, KHBN/Voice of Hope	9955as	9965as		
1700-1800 vl	Papua New Guinea, NBC	4890do			
1700-1756	Romania, R Romania Intl	9625eu	11740eu	11940eu	15365eu
1700-1800	Russia,Voice of Russia WS	5935me	7445me	9470me	
1700-1730	S Africa, Channel Africa	17870af			
1700-1800	Sierra Leone, SLBS	5980do			
1700-1730	Swaziland, Trans World R	9500af			
1700-1800	Tanzania, Radio	5050af			
1700-1800	Uganda, Radio	4976do			
1700-1800	UK, BBC World Service	3255af	3915af	5975as	6005af
		6190af	6195eu	7160as	9410eu
		9510as	9630af	9740as	11980me
	12095eu	15400af	15420af	17830af	17840na
1700-1800 a	Uk, Merlin Network One	3965eu	13640eu		
1700-1800 mtwhf	UK, Merlin Network One	6185eu			
1700-1800	USA, Armed Forces Network	4278am	6458am	12689am	
1700-1800	USA, KAIJ Dallas TX	13815va			
1700-1800	USA, KTBN Salt Lk City UT	15590na			
1700-1800	USA, KWHR Naalehu HI	9930as			
1700-1800	USA, Voice of America	6040af	6110as	7125as	7215as
		9645as	9760as	11920af	12040af
	15205as	15240af	15395as	15445af	17895af
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	9525as	9670as
		9795as	11955as	12005as	15255as
1700-1800	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700-1800	USA, WGTG McCaysville GA	9400va	12170am		
1700-1800	USA, WHRA Greenbush ME	17650af			
1700-1800	USA, WHRI Noblesville IN	13760na	15105na		
1700-1800	USA, WINB Red Lion PA	13800eu			
1700-1800	USA, WJCR Upton KY	7490na	13595na		
1700-1800 irreg	USA, WMLK Bethel PA	9465am			
1700-1800	USA, WRNO New Orleans LA	7395na	15420va		
1700-1800	USA, WSHB Cypress Crk SC	18915af			
1700-1800	USA, WTJC Newport NC	9370na			
1700-1800	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1700-1800	USA, WYFR Okeechobee FL	15695eu	17510eu		
1700-1800	Zambia, Christian Voice	4965do			
1700-1800	Zambia, Natl BC Corp	6165do	6265do		
1700-1800 vl	Zimbabwe, Zimbabwe BC	4828do			
1715-1800 vl	Libya, Voice of Africa	15235va	15415va	15435va	
1715-1730	Vatican City, Vatican R	4005eu	5880eu	7250eu	9645eu
		15595eu			
1720-1750 fa	Armenia, Trans World R	7375eu			
1720-1750	Monaco, Trans World Radio	7375as			
1730-1800	Austria, R Austria Intl	6155va	9655va	13710va	13730va
1730-1800	Guam, AWR/KSDA	7455as	7560as		
1730-1800	Netherlands, Radio	6020af	11655af		
1730-1800	Philippines, R Pilipinas	11720as	15190as	17720as	
1730-1800	S Africa, AWR Africa	12130af			
1730-1800	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1730-1745	Swaziland, Trans World R	9500af			
1730-1745 mtwh	Swaziland, Trans World R	3200af			
1730-1800 s	UK, BBC World Service	5985as	7390as	9750as	11660as
1730-1800	Vatican City, Vatican R	13765af	15570af	17515af	
1745-1800	Albania, R Tirana Intl	7210eu	9755eu		
1745-1800	Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu
1745-1800	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13750af	15075af	15200af
1745-1800	Swaziland, Trans World R	3200af	9500af		
1758-1800 f	New Zealand, R NZ Intl	17675va			

1800-1900	Anguilla,Caribbean Beacon	11775am			
1800-1900 mtwhf	Argentina, RAE	15345eu			
1800-1900 vl	Australia, ABC/Alice Spgs	2310do			
1800-1900 vl	Australia, ABC/Katherine	2485do			
1800-1900 vl	Australia, ABC/Tent Creek	2325do			
1800-1900	Australia, Radio	6080as	7240as	9500as	9580as
		9600as	11880as		
1800-1830	Azerbaijan, Voice of	9165eu			
1800-1900	Bangladesh, Bangla Betar	7165eu	7462eu	9548eu	15520eu
1800-1900 vl	Botswana, Radio	4820do	4830do		
1800-1900	Canada, CFRX Toronto	6070do			
1800-1900	Canada, CFVP Calgary	6030do			
1800-1900	Canada, CHNX Halifax	6130do			
1800-1900	Canada, CKZN St John's	6160do			
1800-1900	Canada, CKZU Vancouver	6160do			
1800-1900	Costa Rica,RF Peace Intl	25930va			
1800-1827	Czech Rep, R Prague Intl	5930eu	7315va		
1800-1830	Egypt, Radio Cairo	15255af			
1800-1900	Eqt Guinea, Radio Africa	15186af			
1800-1900	Germany, Deutsche Welle	6140eu			
1800-1900	Germany,Overcomer Ministr	3965eu			
1800-1900 vl	Ghana, Ghana BC Corp	4915do			
1800-1815	Greece, Voice of	7450eu	9425eu	17565sa	17705na
1800-1900	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13750af	15075af	15200af
1800-1900 vl	Italy, IRRS	3985va			
1800-1900	Kenya, Kenya BC Corp	4935do			
1800-1900	Kuwait, Radio	11990va			
1800-1900 vl	Lesotho, Radio	4800do			
1800-1815	Liberia,LCN/R Liberia Int	5100do			
1800-1810 vl/m-f	Malawi, MBC	5993do			
1800-1900	Malaysia, Radio	7295do			
1800-1900	N Marianas, KFBS Saipan	9465as			
1800-1830	Netherlands, Radio	6020af	11655af		
1800-1850 mtwhf	New Zealand, R NZ Intl	17675va			
1800-1900 vl	Nigeria, Radio/Ibadan	6050do			
1800-1900 vl	Nigeria, Radio/Kaduna	4770do			
1800-1900	Nigeria, Radio/Lagos	3326do			
1800-1900 vl	Nigeria, Voice of	7255af	15120va		
1800-1900	Palau, KHBN/Voice of Hope	9965as			
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900	Philippines, R Pilipinas	11720as	15190as	17720as	
1800-1855	Poland, Radio Polonia	6000eu	7285eu		
1800-1900	Russia,Voice of Russia WS	5940eu	5965eu	9340eu	9480eu
		9890eu	11510af		
1800-1830	S Africa, AWR Africa	5960af	6100af		
1800-1830	S Africa, Channel Africa	17870af			
1800-1900	Sierra Leone, SLBS	3316do			
1800-1900 vl	Solomon Islands, SIBC	5020do			
1800-1810	Somalia, Radio Mogadishu	6690af			
1800-1900	Sudan, Radio Omdurman	9200va			
1800-1830	Swaziland, Trans World R	3200af	9500af		
1800-1900	Taiwan, Radio Taiwan Intl	3965eu			
1800-1900	Tanzania, Radio	5050af			
1800-1900	UK, BBC World Service	3255af	3955eu	6190af	6195eu
		9410eu	9510as	9740pa	11980me
	12095eu	15400af	15420af	17830af	17840na
1800-1900	UK, Merlin Network One	3965eu			
1800-1900	USA, Armed Forces Network	4278am	6458am	12689am	
1800-1900	USA, KAIJ Dallas TX	13815va			
1800-1900	USA, KJES Vado NM	15385na			
1800-1900	USA, KTBN Salt Lk City UT	15590na			
1800-1900	USA, KWHR Naalehu HI	9930as			
1800-1900	USA, Voice of America	6035as	6040af	9760as	11920af
		11975af	13710af	15240af	15580af
1800-1900	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1800-1900	USA, WGTG McCaysville GA	9400va	12170am		
1800-1900	USA, WHRA Greenbush ME	17650af			
1800-1900	USA, WHRI Noblesville IN	9495sa	13760na		
1800-1900	USA, WINB Red Lion PA	13800eu			
1800-1900	USA, WJCR Upton KY	7490na	13595na		
1800-1900 irreg	USA, WMLK Bethel PA	9465am			
1800-1900	USA, WRNO New Orleans LA	7395na	15420va		
1800-1900	USA, WSHB Cypress Crk SC	15665eu	18915af		
1800-1900	USA, WTJC Newport NC	9370na			
1800-1900	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1800-1900	USA, WYFR Okeechobee FL	15695eu			
1800-1900 vl	Vanuatu, Radio	4960do			
1800-1827	Vietnam, Voice of	7145eu	7440eu		
1800-1900	Yemen, Rep of Yemen Radio	11770me			
1800-1900	Zambia, Christian Voice	4965do			
1800-1900	Zambia, Natl BC Corp	6165do	6265do		
1800-1900 vl	Zimbabwe, Zimbabwe BC	4828do			
1830-1900	Ascension Is,RTE Radio	21630af			
1830-1856	Belgium,R Vlaanderen Intl	5910eu	9925eu	13600eu	17695af
1830-1900	Georgia, Georgian Radio	11910eu			
1830-1900	Kiribati, Radio	9810do			
1830-1900	Netherlands, Radio 6020af	9895af	11655af	13700af	17605af
1830-1900 w	Philippines, FEBC R Intl	9465eu			
1830-1900	Swaziland, Trans World R	3200af			
1830-1900 mtwhfa	Sweden, Radio	6065eu			
1830-1900 s	Sweden, Radio	7345eu			
1830-1900 as	USA, Voice of America	9845af	13675af	15445af	
1840-1850	Greece, Voice of	12105af	15630me		
1850-1900	New Zealand, R NZ Intl	17675va			

Frequencies

1900-2000	Anguilla,Caribbean Beacon	11775am			
1900-2000 vl	Australia, ABC/Katherine	2485do			
1900-2000 vl	Australia, ABC/Tent Creek	2325do			
1900-2000	Australia, Radio	6080as	7240as	9500as	9580as
		9600as	11880as		
1900-2000 vl	Botswana, Radio	4820do	4830do		
1900-2000	Canada, CFRX Toronto	6070do			
1900-2000	Canada, CFVP Calgary	6030do			
1900-2000	Canada, CHNX Halifax	6130do			
1900-2000	Canada, CKZN St John's	6160do			
1900-2000	Canada, CKZU Vancouver	6160do			
1900-1956	China, China Radio Intl	6165af	9440af	9595af	11840af
		15360af			
1900-2000	Costa Rica,RF Peace Intl	25930va			
1900-2000	Ecuador, HCJB	17660eu	21455va		
1900-2000	Eqt Guinea, Radio Africa	15186af			
1900-1945	Germany, Deutsche Welle	11765af	11785af	11810af	13610af
		15390af	17810af		
1900-2000	Germany,Overcomer Ministr	3965eu			
1900-1910	Greece, Voice of	7475eu	9375eu		
1900-1950 a	Greece, Voice of	7450eu	9425eu	17565sa	17705na
1900-2000 s	Greece, Voice of	7450eu	9425eu	17565sa	17705na
1900-2000	Guatemala, Adv World R	5980am			
1900-1945	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13750af	15075af	15200af
1900-2000 vl	Italy, IRRS	3985va			
1900-2000	Kenya, Kenya BC Corp	4885do	4935do		
1900-2000	Kiribati, Radio	9810do			
1900-2000	Kuwait, Radio	11990va			
1900-2000 vl	Lesotho, Radio	4800do			
1900-1915	Liberia,LCN/R Liberia Int	5100do			
1900-2000	Malaysia, Radio	7295do			
1900-2000	N Marianas, KFBS Saipan	9465as			
1900-2000	Netherlands, Radio 602Gaf	9895af	11655af	13700af	17605af
1900-2000	New Zealand, R NZ Intl	17675va			
1900-2000 vl	Nigeria, Radio/Ibadan	6050do			
1900-2000 vl	Nigeria, Radio/Kaduna	4770do			
1900-2000	Nigeria, Radio/Lagos	3326do			
1900-2000	Nigeria, Voice of	7255af	15120va		
1900-2000	North Korea, R Pyongyang	4405va	6575na	9335na	11710na
		13760na			
1900-1930 m-a/vl	Papua New Guinea, NBC	4890do	9675do		
1900-1930	Philippines, R Pilipinas	11720as	15190as	17720as	
1900-2000	Russia,Voice of Russia WS	5920eu	5940eu	5965eu	7205va
	7340eu 9480eu	9830af	9875af	9890eu	11510af
1900-2000	Sierra Leone, SLBS	3316do			
1900-2000 vl	Solomon Islands, SIBC	5020do			
1900-2000	South Korea, R Korea Intl	5975om	7275eu		
1900-2000	Swaziland, Trans World R	3200af			
1900-1930	Tanzania, Radio	5050af			
1900-2000	Thailand, Radio	9535eu	9655eu	11905eu	
1900-2000	Uganda, Radio	4976do			
1900-2000	UK, BBC World Service	3255af	3955eu	6005af	6190af
		6195eu	9410eu	9630af	9740pa
		11980me	12095af	15400af	17830af
1900-2000	UK, Merlin Network One	6180eu			
1900-2000	USA, Armed Forces Network	4278am	6458am	12689am	
1900-2000	USA, KAIJ Dallas TX	13815va			
1900-2000	USA, KJES Vado NM	15385na			
1900-2000	USA, KTBN Salt Lk City UT	15590na			
1900-2000	USA, KWHR Naalehu HI	9930as			
1900-2000	USA, Voice of America	6035af	7415af	9525pa	9760af
		11870pa	11920af	11975af	13710af
		15180pa	15240af	15580af	
1900-1930 as	USA, Voice of America	4950af			
1900-2000 mtwhf	USA, Voice of America	5965me	9840as	11720me	11970as
		13725me	15205me	15410as	
1900-2000	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1900-2000	USA, WGTG McCaysville GA	9400va	12170am		
1900-2000	USA, WHRA Greenbush ME	17650af			
1900-2000	USA, WHRI Noblesville IN	9495sa	13760na		
1900-2000	USA, WINB Red Lion PA	13800eu			
1900-2000	USA, WJCR Upton KY	7490na	13595na		
1900-2000	USA, WRNO New Orleans LA	7395na	15420va		
1900-2000	USA, WSHB Cypress Crk SC	15665eu	18915af		
1900-2000	USA, WTJC Newport NC	9370na			
1900-2000	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1900-2000	USA, WYFR Okeechobee FL	5760eu			
1900-2000 vl	Vanuatu, Radio	4960do			
1900-1927	Vietnam, Voice of	7145eu	9730eu		
1900-2000	Zambia, Christian Voice	4965do			
1900-2000	Zambia, Natl BC Corp	6165do	6265do		
1900-2000 vl	Zimbabwe, Zimbabwe BC	4828do			
1905-1910	Croatia, Croatian Radio	13830eu			
1930-2000	Georgia, Georgian Radio	11760eu			
1930-2000	Iran, VOIRI	7215eu	9022eu	9880as	
1930-2000	Serbia, Radio Yugoslavia	6100eu	9720eu		
1930-2000	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1930-2000	Turkey, Voice of	9630eu	9895eu		
1935-1955	Italy, RAI Intl	5970eu	7285eu	9760eu	
1956-2000	S Africa, Voice of Hope	6290af			

2000 UTC

2000-2100	Algeria, R Algiers Intl	11715af	15160me	
2000-2100	Angola, Radio Nacional	3355af		
2000-2100	Anguilla,Caribbean Beacon	11775am		
2000-2100 vl	Australia, ABC/Alice Spgs	2310do		
2000-2100 vl	Australia, ABC/Katherine	2485do		
2000-2100 vl	Australia, ABC/Tent Creek	2325do		
2000-2100	Australia, Radio 9500as	9580as	9660as	11810as 12080as
2000-2100 as	Australia, Radio	6080as	7240as	
2000-2100 vl	Botswana, Radio	4820do	4830do	
2000-2100	Bulgaria, Radio	5845eu	7535eu	
2000-2100	Canada, CFRX Toronto	6070do		
2000-2100	Canada, CFVP Calgary	6030do		
2000-2100	Canada, CHNX Halifax	6130do		
2000-2100	Canada, CKZN St John's	6160do		
2000-2100	Canada, CKZU Vancouver	6160do		
2000-2056	China, China Radio Intl	5965eu	7590af	9440af 9535eu
	11735af 11840af	11975af	13675af	15360af 15500af
2000-2100	Costa Rica,RF Peace Intl	25930va		
2000-2100	Ecuador, HCJB	17660eu	21455va	
2000-2100	Eqt Guinea, Radio Africa	15186af		
2000-2030	Finland, YLE/R Finland	6135eu		
2000-2020 s	Finland, YLE/R Finland	6135eu		
2000-2045	Germany, Deutsche Welle	9725eu		
2000-2100	Germany,Overcomer Ministr	3965eu		
2000-2100 vl	Ghana, Ghana BC Corp	4915do		
2000-2100	Guatemala, Adv World R	5980am		
2000-2030	Hungary, Radio Budapest	6025eu	7165eu	
2000-2100	Indonesia, Voice of	15150va		
2000-2030	Iran, VOIRI	7215eu	9022eu	9880eu
2000-2100 irreg	Iraq, Radio Iraq Intl	9685va	11787va	
2000-2030	Israel, Kol Israel 7510va	9435va	11605va	15640af 15650va
2000-2100 vl	Italy, IRRS	3985va		
2000-2100	Kenya, Kenya BC Corp	4885do	4935do	
2000-2100	Kiribati, Radio	9810do		
2000-2100	Kuwait, Radio	11990va		
2000-2100 vl	Lesotho, Radio	4800do		
2000-2055	Liberia,LCN/R Liberia Int	5100do		
2000-2100	Malaysia, Radio	7295do		
2000-2100 mtwhfa	Malta, VO Mediterranean	7440eu		
2000-2030	Mongolia, Voice of	9720eu	12085eu	
2000-2100	Namibia, NBC	3270af	3289af	
2000-2025	Netherlands, Radio 602Gaf	9895af	11655af	13700af 17605af
2000-2100	New Zealand, R NZ Intl	17675va		
2000-2015 vl	Niger, Voice du Sahel	5019do		
2000-2100 vl	Nigeria, Radio/Ibadan	6050do		
2000-2100 vl	Nigeria, Radio/Kaduna	4770do		
2000-2100	Nigeria, Radio/Lagos	3326do		
2000-2100	Nigeria, Volce of	7255af	15120va	
2000-2100 vl	Papua New Guinea, NBC	9675do		
2000-2100	Russia,Voice of Russia WS	5940eu	5965eu	6205eu 7320eu
		7340eu	9480eu	9890eu
2000-2005	S Africa, Voice of Hope	6290af		
2000-2100	Sierra Leone, SLBS	3316do		
2000-2100 vl	Solomon Islands, SIBC	5020do		
2000-2045	Swaziland, Trans World R	3200af		
2000-2030	Switzerland, Swiss R Intl	6165eu	9620af	11910af 13660af
		13790af		
2000-2030	Turkey, Voice of	9630eu	9895eu	
2000-2100	Uganda, Radio	4976do		
2000-2100	UK, BBC World Service	3255af	3955eu	5975pa 6005af
		6190af	6195eu	9410eu 9630af
	9740pa	11835af	12095af	15400af 17830af
2000-2100	USA, Armed Forces Network	4278am	6458am	12689am
2000-2100	USA, KAIJ Dallas TX	13815va		
2000-2100	USA, KJES Vado NM	15385na		
2000-2100	USA, KTBN Salt Lk City UT	15590na		
2000-2100	USA, KWHR Naalehu HI	17510as		
2000-2100	USA, Voice of America	4950af	6035af	6095as 7415af
		9760as	11855af	11975af 13710af
		15420af	15580af	17725af 17885af
2000-2100	USA, WEWN Birmingham AL	11875na	13615na	15745eu
2000-2100	USA, WGTG McCaysville GA	9400va	12170am	
2000-2100	USA, WHRA Greenbush ME	17650af		
2000-2100	USA, WHRI Noblesville IN	9495na	13760na	
2000-2100	USA, WINB Red Lion PA	13790eu		
2000-2100	USA, WJCR Upton KY	7490na	13595na	
2000-2100	USA, WRNO New Orleans LA	7395na	15420va	
2000-2100	USA, WSHB Cypress Crk SC	11550eu	13770eu	15665af
2000-2100	USA, WTJC Newport NC	9370na		
2000-2100	USA, WWCR Nashville TN	9475na	12160na	13845na 15685na
2000-2100	USA, WYFR Okeechobee FL	5760eu	7355eu	15565va 21525af
2000-2100 vl	Vanuatu, Radio	4960do		
2000-2030	Vatican City, Vatican R	9660af	11625af	13765af
2000-2027	Vietnam, Voice of	9730eu		
2000-2100	Zambia, Christian Voice	4965do		
2000-2100	Zambia, Natl BC Corp	6165do	6265do	
2000-2100 vl	Zimbabwe, Zimbabwe BC	4828do		
2005-2100	Syria, Radio Damascus	12085eu	13610eu	
2015-2100 vl	Libya, Voice of Africa	15235va	15415va	15435va
2025-2045	Italy, RAI Intl	7220af	9710af	11880af
2030-2100 th	Belarus, R Minsk	7105eu	7210eu	
2030-2100	Cuba, Radio Havana	13660eu	13715eu	13750eu
2030-2100	Egypt, Radio Cairo	15375af		
2030-2100	Germany, AWR Europe	9640af		
2030-2100	Poland, Radio Polonia	6035eu	6095eu	7285eu 9525eu
2030-2100	S Africa, AWR Africa	9745af		
2030-2100	Sweden, Radio	6065eu		
2030-2045	Thailand, Radio	9535eu	9655eu	11905eu
2030-2100 as	USA, Voice of America	4950af		
2030-2100	Uzbekistan, R Tashkent	7105eu	9540eu	
2030-2057	Vietnam, Voice of	7145eu		
2045-2100	India, All India Radio	7150au	7410eu	9650eu 9910au
		9950eu	11620va	11715au
2050-2100	Vatican City, Vatican R	4005eu	5880eu	7250eu

Frequencies

2100-2200	Anguilla,Caribbean Beacon	11775am			
2100-2130 vl	Australia, ABC/Alice Spgs	2310do			
2100-2130 vl	Australia, ABC/Katherine	2485do			
2100-2200 vl	Australia, ABC/Katherine	5025do			
2100-2130 vl	Australia, ABC/Tent Creek	2325do			
2100-2130	Australia, Radio	7240as	9500as	9580as	9660as
		11880as	12080as	21740as	
2100-2200 vl	Botswana, Radio	3356do	4820do		
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2200	Canada, Radio Canada Intl	5995va	7235va	9770va	9805va
	11945va	13650va	13690va	15325va	17820va
2100-2200	Costa Rica,RF Peace Intl	15050va	25930va		
2100-2105	Croatia, Croatian Radio	11605af			
2100-2130	Cuba, Radio Havana	13750eu			
2100-2127	Czech Rep, R Prague Intl	5930na	9430as		
2100-2200	Ecuador, HCJB	17660eu	21455va		
2100-2115	Egypt, Radio Cairo	15375af			
2100-2200	Eqt Guinea, Radio Africa	15186af			
2100-2145	Germany, Deutsche Welle	9615af	9690af	9765as	15135as
		15410va	17560as		
2100-2200	India, All India Radio	7150va	7410eu	9650eu	9910au
		9950eu	11620va	11715au	
2100-2200 vl	Italy, IRRS	3985va			
2100-2200	Japan, Radio/NHK	6035pa	9725eu	11850pa	17825va
2100-2130	Kenya, Kenya BC Corp	4885do	4935do		
2100-2130	Kiribati, Radio	9810do			
2100-2200 vl	Lesotho, Radio	4800do			
2100-2115	Liberia,LCN/R Liberia Int	5100do			
2100-2200	Malaysia, Radio	7295do			
2100-2200	Namibia, NBC	3270af	3289af		
2100-2200	New Zealand, R NZ Intl	17675va			
2100-2200 vl	Nigeria, Radio/Ibadan	6050do			
2100-2200 vl	Nigeria, Radio/Kaduna	4770do			
2100-2200	Nigeria, Radio/Lagos	3326do			
2100-2156	North Korea, R Pyongyang	4405eu	6575eu	9335am	11710am
		13760am			
2100-2200	Palau, KHBN/Voice of Hope	9985as			
2100-2200 vl	Papua New Guinea, NBC	9675do			
2100-2125	Poland, Radio Polonia	6035eu	6095eu	7285eu	9525eu
2100-2156	Romania, R Romania Intl	5955eu	7195eu	7215eu	9690eu
2100-2200	Russia,Voice of Russia WS	5940eu	5965eu	6205eu	7300eu
		7320eu	7340eu	9890eu	
2100-2200	Sierra Leone, SLBS	3316do			
2100-2200 vl	Solomon Islands, SIBC	5020do			
2100-2130	South Korea, R Korea Intl	6480eu	15575eu		
2100-2200 mtwhf	Spain, R Exterior Espana	9595af	9680eu		
2100-2105	Syria, Radio Damascus	12085eu	13610eu		
2100-2200	UK, BBC World Service	3255af	3915as	3955eu	5965as
	5975va	6005af	6180eu	6190af	6195va
	9410pa	9740pa	11835af	12095as	15400af
2100-2200	USA, Armed Forces Network	4278am	6458am	12689am	
2100-2200	USA, KAIJ Dallas TX	13815va			
2100-2200	USA, KTBN Salt Lk City UT	15590na			
2100-2200	USA, KWHR Naalehu HI	17510as			
2100-2200	USA, Voice of America	6035af	6040me	6095as	7415af
	9595as	9760as	11870pa	11975af	13710af
	15185pa 15240af	15580af	17725af	17735as	17820as
2100-2200	USA, WBCQ Monticello ME	7415na			
2100-2200	USA, WEWN Birmingham AL	9975eu	11875na	13615na	
2100-2200	USA, WGTG McCaysville GA	9400va	12170am		
2100-2200	USA, WHRA Greenbush ME	17650af			
2100-2200	USA, WHRI Noblesville IN	5745na	9495sa		
2100-2200	USA, WINB Red Lion PA	13790eu			
2100-2200	USA, WJCR Upton KY	7490na	13595na		
2100-2200 s	USA, WRMI/R Miami Intl	9955am			
2100-2200	USA, WRNO New Orleans LA	7395na	15420va		
2100-2200	USA, WSHB Cypress Crk SC	11550eu	13770eu	15665af	
2100-2200	USA, WTJC Newport NC	9370na			
2100-2200	USA, WWCR Nashville TN	7435na	9475na	12160na	13845na
2100-2200	USA, WYFR Okeechobee FL	5760eu	7355eu	15565va	21525af
2100-2200 vl	Vanuatu, Radio	4960do			
2100-2110	Vatican City, Vatican R	4005eu	5880eu	7250eu	
2100-2200	Zambia, Christian Voice	4965do			
2100-2200	Zambia, Natl BC Corp	6165do	6265do		
2100-2200 vl	Zimbabwe, Zimbabwe BC	4826do			
2110-2200 s	Greece, Voice of	9425au	11645au		
2110-2200	Syria, Radio Damascus	12085na	13610na		
2115-2145 mtwhfa	Armenia, Voice of	4810eu	9965eu		
2115-2200	Egypt, Radio Cairo	9990eu	15375af		
2115-2130 mtwhf	UK, BBC Caribbean Report	5975am	11765am	15390am	
2115-2130 as	UK, BBC World Service	5975na			
2130-2200 vl	Australia, ABC/Tent Creek	4910do			
2130-2200	Australia, Radio	7240as	9660as	11880as	12080as
		15415as	17580as	21740as	
2130-2200 th	Belarus, R Minsk	7105eu	7210eu		
2130-2156	China, China Radio Intl	5965eu	7590eu	9535eu	13675af
		15500af			
2130-2200	Guam, AWR/KSDA	9495as	11985as		
2130-2200	Iran, VOIRI	11740as	13720as	13745as	
2130-2155	Moldova, R Moldova Intl	7520eu			
2130-2200	South Korea, R Korea Intl	15575eu			
2130-2200	Turkey, Voice of	9525as			
2130-2145 t f	UK BBC Calling Falklands	11680as			
2145-2200 mtwhf	USA, WRMI/R Miami Intl	7385na			

2200 UTC

2200-2300	Anguilla,Caribbean Beacon	6090am			
2200-2300 vl	Australia, ABC/Katherine	5025do			
2200-2300 vl	Australia, ABC/Tent Creek	4910do			
2200-2300	Australia, Radio	9660as	12080as	15415as	17580as
		17705as	17795as	21740as	
2200-2300	Bulgaria, Radio	7535eu	7545eu		
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2259	Canada, Radio Canada Intl	5995va	7235va	9805va	11705as
		13690va	15325va		
2200-2256	China, China Radio Intl	7170eu			
2200-2300	Costa Rica,RF Peace Intl	15050va	25930va		
2200-2245	Egypt, Radio Cairo	9990eu			
2200-2300	Eqt Guinea, Radio Africa	15186af			
2200-2300	Germany,Overcomer Ministr	7285as	9485as	9795as	9875as
		11690af			
2200-2300 vl	Ghana, Ghana BC Corp	4915do			
2200-2210 s	Greece, Voice of	9425au	11645au		
2200-2230	Hungary, Radio Budapest	6025eu			
2200-2230	India, All India Radio	7150va	7410eu	9650eu	9910au
		9950eu	11620va	11715au	
2200-2230	Iran, VOIRI	11740as	13720as	13745as	
2200-2300 vl	Italy, IRRS	3985va			
2200-2225	Italy, RAI Intl	6010eu	9675as	11900as	
2200-2215	Liberia,LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2300	Namibia, NBC	3270af	3289af		
2200-2300	New Zealand, R NZ Intl	17675va			
2200-2300 vl	Nigeria, Radio/Ibadan	6050do			
2200-2300 vl	Nigeria, Radio/Kaduna	4770do			
2200-2300	Nigeria, Radio/Lagos	3326do			
2200-2300	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2230	Serbia, Radio Yugoslavia	6100eu	6185eu		
2200-2300	Sierra Leone, SLBS	3316do			
2200-2300 vl	Solomon Islands, SIBC	5020do			
2200-2230	South Korea, R Korea Intl	3980eu			
2200-2300 as	Spain, R Exterior Espana	9595af	9680eu		
2200-2210	Syria, Radio Damascus	12085na	13610na		
2200-2300	Taiwan, Radio Taiwan Intl	5810eu	9355eu		
2200-2300	UK, BBC World Service	3955eu	5965as	5975na	6175na
	6195va	7110as	9590na	9660as	9915eu
	11835af	11955as	12080pa	12095as	15400af
2200-2300 f	UK, Merlin Network One	6170eu	7165eu	9615eu	
2200-2300	Ukraine, R Ukraine Intl	4820eu	5905eu	6020eu	6030va
		6080eu	7205eu	7420eu	9560eu
		9610eu	9785na	9810va	
2200-2300	USA, Armed Forces Network	4278am	6458am	12689am	
2200-2300	USA, KAIJ Dallas TX	13615va			
2200-2300	USA, KTBN Salt Lk City UT	15590na			
2200-2300	USA, KWHR Naalehu HI	17510as			
2200-2230	USA, Voice of America	7215as	9770as	9890as	11760as
		15185as	15290as	17735pa	17820as
2200-2230 mtwhf	USA, Voice of America	6035af	7415af	11975af	12080af
		13710af			
2200-2300	USA, WBCQ Monticello ME	7415na			
2200-2300	USA, WEWN Birmingham AL	9385na	9975eu	13615na	
2200-2300	USA, WGTG McCaysville GA	9400va	12170am		
2200-2300	USA, WHRA Greenbush ME	17650af			
2200-2300	USA, WHRI Noblesville IN	5745na	9495sa		
2200-2300	USA, WINB Red Lion PA	13790eu			
2200-2300	USA, WJCR Upton KY	7490na	13595na		
2200-2300 mtwhf	USA, WRMI/R Miami Intl	7385na			
2200-2300 s	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	7395na	15420va		
2200-2300	USA, WSHB Cypress Crk SC	7510eu	13770eu	15285as	
2200-2300	USA, WTJC Newport NC	9370na			
2200-2300	USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
2200-2300	USA, WYFR Okeechobee FL	11740na	15565va	21525af	
2200-2300 vl	Vanuatu, Radio	4960do			
2200-2210	Zambia, Natl BC Corp	6165do	6265do		
2230-2300	Albania, R Tirana Intl	7130eu	9540eu		
2230-2300	Austria, R Austria Intl	5945eu	6155eu	13730af	
2230-2256	Belgium,R Vlaanderen Intl	13670na			
2230-2300	Cuba, Radio Havana	9550am			
2230-2257	Czech Rep, R Prague Intl	7345na	9435af		
2230-2300	Hungary, Radio Budapest	3975eu			
2230-2255	Moldova, R Moldova Intl	7520eu			
2230-2300	Sweden, Radio	6065eu	7325eu		
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
		13625as			
2245-2300	Vatican City, Vatican R	7305eu	9600au	11830au	

Frequencies

2300-0000	Anguilla,Caribbean Beacon	6090am			
2300-0000 vl	Australia, ABC/Katherine	5025do			
2300-0000 vl	Australia, ABC/Tent Creek	4910do			
2300-0000	Australia, Radio	9660as	12080as	15415as	17580as
		17705as	17795as	21740as	
2300-0000	Canada, CBC N Quebec Svc	9625do			
2300-0000	Canada, CFRX Toronto	6070do			
2300-0000	Canada, CFVP Calgary	6030do			
2300-0000	Canada, CHNX Halifax	6130do			
2300-0000	Canada, CKZN St John's	6160do			
2300-0000	Canada, CKZU Vancouver	6160do			
2300-2330	Canada, Radio Canada Intl	5960na	6040na	9535am	9755na
		11865am			
2300-2356	China, China Radio Intl	5990na			
2300-0000	Costa Rica,RF Peace Intl	6975va	15050va	25930va	
2300-2330	Cuba, Radio Havana	9550am			
2300-0000	Egypt, Radio Cairo	9900am			
2300-2345	Germany, Deutsche Welle	9515as	9815as	13690as	
2300-0000 s	Germany,Good News World R	9405sa			
2300-0000 vl	Ghana, Ghana BC Corp	4915do			
2300-0000	India, All India Radio	7410as	9705as	9950as	11620as
		13625as			
2300-2315 vl	Italy, IRRS	3985va			
2300-2315	Liberia,LCN/R Liberia Int	5100do			
2300-0000	Malaysia, Radio	7295do			
2300-2330	Mexico, Radio Mexico Intl	9705am			
2300-0000	Namibia, NBC	3270af	3289af		
2300-2359	New Zealand, R NZ Intl	17675va			
2300-2330 vl	Nigeria, Radio/Ibadan	6050do			
2300-2330 vl	Nigeria, Radio/Kaduna	4770do			
2300-2330	Nigeria, Radio/Lagos	3326do			
2300-2356	North Korea, R Pyongyang	11335am	11710am	13760am	15130am
2300-0000	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	
2300-0000 vl	Papua New Guinea, NBC	9675do			
2300-2356	Romania, R Romania Intl	7195eu	9570na	9690eu	11940na
2300-0000	Sierra Leone, SLBS	3316do			
2300-0000	Singapore,RCorp Singapore	6150do			
2300-0000 vl	Solomon Islands, SIBC	5020do			
2300-0000	Turkey, Voice of	5980eu	6120eu	6135eu	9655va
2300-0000	UK, BBC World Service	3915as	5965as	5975na	6035as
		6175na	6195va	7110as	9590na
	9915eu	11945as	11955as	12095sa	15280as
2300-0000 f	UK, Merlin Network One	3985eu	6170eu	7165eu	
2300-0000	UK, Merlin Network One	3975eu			
2300-0000	USA, Armed Forces Network	4278am	6458am	12689am	
2300-0000	USA, KAIJ Dallas TX	13815va			
2300-0000	USA, KTBN Salt Lk City UT	15590na			
2300-0000	USA, KWHR Naalehu HI	17510as			
2300-0000	USA, Voice of America	7215as	9770as	9890as	11760as
		15185as	15290as	17735as	17820as
2300-0000	USA, WBCQ Monticello ME	7415na			
2300-0000	USA, WEWN Birmingham AL	9385na	9975eu	13615na	
2300-0000	USA, WGTG McCaysville GA	5085va	6890am		
2300-0000	USA, WHRA Greenbush ME	7580af			
2300-0000	USA, WHRI Noblesville IN	5745na	9495sa		
2300-0000	USA, WINB Red Lion PA	11950am			
2300-0000	USA, WJCR Upton KY	7490na	13595na		
2300-0000 a	USA, WRMI/R Miami Intl	9955am			

Selected Programs

Sundays

2300 Radio Mexico Intl: Mirror of Mexico. Focus on manufacturing and industry in Mexico.
2300 VOA (Special English): News. See A 2345.
2306 VOA (Special English): New Dynamic English. A program designed for those learning to speak English that includes conversations about everyday life in the U.S. and explanations of grammar and usage.
2330 VOA (Special English): News (Special English). See S 0030.
2340 VOA (Special English): Words and their Stories (Special English). See S 0040.
2345 VOA (Special English): People In America (Special English). See S 0045.

Mondays

2300 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
2300 VOA (Special English): News. See A 2345.
2306 VOA (Special English): New Dynamic English. See S 2306.
2330 VOA (Special English): News (Special English). See S 0030.
2340 VOA (Special English): Development Report (Special English). See M 0040.
2345 VOA (Special English): This is America (Special English). See M 0045.

Tuesdays

2300 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
2300 VOA (Special English): News. See A 2345.
2306 VOA (Special English): New Dynamic English. See S 2306.
2330 VOA (Special English): News (Special English). See S 0030.
2340 VOA (Special English): Agriculture Report (Special English). See T 0040.
2345 VOA (Special English): Science In the News (Special English). See T 0045.

Wednesdays

2300 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
2300 VOA (Special English): News. See A 2345.
2306 VOA (Special English): New Dynamic English. See S 2306.
2330 VOA (Special English): News (Special English). See S 0030.
2340 VOA (Special English): Science Report (Special English). See W 0040.
2345 VOA (Special English): Exploration (Special English). See W 0045.

Thursdays

2300 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
2300 VOA (Special English): News. See A 2345.
2306 VOA (Special English): New Dynamic English. See S 2306.
2330 VOA (Special English): News (Special English). See S 0030.
2340 VOA (Special English): Science Report (Special English). See W 0040.
2345 VOA (Special English): The Making of a Nation (Special English). See H 0045.

Fridays

2300 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
2300 VOA (Special English): News. See A 2345.
2306 VOA (Special English): New Dynamic English. See S 2306.
2330 VOA (Special English): News (Special English). See S 0030.
2340 VOA (Special English): Environment Report (Special English). See F 0040.
2345 VOA (Special English): American Mosaic (Special English). See F 0045.

Saturdays

2300 Radio Mexico Intl: Regional Roots and Rhythms. See S 1500.
2300 VOA (Special English): News. See A 2345.
2306 VOA (Special English): New Dynamic English. See S 2306.
2330 VOA (Special English): News (Special English). See S 0030.
2340 VOA (Special English): In the News (Special English). See A 0040.
2345 VOA (Special English): American Stories (Special English). See A 0045.

Thank You...

Additional contributors to this month's Shortwave Guide:

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PROPAGATION CONDITIONS, U.S.

OPTIMIZE YOUR MONITORING

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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 the Period 15 February 2000 to 14 March 2000 Flux=206 SSN=160

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	21	20	17	15	14	12	11	10	10	9	9	9	9	9	15	22	26	28	29	29	28	28	27	26
SOUTH AMERICA	20	20	21	22	18	14	13	13	13	12	11	11	*	*	19	27	26	25	24	24	24	24	23	22
WESTERN EUROPE	10	9	9	9	9	9	9	10	10	9	*	*	*	*	10	16	21	24	21	18	16	14	13	11
EASTERN EUROPE (P)	9	9	9	9	9	10	11	10	10	*	*	*	*	*	10	15	21	18	15	13	12	*	*	*
NORTH AFRICA	16	15	14	14	13	13	12	12	11	*	*	*	*	*	13	19	24	29	26	23	19	17	16	16
CENTRAL AFRICA	29	26	23	18	13	13	12	11	*	*	*	*	*	*	14	20	25	29	33	34	34	33	32	30
SOUTH AFRICA	20	18	17	16	15	14	13	*	*	*	*	*	*	*	17	25	28	27	27	26	27	28	25	22
MIDDLE (P) EAST	12	12	12	13	18	15	12	*	*	*	*	*	*	*	10	14	21	20	17	14	14	13	13	13
CENTRAL ASIA (P)	12	15	24	26	21	17	14	*	*	*	*	9	9	9	9	11	15	14	13	13	12	12	12	12
INDIA (P)	11	18	29	26	22	17	14	*	*	*	*	*	8	8	8	10	16	18	17	16	15	13	13	11
THAILAND	25	32	30	28	23	18	15	*	*	*	10	9	9	9	8	9	14	22	21	19	16	14	*	14
AUSTRALIA	30	30	31	31	27	22	18	15	13	13	12	12	11	11	10	11	17	23	21	19	18	20	27	28
CHINA	26	31	30	27	23	18	15	12	10	9	9	9	9	9	8	9	13	13	13	13	13	12	13	17
JAPAN	29	28	26	25	21	17	13	12	10	9	9	9	9	8	8	9	12	11	11	*	12	19	28	30
SOUTH PACIFIC	24	23	25	25	22	19	16	14	12	12	11	10	9	9	8	12	15	17	24	28	27	26	24	24
TO/FROM US MIDWEST																								
CARIBBEAN	23	21	18	15	13	12	12	12	11	10	9	9	12	19	25	29	31	32	31	30	29	29	28	27
SOUTH AMERICA	25	25	23	20	17	16	16	16	14	13	12	12	14	25	32	31	30	29	29	29	28	28	28	26
WESTERN EUROPE	12	11	11	10	10	10	10	11	12	12	12	12	12	16	23	27	29	28	24	21	19	17	16	13
EASTERN EUROPE (P)	8	8	8	8	8	9	12	11	11	10	*	*	10	12	19	22	24	21	17	14	12	*	9	9
NORTH AFRICA	16	15	14	14	13	12	13	13	12	*	*	*	*	16	23	27	30	28	26	23	20	18	17	16
CENTRAL AFRICA	30	25	22	19	15	13	15	15	14	13	*	*	15	22	29	33	36	38	37	37	36	35	35	33
SOUTH AFRICA	19	17	17	15	14	16	15	15	14	*	*	*	15	24	29	28	28	27	26	26	26	27	24	22
MIDDLE EAST	13	13	12	12	16	14	14	13	13	*	*	*	12	15	21	25	26	22	18	16	14	14	14	13
CENTRAL ASIA (P)	11	13	20	18	16	14	13	12	12	11	11	11	11	12	16	19	16	14	13	12	12	12	12	12
INDIA	11	14	22	18	16	14	*	*	*	*	*	10	10	11	15	21	21	18	17	16	16	14	13	12
THAILAND	22	28	25	20	17	14	*	*	*	*	10	10	10	10	12	18	23	22	20	18	15	14	11	12
AUSTRALIA	30	30	29	25	20	16	*	*	12	12	11	11	11	11	12	18	25	23	21	19	18	20	27	28
CHINA (P)	22	28	24	20	17	14	12	11	11	10	10	10	10	10	13	14	13	13	13	13	13	12	13	15
JAPAN	30	28	26	21	17	14	12	11	10	10	10	10	9	9	10	13	12	12	*	*	12	20	29	31
SOUTH PACIFIC	26	26	27	24	20	16	14	13	13	12	11	11	10	10	14	18	17	20	27	31	29	28	26	26
TO/FROM US EAST COAST																								
CARIBBEAN	15	14	12	11	10	9	9	8	7	6	6	7	14	19	21	22	23	22	22	21	20	20	20	18
SOUTH AMERICA	22	21	19	18	17	16	16	13	12	11	10	13	23	29	29	28	26	26	25	25	25	25	23	22
WESTERN EUROPE	12	11	11	11	10	10	10	11	13	12	12	14	21	28	31	32	30	30	27	23	20	18	16	14
EASTERN EUROPE	9	9	8	8	8	8	12	13	12	12	11	12	17	25	28	27	25	22	19	17	13	11	10	9
NORTH AFRICA	16	16	15	13	13	12	14	13	13	13	*	14	22	29	31	32	30	28	26	22	20	19	18	17
CENTRAL AFRICA	24	21	19	18	15	13	15	14	14	*	*	18	27	32	34	36	36	35	33	32	32	31	31	27
SOUTH AFRICA	19	17	16	15	14	16	15	14	*	*	*	19	29	29	29	28	28	27	26	25	26	26	23	21
MIDDLE EAST	13	13	13	12	15	15	14	14	13	13	*	14	21	28	32	30	27	23	20	17	16	15	15	14
CENTRAL ASIA (P)	11	12	16	18	16	15	14	14	13	13	13	13	16	23	26	21	17	15	13	12	12	12	12	12
INDIA (P)	11	12	19	17	15	14	*	*	*	*	*	12	16	23	28	26	22	18	17	16	15	15	13	12
THAILAND (P)	16	23	20	17	15	14	*	*	*	*	12	12	14	20	25	29	24	22	19	18	16	14	12	10
AUSTRALIA	30	29	24	20	16	*	14	13	13	12	12	12	12	15	23	26	24	23	21	19	18	20	27	28
CHINA (P)	18	24	20	17	15	14	14	13	12	12	12	12	13	18	17	15	13	*	13	12	12	12	12	13
JAPAN	31	27	22	19	16	14	14	13	13	12	12	12	12	14	14	13	13	13	13	12	13	19	28	33
SOUTH PACIFIC	28	27	24	21	17	15	14	14	14	13	12	12	12	17	20	19	18	23	30	33	32	*	*	*

* ***Unfavorable conditions: Search around the last listed frequency for activity.***

(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

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Back to Basics: The Best SW Media Programs

Understandably, programs which cater directly to the interests of the shortwave radio listener and hobbyist always have been among the most popular. With the addition of the Internet as a means of archiving program audio and providing enhanced information that can't be fit into restricted airtime, the value of these programs to listeners becomes even greater. Here are the six best with the usual caveats: frequencies/times subject to change; day abbreviations track ***MT***'s *Shortwave Guide*; check the latter for frequency information.

1 "Media Network" Radio Netherlands

Simply put, *Media Network* is the standard. *MN* was the first of this genre to perceive that big changes were coming to international broadcasting and the program has been chronicling these changes for nearly two decades. Since its inception in 1981 as a reincarnation of *DX Jukebox*, a radio hobby program that began its run in 1959, *MN* has always been "ahead of the curve." The hosts are Jonathan Marks, who engineered the program's rebirth and is now RN's head of programming, and Diana Janssen, the station's expert on new media applications, with a list of contributors which reads like a "who's who" of the global radio community. The program's agenda is quite fluid and the listener can count on the *MN* team to keep on top of the latest developments in all facets of international broadcasting.

In addition to being a radio show, *MN* is also a "webzine," the latter capably edited by Andy Sennitt, former longtime editor of the *World Radio-TV Handbook*. Accessible from the **RN** website (<www.rnw.nl>, click on "Media"), it includes a range of information that complements and enhances that provided on the radio show.

[**Tuning In**: *On shortwave:* H 0950, 1150, 1450, 1750, 1950, 2050; F 0050, 0450. *On WRN on NPR*-A 0030 local time on participating **NPR** stations. *On CBC Overnight*-F 0105 local time on **CBC Radio One** affiliates. *Via Internet:* On-demand 24 hour archive @ <www.rnw.nl/distrib/realaudio/html/english.html>. On-demand 3 month archive @ <www.wrn.org/ondemand>, click on "Media Network" link.]

2 "World of Radio" WWCR, Tennessee RFPI, Costa Rica WBCQ, Maine

Glenn Hauser, a name you will recognize in the pages of this magazine, is the one man band that compiles and presents *WOR*. The program recently ran its 1000th weekly edition representing over two decades of service to hobbyists and broadcasters.

The approach is straightforward; the focus is concentrated. Hauser gathers as much information about developments on the shortwave broadcast bands as one human being can and presents as much as will fit into a half hour, using his unique no-nonsense presentation style. For Glenn, it's always been about the information and there's lots of it here – every week without fail. Judging from the number of everyday listeners who contribute information (and Hauser assiduously credits them all individually), the effort is clearly appreciated. And, notably, *WOR* is the only media program that regularly provides advance and detailed information on upcoming shortwave programs.

WOR also has a website (<http://www.angelfire.com/ok/worldofradio/>) that reflects the spartan style of the program. It consists of a clean and concise series of detailed program indexes in text format.

[**Tuning In**: *On shortwave: WBCQ*-W 2200. *WWCR*-H 2130 on 9475; A 1230 on 15685, 2030 on 12160; S 0330 & 0730 on 5070; M 0131 & 0601 on 3210; T 1330 on 15685. *RFPI*-F 1930; A 0330, 1130, 1800; S 0200, 1000, 2300; M 0700 & 1500; T 1900, W 0300 & 1100. *Via Internet:* On demand 3 month archive @ <www.wrn.org/ondemand/>, click on "World of Radio" link.]

3 "Communications World" Voice of America WWCR WBCQ

CW is a half hour program divided into three segments, a format necessitated by its airing within the sound-bite confines of *VOA News Now*. Segment "A" highlights communications-related developments over the past week. Segment "B" usually focuses on one topic and often includes a related interview. Segment "C" reviews listener correspondence, replying to questions and offering comments.

Navigating such a disjointed format can be a challenge even for the devoted listener. However, Dr. Kim Elliott, CW's producer and presenter, has managed to put together a program that works in both its segmented form and as a half-hour presentation. (You can hear it both ways; see below.)

As a communications professor and the VOA's former audience research officer, Elliott also brings a deep understanding of communications media and a keen insight into the **VOA** and its audiences to *CW*. This allows the program to cast a wide spotlight – on communications in general ranging from traditional radio to the new media. Yet it always remains interesting and accessible for all listeners, with items ranging from the technical to the whimsical. You might hear a Graham Mytton (the BBC's former head of audience research) one week and Elliott's four year old son, Ian, the next. Whatever, it's a formula that works.

[**Tuning In**: *(**N.B.** At deadline, there were preliminary reports that the VOA was considering changes that would allow CW to be aired on "News Now" as a single program, perhaps beginning in February.) On shortwave: VOA*-Segmented version, A @ 0136, 0536, 1136, 1736; B @ 0936, 1336, 2136; C @ 0736, 1536, 1936, 2336. Half-hour version, A 0700 on 6873ssb; 1400 on 18275ssb. WWCR-S 0300 on 5070, 0630 on 3210; M 1330 on 15685. WBCQ-S 2100. *Via Internet:* On demand 3 month archive @ <www.wrn.org/ondemand/>, click on "Communications World" link. The *CW* website (<www.trsc.com/sw>) consists of an archive of program scripts and web site addresses referenced on the show.]

4 DX Partyline HCJB, Ecuador

This is a venerable entry that has done much over the years to support DXers, listeners and the radio hobby. This program is of value especially for newcomers – with its lengthy reports on recent loggings, regular features like club reports, regional DX news from around the globe, and a technical topics segment. This fifty minute program has to be quite a challenge to put together every week and recognition is due Allan Graham and all of the program's previous hosts for the care and dedication that have put into maintaining the program's legacy.

[**Tuning In**: *On shortwave:* A 0710, 0910, 1910; S 0110, 0410. The program's website (<http://www.hcjb.org/radio/index.htm>) has a range of items from audio clips of the program to material enhancing information discussed there.]

5 DXers Unlimited Radio Habana Cuba

This program makes my list because it is the only media program that deals extensively with the technical matters that are of unique interest to radio hobbyists. Host Arnie Coro is a ham himself and, on his twice weekly program, he discusses things like radio propagation, antennas and build it yourself projects in terms that are understandable to the newcomer, while remaining of interest for the veteran.

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SWL PROGRAM GUIDE
PUBLISHED QUARTERLY

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Listener Notes:

Kim Elliott's *Communications World* via VOA was projected to change during February to a more simplified, combined format. Full details were not available at press time, but see Glenn Hauser's column on p. 42 for more particulars.

World of Radio programs via WWCR and *DXing with Cumbre* programs via World Harvest Radio may be subject to month-to-month changes due to the sale of radio time to producers of religious programs.

Sundays

0000 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
0021 Radio Exterior de Espana: "Radio Waves"
0110 HCJB (am): "DX Partyline"
0121 Radio Exterior de Espana: "Radio Waves"
0130 Radio For Peace Intl: "Continent of Media"
0136 Radio Havana Cuba: "DXers Unlimited"
0200 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
0200 Glenn Hauser via RFPI: "World of Radio"
0245 WWCR #3 (Tennessee): "Ask WWCR"
0300 Kim Elliott via WWCR #3: "Communications World ABC"
0330 Australia, Radio: "Feedback"
0330 Glenn Hauser via WWCR #3: "World of Radio"
0336 Radio Havana Cuba: "DXers Unlimited"
0345 Radio Bulgaria: "Radio Bulgaria Calling"
0400 Radio Mexico Intl: "DXperience"
0400 WWCR #3 (Tennessee): "Spectrum (live)"
0410 HCJB (am): "DX Partyline"
0423 Voice of Turkey: "The DX Corner" (biweekly)
0508 Vatican Radio: "On-the-Air"
0521 Radio Exterior de Espana: "Radio Waves"
0530 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
0536 Radio Havana Cuba: "DXers Unlimited"
0600 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
0630 Glenn Hauser via WRN1: "World of Radio"
0715 BBC (as): "Waveguide" (27th)
0715 BBC (as): "Write On"
0730 Glenn Hauser via WWCR #3: "World of Radio"
0804 Radio Vlaanderen Intl: "Radio World"
0835 Radio Korea: "Multiwave Feedback"
0905 BBC (am/eu): "Waveguide" (27th)
0905 BBC (am/eu): "Write On"
0930 Radio For Peace Intl: "Continent of Media"
0930 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
0930 Italy (AWR): "Wavescan"
1000 KSDA (Guam): "Wavescan"
1000 Glenn Hauser via RFPI: "World of Radio"
1030 KSDA (Guam): "Wavescan"
1045 BBC (af): "Waveguide" (27th)
1045 BBC (af): "Write On"
1135 Radio Korea: "Multiwave Feedback"
1145 WWCR #3 (Tennessee): "Ask WWCR"
1230 BBC (as): "Waveguide" (27th)
1230 Italy (AWR): "Wavescan"
1230 KSDA (Guam): "Wavescan"
1230 BBC (as): "Write On"
1234 Radio Vlaanderen Intl: "Radio World"
1300 Marie Lamb via KWHR (Angel 4): "DXing with Cumbre"
1330 KSDA (Guam): "Wavescan"
1335 Radio Korea: "Multiwave Feedback"
1335 Radio Canada Intl: "The Make Believe Mailbag"
1430 KSDA (Guam): "Wavescan"
1436 Radio Canada Intl: "The Make Believe Mailbag"
1500 Kim Elliott via WRN1 (Internet): "Communications World (ABC)"
1500 World Radio Network (WRN1): "Communications World (ABC)"
1500 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"
1530 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
1530 KSDA (Guam): "Wavescan"
1534 World Radio Network (WRN1): "Radio World"
1600 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"
1600 KSDA (Guam): "Wavescan"
1635 Radio Korea: "Multiwave Feedback"
1637 Radio Canada Intl: "The Make Believe Mailbag"
1730 KSDA (Guam): "Wavescan"
1800 WWCR #3 (Tennessee): "Ask WWCR"
1830 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
1837 Radio Vlaanderen Intl: "Radio World"
1907 World Radio Network (WRN1): "Radio World"
1935 Radio Korea: "Multiwave Feedback"
2100 Kim Elliott via WBCQ: "Communications World ABC"
2105 Radio Korea: "Multiwave Feedback"
2105 BBC (am/eu): "Waveguide" (27th)
2105 BBC (am/eu): "Write On"
2130 KSDA (Guam): "Wavescan"
2137 Radio Canada Intl: "The Make Believe Mailbag"
2208 Radio Korea: "Multiwave Feedback"
2231 Radio Vlaanderen Intl: "Radio World"
2300 Glenn Hauser via RFPI: "World of Radio"

Mondays

0000 Radio Mexico Intl: "DXperience"
0130 Glenn Hauser via WWCR #1: "World of Radio"
0231 Radio Canada Intl: "The Make Believe Mailbag"
0235 Radio Korea: "Multiwave Feedback"
0400 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
0401 Radio Vlaanderen Intl: "Radio World"
0407 Radio Canada Intl: "The Make Believe Mailbag"
0430 WRMI (Florida): "Wavescan"
0545 WWCR #3 (Tennessee): "Ask WWCR"
0700 Glenn Hauser via RFPI: "World of Radio"
0800 WWCR #1 (Tennessee): "Spectrum (live)"
0830 WRMI (Florida): "Wavescan"
0905 BBC (as): "Waveguide" (4)
0905 BBC (as): "Write On"
1040 All India Radio: "DX-ers Corner" (14th,28th)
1545 KTWR (Guam): "Pacific DX Report"
1840 All India Radio: "DX-ers Corner" (14th,28th)
2130 All India Radio: "DX-ers Corner" (14th,28th)
2135 Radio New Zealand Intl: "Mailbox" (biweekly)

Tuesdays

0600 WWCR #3 (Tennessee): "Ask WWCR"
0830 WRMI (Florida): "Wavescan"
0900 KTWR (Guam): "Pacific DX Report"
1330 Glenn Hauser via WWCR #1: "World of Radio"
1346 Radio Sweden: "MediaScan" (1st,15th)
1355 FEBC (Philippines): "DX Dial"
1445 BBC (am/eu): "Waveguide" (22nd)
1445 BBC (am/eu): "Write On"
1446 Radio Sweden: "MediaScan" (1st,15th)
1846 Radio Sweden: "MediaScan" (1st,15th)
1900 Glenn Hauser via RFPI: "World of Radio"
2000 Radio For Peace Intl: "Continent of Media"

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CONTINUED

2000 Polish Radio: "Polish Radio DX Club"
2046 World Radio Network (WRN1): "MediaScan" (1st,15th)
2111 Radio Havana Cuba: "DXers Unlimited"
2311 Radio Havana Cuba: "DXers Unlimited"
2340 All India Radio: "DX-ers Corner" (8th,22nd)

Wednesdays

0000 Radio Mexico Intl: "DXperience"
0140 Radio Havana Cuba: "DXers Unlimited"
0146 Radio Sweden: "MediaScan" (2nd,16th)
0246 World Radio Network (WRN1): "MediaScan" (2nd,16th)
0246 Radio Sweden: "MediaScan" (2nd,16th)
0300 Glenn Hauser via RFPI: "World of Radio"
0340 Radio Havana Cuba: "DXers Unlimited"
0346 Radio Sweden: "MediaScan" (2nd,16th)
0346 Radio Bulgaria: "Radio Bulgaria Calling"
0400 Radio For Peace Intl: "Continent of Media"
0540 Radio Havana Cuba: "DXers Unlimited"
0730 HCJB (eu): "Ham Radio Today"
0930 HCJB (pac): "Ham Radio Today"
1100 Glenn Hauser via RFPI: "World of Radio"
1200 Radio For Peace Intl: "Continent of Media"
1315 FEBC (Philippines): "DX Dial"
1720 Polish Radio: "Polish Radio DX Club"
1730 Radio For Peace Intl: "Continent of Media"
1735 Radio New Zealand Intl: "Mailbox" (biweekly)
1820 Argentina, RAE: "DX'ers Special"
1930 HCJB (eu): "Ham Radio Today"
2200 Glenn Hauser via WBCQ: "World of Radio"
2205 Radio Budapest Intl: "Radio Budapest DX Blockbuster"

Thursdays

0030 Australia, Radio: "Media Report"
0130 Radio For Peace Intl: "Continent of Media"
0130 HCJB (am): "Ham Radio Today"
0239 Argentina, RAE: "DX'ers Special"
0335 Radio Budapest Intl: "Radio Budapest DX Blockbuster"
0430 HCJB (am): "Ham Radio Today"
0800 KTWR (Guam): "Pacific DX Report"
0930 Radio For Peace Intl: "Continent of Media"
0953 Radio Netherlands Intl: "Media Network"
1030 Australia, Radio: "Media Report"
1153 Radio Netherlands Intl: "Media Network"
1220 Polish Radio: "Polish Radio DX Club"
1230 World Radio Network (WRN1): "Media Report"
1454 Radio Netherlands Intl: "Media Network"
1530 Australia, Radio: "Media Report"
1600 Radio Mexico Intl: "DXperience"
1753 Radio Netherlands Intl: "Media Network"
1954 Radio Netherlands Intl: "Media Network"
2130 Glenn Hauser via WWCR #1: "World of Radio"

Fridays

0054 Radio Netherlands Intl: "Media Network"
0453 Radio Netherlands Intl: "Media Network"
1030 KTWR (Guam): "Pacific DX Report"
1900 Radio For Peace Intl: "Continent of Media"
1930 Radio New Zealand Intl: "Mailbox" (biweekly)
1930 Glenn Hauser via RFPI: "World of Radio"
2047 Radio Bulgaria: "Radio Bulgaria Calling"
2100 WWCR #1 (Tennessee): "Ask WWCR"
2330 Australia, Radio: "Media Report"
2338 Voice of Turkey: "The DX Corner" (biweekly)

Saturdays

0005 BBC (as): "Waveguide" (26th)
0005 BBC (as): "Write On"
0030 Australia, Radio: "Feedback"
0045 Radio Bulgaria: "Radio Bulgaria Calling"
0136 Kim Elliott via VOA (News Now): "Communications World (A)"
0300 Radio For Peace Intl: "Continent of Media"
0300 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
0330 Glenn Hauser via RFPI: "World of Radio"
0336 Kim Elliott via VOA (News Now): "Communications World (B)"
0438 Voice of Turkey: "The DX Corner" (biweekly)
0536 Kim Elliott via VOA (News Now): "Communications World (A)"
0600 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"
0600 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
0600 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
0605 Australia, Radio: "Feedback"
0710 HCJB (eu): "DX Partyline"
0800 Marie Lamb via KWHR (Angel 4): "DXing with Cumbre"
0830 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"
0830 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
0910 HCJB (pac): "DX Partyline"
0930 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
0936 Kim Elliott via VOA (News Now): "Communications World (B)"
0940 FEBC (Philippines): "DX Dial"
0945 WWCR #3 (Tennessee): "Ask WWCR"
1100 Radio For Peace Intl: "Continent of Media"
1130 Glenn Hauser via RFPI: "World of Radio"
1136 Kim Elliott via VOA (News Now): "Communications World (A)"
1230 Glenn Hauser via WWCR #1: "World of Radio"
1245 Radio Bulgaria: "Radio Bulgaria Calling"
1330 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"
1336 Kim Elliott via VOA (News Now): "Communications World (B)"
1342 Radio Tashkent: "Radio Tashkent DX Program"
1345 Voice of Turkey: "The DX Corner" (biweekly)
1430 Marie Lamb via KWHR (Angel 4): "DXing with Cumbre"
1455 FEBC (Philippines): "DX Dial"
1530 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
1536 Kim Elliott via VOA (News Now): "Communications World (C)"
1700 Glenn Hauser via WRN1: "World of Radio"
1730 Radio For Peace Intl: "Continent of Media"
1736 Kim Elliott via VOA (News Now): "Communications World (A)"
1800 Glenn Hauser via RFPI: "World of Radio"
1900 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
1909 HCJB (eu): "DX Partyline"
1936 Kim Elliott via VOA (News Now): "Communications World (C)"
2015 Voice of Turkey: "The DX Corner" (biweekly)
2030 Glenn Hauser via WWCR #3: "World of Radio"
2058 Vatican Radio: "On-the-Air"
2106 Radio Havana Cuba: "DXers Unlimited"
2110 Australia, Radio: "Feedback"
2131 Radio Exterior de Espana: "Radio Waves"
2136 Kim Elliott via VOA (News Now): "Communications World (B)"
2145 WWCR #3 (Tennessee): "Ask WWCR"
2230 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
2230 WRMI (Florida): "Wavescan"
2247 Radio Bulgaria: "Radio Bulgaria Calling"
2300 Vatican Radio: "On-the-Air"
2306 Radio Havana Cuba: "DXers Unlimited"
2318 Voice of Turkey: "The DX Corner" (biweekly)

Single Channel Per Carrier (SCPC) Services

By Robert Smathers, roberts@nmia.com

An SCPC transmitted signal is transmitted with its own carrier, thus eliminating the need for a video carrier to be present. Dozens of SCPC signals can be transmitted on a single transponder. In addition to a standard TVRO satellite system, an additional receiver is required to receive SCPC signals.

The frequency in the first column is the 1st IF (typical LNB frequency) and the second column frequency (in parentheses) is the 2nd IF (commercial receiver readout) for the SCPC listing. Both frequencies are in MHz.

GE-2 Transponder-Vertical 13 (C-band)

1179.40 (80.6)	NASA space shuttle audio

Galaxy 11 Transponder 1-Horizontal (C-band)

1443.80 (56.2)	Voice of Free China (International Shortwave Broacaster) Taipei, Taiwan
1443.60 (56.4)	KBLA-AM (1580) Santa Monica, CA–*Radio Korea*
1443.40 (56.6)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7)	WWRV-AM (1330) New York, NY–Spanish religious programming and music, ID–*Radio Vision Christiana de Internacional*

Galaxy 11 Transponder 3-Horizontal (C-band)

1404.80 (55.2)	KOA-AM (850)/KTLK-AM (760) Denver, Colo–news and talk /Colorado college sports
1404.60 (55.4)	WGN-AM (720) Chicago, IL–news and talk radio/Northwestern college sports
1404.40 (55.6)	Illinois News Network/WMVP-AM (1000) Chicago, IL–"ESPN Radio 1000/Bulls NBA radio network
1404.20 (55.8)	Tribune Radio Networks/Wisconsin Radio Network
1402.90 (57.1)	USA Radio Network
1402.70 (57.3)	WLAC-AM (1510) Nashville, TN–news and talk/ *Road Gang* trucker program (overnight)/ Tennessee college sports
1402.20 (57.8)	NorthWest Ag News Network - Agriculture info for the Pacific Northwest
1402.00 (58.0)	Clemson Sports Network
1401.80 (58.2)	For the People Radio Network with Chuck Harder – talk radio format
1401.50 (58.5)	Agrinet Ag info/USA Radio Network
1399.00 (61.0)	Sports Byline USA/Sports Byline Weekend
1398.80 (61.2)	Talk Radio Network (TRN) – talk radio format
1398.50 (61.5)	Occasional audio
1398.30 (61.7)	WSB-AM (750) Atlanta, GA– news/talk/Georgia college sports
1397.80 (62.2)	Occasional audio/Nuggets NBA radio network
1397.50 (62.5)	Minnesota Talking Book Radio Network–reading service for the blind
1397.10 (62.9)	Wisconsin Radio Network/Wisconsin college sports
1396.90 (63.1)	Occasional audio
1396.70 (63.3)	Radio America Network
1396.40 (63.4)	Georgia News Network (GNN)–network news feeds
1395.80 (64.2)	WTMJ-AM (620) Milwaukee, WI–talk radio
1395.60 (64.4)	WGST-AM/FM (640/105.7) Atlanta, GA ID *Planet Radio*–news and talk radio
1395.40 (64.6)	Michigan News Network–network news feeds/ WPLT-FM (96.3) Detroit, /Michigan college sports
1395.00 (65.0)	Occasional audio
1394.70 (65.3)	WJR-AM (760) Detroit, MI–news and talk radio/ Michigan News Network
1394.30 (65.7)	Michigan News Network – network news feeds/ Michigan State college sports
1384.40 (75.6)	KOA-AM (850)/KTLK-AM (760) Denver, CO–news and talk radio/Colorado college sports
1384.20 (75.8)	WSB-AM (750) Atlanta, GA – news/talk/ Georgia college sports
1383.10 (76.9)	KIRO-AM (710) Seattle, WA–news and talk radio
1382.60 (77.4)	Soldiers Radio Satellite (SRS) network–U.S. Army information and entertainment radio/Army college sports
1382.30 (77.7)	Motor Racing Network (occasional audio) NASCAR racing
1382.00 (78.0)	Occasional audio
1381.60 (78.4)	KEX-AM (1190) Portland, OR–news and talk radio
1381.40 (78.6)	Occasional audio/Westwood One radio sports
1381.20 (78.8)	KJR-AM (950) Seattle, WA– sports talk radio/ Washington State college sports
1380.90 (79.1)	Occasional audio
1377.10 (82.9)	In-Touch–reading service
1376.00 (84.0)	Kansas Audio Reader Network–reading service

Anik E2 Transponder 1-Horizontal (C-band)

1446.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (Quebec) service

Anik E2 Transponder 5-Horizontal (C-band)

1366.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (Eastern Arctic) service

Anik E2 Transponder 7-Horizontal (C-band)

1326.00 (66.0)	Canadian Broadcasting Corporation (CBC) Radio–North (MacKenzie) service
1325.50 (65.5)	Canadian Broadcasting Corporation (CBS) Radio–Occasional feeds/events

Anik E2 Transponder 17-Horizontal (C-band)

1126.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (Western Arctic) service
1125.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio–North (Newfoundland and Labrador) service

Anik E2 Transponder 23-Horizontal (C-band)

1006.00 (54.0)	Societe Radio-Canada (SRC) Radio–AM Network
1005.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio-North (Yukon) service

Solidaridad 1 Transponder 1-Vertical (C-band)

1447.90 (52.1)	Antenna Radio Noticias
1447.60 (52.4)	Antenna Radio Noticias
1447.20 (52.8)	La Grande Cadena Raza

Anik E1 Transponder 21-Horizontal (C-band)

1036.70 (63.3)	In-store music
1037.00 (63.0)	In-store music
1037.50 (62.5)	In-store music

SBS5 Transponder 2-Horizontal (Ku-band)

1013.60 (80.4)	Wal-Mart in-store network
1013.20 (80.8)	Wal-Mart in-store network
1012.80 (81.2)	Sam's Wholesale Club in-store network
1004.50 (89.5)	Wal-Mart in-store network
1004.00 (90.0)	Wal-Mart in-store network
1003.60 (90.4)	Sam's Wholesale Club in-store network
1003.20 (90.8)	Wal-Mart in-store network

RCA C5 Transponder 3-Vertical (C-band)

1404.60 (55.4)	Wyoming News Network–network news feeds
1400.60 (59.4)	Learfield Communications/Stan Solomon Talk Show (occ)/Indiana college sports
1400.40 (59.6)	Learfield Communications/MissouriNet
1400.20 (59.8)	Learfield Communications
1400.00 (60.0)	Learfield Communications/Stan Solomon Talk Show (occ)/Purdue college sports
1396.60 (63.4)	Kansas Information Network/Kansas Agnet–network news feeds
1396.40 (63.6)	Liberty Works Radio Network – talk radio
1396.20 (63.8)	MissouriNet/Illinois college sports
1396.10 (63.9)	MissouriNet
1395.90 (64.1)	Western Montana Radio Network/Red River Farm Network
1395.70 (64.3)	MissouriNet
1386.40 (73.6)	Learfield Communications
1386.20 (73.8)	Radio Iowa/Iowa college sports
1384.60 (75.4)	Capitol Radio Network/North Carolina college sports
1384.00 (76.0)	Capitol Radio Network
1383.80 (76.2)	Learfield Communications/Stan Solomon Talk Show (occ)
1383.40 (76.6)	Capitol Radio Network
1382.90 (77.1)	MissouriNet
1382.50 (77.5)	Virginia News Network–network news feeds/
1382.10 (77.9)	Learfield Communications/MissouriNet/Blues NHL radio network

SATELLITE LOADING REPORT OF THE MONTH

SBS-6 at 74 degrees West longitude

Ku-band

1	11717-H	Data transmissions/ FamilyNet (Digicipher)
2	11749.5-V	CONUS Communications (half transponders)
3	11774-H	CONUS Communications (half transponders)
4	11798.5-V	Occasional Video
5	11823-H	CONUS Communications (half transponders)
6	11847.5-V	Occasional Video
7	11872-H	Occasional Video
8	11896.5-V	Occasional Video
9	11921-H	Occasional Video
10	11945.5-V	DigitalXpress (proprietary digital)
11	11963-H	Spacecom FM Cubed transmissions
12	11994.5-V	Data Transmissions
13	11963-H	Data Transmissions
14	12043.5-V	Data Transmissions
15	12075-H	Occasional Video
16	12092.5-V	Occasional Video
17	12110-H	Data Transmissions
18	12141.5-V	Occasional Video
19	12174-H	Occasional Video

GE-5 at 79 degrees West longitude

Ku-band

1	11730-V	Data Transmissions/ Utah Educational Network (digital)
2	11743-H	Data Transmissions
3	11791-V	Data Transmissions
4	11804-H	Empire Sports Network (digital)/Data Transmissions
5	11852-V	CBS feeds (digital and analog)
6	11865-H	Occasional Video
7	11913-V	Data Transmissions
8	11926-H	GE-5 ID Slate
9	11974-V	Occasional Video
10	11987-H	Occasional Video
11	12035-V	CNN feeds (digital and analog)
12	12048-H	Occasional Video
13	12096-V	Occasional Video
14	12109-H	Occasional Video
15	12157-V	Occasional Video
16	12170-H	New York Network/ SUNYsat (digital and analog)

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Shortwave Listening with Pictures!

How much would you pay for a receiver which could pick up some of the biggest international broadcasters with studio quality sound, no fading, no atmospheric noise, no adjacent channel interference? What if you could also get pictures to go with the sound? $1,500, $2,000? Well, how about less than $600!

It happens that many of the world's best known short wave broadcasters have TV signals beaming to North America on Panamsat 5 and are receivable in most areas east of the Mississippi with dishes as small as 4.5 ft. Most signals are transmitted in the Digital Video Broadcasting (DVB) mode using MPEGII technology and are "Free-To-Air"–i.e. unencrypted.

DVB is the digital system used most widely in Europe and Asia by direct-to-home satellite programmers and, because DVB equipment is very competitively priced, it has rapidly gained acceptance with programmers in the Western hemisphere. Every year more are using DVB to transmit their programming on dozens of satellites, most of which are viewable to most of the U.S.

PAS-5 Line-up

If you were to swing your standard big dish satellite system over to 58°W you would discover two things: 1) you can't find Panamsat 5, and 2) even if you could, you probably wouldn't see anything with your analog receiver. What's going on?

Well, it's no mystery. There is usually no analog activity on PAS-5 so there won't appear to be anything on any of your analog receiver's channels. However, if you have a signal meter on the front of your receiver you should see a significant rise in the meter on virtually any horizontal or vertically polarized channel as you swing through the PAS-5 beam. The signals are there; you just need a digital receiver to pick them up.

In fact, there are about 90 channels of video and 13 audio channels on this one satellite. Twenty-one of these video channels are in the DigiCipherII mode and encrypted. These cannot be received by a DVB receiver. Another 23 are DVB digital, but encrypted and appear as a black screen on a TV tuned to those channels. That leaves some 44 channels of unencrypted video which includes some of the more interesting channels in all of satellite TV (see chart). For a complete line-up of PAS-5 action see **www.lyngsat.com/pas5.shtml**.

As with any of their radio counterparts, international video broadcasters have schedules of their programming available on their web sites. Checking in with each will give you the times each day when English programming is sent. This really takes the guesswork out of watching the foreign broadcasters. Even without the schedules I find the musical variety programs of great interest, and many of the dramatic shows have English subtitles! All feature English news programs.

What You Need to Watch

If you have an existing big dish C-band system, you need only add an MPEGII receiver such as any of the ones I've reviewed in this column over the last year and a half. One that I've recently been using is the ASR-2000, sold by Smallear Satellite Systems. It has a number of interesting features. Like most, it has a channel 3/4 demodulator, a small, full featured IR remote control, space for 200 digital channels, and can tune other audio subcarriers, if present. Unlike most other DVB receivers, the ASR-2000 will convert PAL DVB satellite signals to our standard NTSC. It also has a "pause" button which freezes the picture at the current image and the aspect ratio can be switched from 4:3 (standard) to 16:9 (wide screen).

If you don't have a C-band system and don't want to shell out the big bucks local dealers are asking for such systems, you may want to opt for the 4.5-ft. system Smallear has available. The system is comprised of a Jonsa dish which is a prime focus dish (the LNB is directly over the center of the dish) and comes unassembled via UPS. The six-piece steel dish is well designed for being so inexpensive, and I put it together in an hour or so with no difficulty. I was able to secure it to a deck in the front of the house (see photo) by simply attaching the base of the dish mount with heavy-duty wood screws. It comes with a Ku-band feed horn; you supply the Ku-band LNB.

However, if you purchase Smallear's C-band 4.5-ft. dish kit, you'll get the Jonsa dish with a 15 degree C-band LNBF, good enough to catch the DVB action on Panamsat 5. The dish features an AZ/EL dish mount which means that it does not "track" the arc on which all the satellites are placed. Instead, you have to physically change the Azimuth and Elevation angles for each satellite you wish to receive. That's why this dish is great as a stand-alone system for PAS-5. Once you've got it lined up, just tighten up the mount bolts and start watching!

Finding satellites using a small dish with a digital receiver is a bit of a challenge. Once you get the dish put together, the LNBF mounted, and cables hooked up from the LNBF to the receiver, and the receiver to the TV set, you're ready to hunt PAS-5. Following the minimalist instructions in the ASR-2000 manual for "Set Up," you'll enter the parameters for, let's say Deutsche Welle, using the IR remote control. Now, press the "Select/OK" button and the receiver begins to search the data stream for those parameters. Unless, by some miracle, you happen to be right on the satellite, the screen will announce "no signal." Don't panic.

Now pivot the dish on its AZ/EL mount slowly in the area of the sky in which PAS-5 resides. (You can find your local azimuth and elevation angles on **www.lyngsat.com** by clicking on the SatTracker icon on the PAS -5 page.) Keep your eye on the front panel of the ASR-2000. An orange LED will light up as the receiver locks on to the signal. *Voila,* you're now watching programming from Germany on Deutsche Welle.

You'll notice, as you tune up the channels, that there are three different audio subcarriers carrying DW's radio services 1, 2 and 7. To receive the other DVB services on PAS-5 you'll have to enter the parameters for each in the same manner. Once you get used to the procedure, entering and storing the data becomes routine.

[MPEGII FTA VIDEO PAS-5]	[MPEGII FTA AUDIO PAS-5]
EWTN Latin America (Catholic TV)	EWTN Catholic Radio
RTP International (Portugal)	WACC-AM (Miami, Spanish)
CCTV 4 (Beijing, China)	Deutsche Welle 1 (Germany)
CCTV 3 (Beijing, China)	Deutsche Welle 2 (Germany)
CCTV 9 (Beijing, China)	Deutsche Welle 7 (Germany)
APTN Newswire (U.S.)	RDP Antena 1 (Portugal)
APTN Washington (U.S.)	Radio Timor (Portugal)
Deutsche Welle TV (Germany)	Radio Christina (Costa Rica)
NHK World TV (Japan)	Al Ddkir Channel (Arabic)
Enlace (Costa Rica religious)	RAI International (Italy)
RAI International (Italy)	Arabic Music Channel
LBC America (Lebanon)	
Al Jazeera Satellite Channel (Syria)	
Caracol (Colombia)	

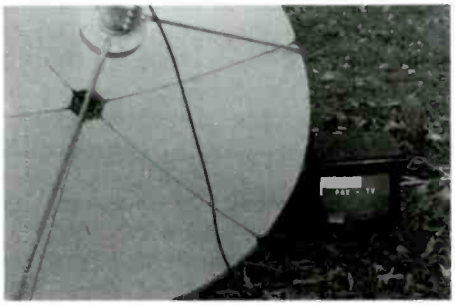
DXing with a Small Dish

I found the Jonsa dish with the 15 degree LNBF did an excellent job using an analog receiver to pick up the many analog C-band signals available in the clear all over the Clarke Belt. I was tuning in nearly sparkle free pictures on Anik E2 (Canada), Morelos (Mexico), GE-2 (home of the NASA channel), and others. Because the 4.5-ft. dish is so shallow, it wants to "see" signals from competing nearby satellites. This "ingress" from the satellites next door shows up as interference on an analog channel. One reason it works so well looking at PAS-5 is that there are no other heavily used satellites within 2 degrees of it.

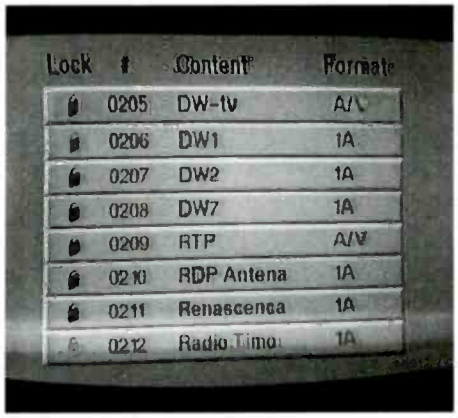
Tuning in DVB signals on other C-band satellites such as WorldNet on GE-2, CTV on Anik E2, Pax TV on GE-1 were possible, but required care in setting up. Again, heavily active transponders on nearby satellites make it more difficult than with a larger dish. But, the Jonsa dish really shines on the Ku-band. The dish comes with a Ku-band feed horn so I outfitted it with a .7 dB Ku-band LNB and had excellent results on analog and DVB reception on the Ku-band. This is particularly nice for tuning in the Arabic and Asian programming on Telstar 5 Ku-band, much of which is unencrypted. The analog and DVB NBC channels on GE-1 all came in perfectly.

Those with big dish C/Ku-band feed horns can get into even more international satellite DX by tuning in Hispasat at 30°W (which includes seven national and international radio feeds direct from Spain) on Ku-band and Intelsat

Smallear's 4.5-ft. steel dish on a 10-ft x 10-ft deck. This is a dish that's unobtrusive to landscapes and fits easily on a deck, patio, balcony or other small area within the confines of your property.



Here's the Jonsa 4.5-ft. foot dish turned to GE-1 and bringing in PAX-TV in DVB, the little ASR-2000 DVB receiver sits on top of a 15-in. TV set.



On-screen Electronic Program Guide is automatically loaded when a DVB channel is tuned in. Once loaded, simply scrolling through the list and clicking on the highlighted channel brings it up. Here's the Deutsche Welle radio and TV line-up.

On-screen set-up lets you see the data you're entering with the remote control. All the necessary numbers can be found at www.lyngsat.com. Here are the parameters for receiving Deutsche Welle TV and Radio.

806 (which includes music and entertainment programming from all over Europe and South America) on C-band circular polarity. The ASR-2000 tunes them all in!

Smallear sells a complete C-band 4.5-ft. system which includes the Jonsa dish and an analog stereo receiver with remote control for $319 (plus $30 S&H); the Jonsa dish alone for $219 (plus $30 S&H) and the ASR 2000 DVB receiver alone for $279 (plus $15 S&H). They also sell a complete analog Ku-band system including 90 cm dish, .6 dB Ku-LNBF, 60-ft. RG6 cable and 4-ft. of TV cable for just $229 (plus $20 S&H). For more information on Smallear and their extensive list of inexpensive satellite TV equipment visit their web site at **www.smallear.com** or call their order number toll free 888-731-1834 or write them at Smallear Corporation P.O. Box 81811 Rochester, MI 48308-1811

VIEW FROM ABOVE

WATCHING THE WEATHER SATELLITES

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What's New in 2000?

KEY	
APT	automatic picture transmission
GOES	Geostationary Operational Envionmental Satellite
HRPT	high resolution picture transmission
NOAA	National Oceanic and Atmospheric Administration
WXSAT	weather satellite

Another year over and what is new? Here in Britain there is the exciting possibility of cheaper access to the Internet. Currently our cheapest rates still cost the equivalent of a few cents per minute at the weekend (Britain, for the most part, does not have free local calls), and double that during the evenings. Until two years ago there was an additional charge equivalent to several dollars per month for Internet access itself, but following deregulation of the UK's monopolistic telephone system, many new ISPs (Internet Service Providers) now offer a "free" service, taking a portion of the high charge for the telephone call for their own funds. This has resulted in many UK residents being able to open free accounts with any of several providers, and this is why I potentially have half-a-dozen independent mailbox addresses! In practice I only use one for all my mail, but can send mail using the others for backup access.

The system works extremely well, yet many people in Britain still pay for Internet service, perhaps in the belief that payment means quality. The exciting aspect is that at least two new providers are now claiming to offer completely free access – including the telephone call. Offering is one thing – getting the service is another! I have spent one whole week attempting to contact both providers, but each call ends with an answering machine and does not result in a returned call. I live in hope!

Cheaper access to the Internet would allow me to explore a large number of sites around the world that provide local WXSAT images and information. Each weekend I find and visit many sites in the search for locally obtained NOAA APT and HRPT images. Interestingly, there appear to be more amateurs ready to transfer their satellite imagery to the web than do the professional organizations. This is probably a matter of available staff time. In this article I have listed some web site updates.

WXSATs – preferred orbits

Three decades ago, 1968 to be precise, I found myself working with radio telescopes. As one of the new recruits, I was also asked to "stand in" while Britain's only scientific satellite – Ariel-5 – was being tested in a simulated space environment prior to launch. My presence was merely that of a "caretaker," in which my colleague and I simply monitored some dials while the satellite was roasted or frozen (I forget which!). The only excitement throughout a long, boring weekend was the explosion of an electric light bulb! During this period, I had a look at satellite orbits and slowly began to understand the intricacies of elliptical, geostationary and circular orbits.

Using powerful rockets launched from suitable locations, a satellite can be put into almost any type of orbit. A satellite orbit with a high inclination to the earth's equator will eventually pass over every part of the earth – so such an orbit is perfect for WXSATs (NOAAs, Meteors, Sich, Okean and Resurs).

By adjusting the height of the orbit (and therefore its period) and its inclination, the resulting orbital plane can be set to keep pace with the slow movement of the earth around the sun. The orbital plane slowly moves around the earth; if the orbit synchronizes suitably with the sun, the satellite keeps its solar panels in conditions of good illumination. There are an infinite number of orbits that are sun-synchronous, but those passing north or south around the middle of the day are going to produce favorable conditions of solar illumination. One of my first ever WXSAT recordings was that of Meteor 1-30, that passed southbound over Britain each morning around 1100 UTC, transmitting APT on an unusual frequency near 137.1 MHz.

FIG 1: *Resurs 01-4 pass over east Atlantic 1307 UTC December 5, 1999*

In an orbit that constantly changes its plane with respect to the sun – such as that of Meteor 3-5 – there will always be periods when the solar panels receive a relatively low level of solar illumination. Many Meteor satellites were launched into such orbits; in contrast, Resurs 01-4 was placed in a nominally sun-synchronous orbit and can be heard several times each day on 137.85 MHz when passing southbound. Like the Meteors, Resurs does not transmit during the nighttime part of its orbit – except near the end, just before entry into sunshine.

Like its Meteor brethren, its image transmissions show streaks and bands; an unusual anomaly also occurs along one edge where part of the image is repeated in reverse, giving the appearance of a reflection – see figure 1. The dark northern polar region is currently seen well in Resurs images because, unlike both NOAA and the Meteor WXSATs, Resurs transmits near the end of the unlit portion. Additionally, its higher orbit results in longer acquisition times.

Meteor transmissions only start when the ground below the craft is near full illumination; NOAA-14 and NOAA-15 transmit an image from the near-infrared part of the spectrum until switching over to a visible-light channel at a programmed time. Consequently, Resurs shows a larger amount of the curved dark twilight zone during these late autumn passes.

Winter images from NOAA

With all settings on the decoding software at the correct values, NOAA daytime visible-light channel images are still all but washed out. A touch of contrast and brightness level adjustment to an image, using an image processing program, reveals everything. Figure 2 is a contrast enhanced image from Milan Konecny, who keeps an updated series of NOAA and Resurs WXSAT images on his web site at:

http://ourworld.compuserve.com/homepages/Milan_Konecny

The dark twilight region seen across the upper right of Milan's image compares with the similar dark region seen across the upper left of Resurs images. Resurs is passing southbound during the late morning, and NOAA-14 is passing northbound during the afternoon.

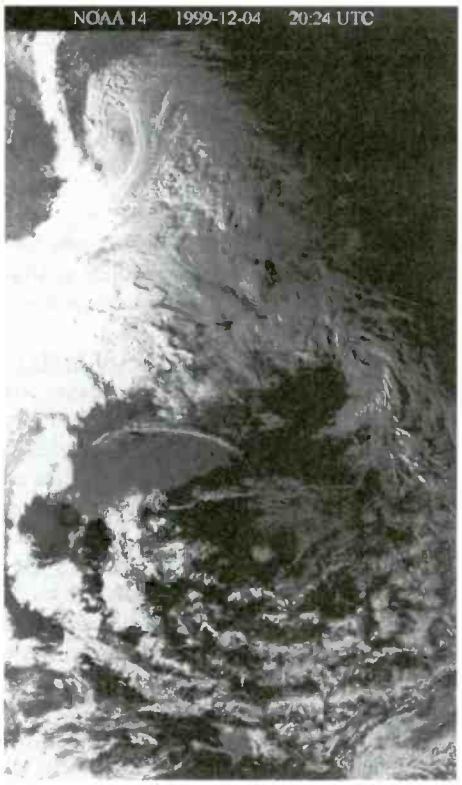

FIG 2: *NOAA-14 December 4, 1999 at 2024 UTC from Milan Konecny*

The orbits of both are nominally sun-synchronous.

The failure of the Japanese launch vehicle carrying the Japanese MTSAT weather satellite has denied us our first taste of the new digital WXSAT transmission. I do not know yet whether a backup satellite is available for later launch.

GOES-8 and GOES-10

With these geostationary WXSATs in virtually permanent operation over continental USA, those with suitable equipment are able to receive transmissions from either (or both) satellites. Others that might be wondering whether there is anything of real interest could be amazed by the diversity of imagery. As with GOES-8 (the current GOES-east spacecraft), GOES-10 transmits a sequence of images according to a published schedule.

Sequences from GOES-8 and GOES-10 are scheduled with those from the Japanese WXSAT GMS, the European Meteosat-7, and the polar orbiting satellite NOAA-14. The main difference between the schedules is that each carries its home images earlier than the others. GOES-10 images are transmitted from GOES-8 and vice versa. The NOAA-14 formats included in the schedule allow US users a significant advantage over the European users of Meteosat-7; we have no direct means of monitoring the polar regions.

A series of infrared images from both poles are obtained by the NOAA polar orbiters and a mosaic of these is subsequently transmitted at different times by both GOES WXSATs. Figure 3 shows a composite of infrared images of the south polar region originating from NOAA-14.

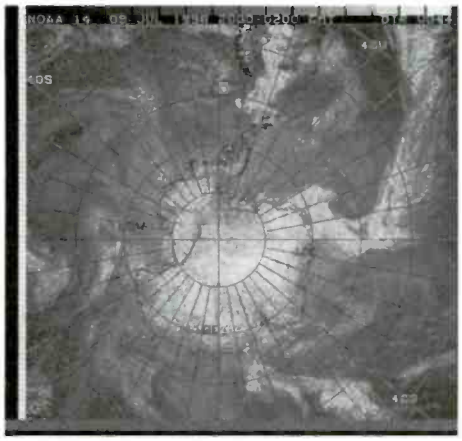

FIG 3: *The south polar region from NOAA-14 via GOES-8 (and GOES-10)*

Internet site update

The Global Hydrology and Climate Center web site now includes HRPT images from NOAA-12, NOAA-14 and NOAA-15 in near-real-time, in addition to high resolution images from GOES. This is one of only a few HRPT image sources of North America on the web. Images are presented in the form of thumbnails, which, when selected, can then download 1 km-resolution visible band data from GOES-8, as well as the other bands, together with images from GOES-10, GMS and METEOSAT. My thanks to Milan Konecny for pointing this out.

http://wwwghcc.msfc.nasa.gov/GOES/
http://wwwghcc.msfc.nasa.gov/avhrr/

For European sites carrying HRPT, try Russia! The *Space Monitoring Information Support Laboratory (SMIS)* of the Space Research Institute (IKI RAN) provides continuous monitoring of NOAA satellites' HRPT telemetry, and images from each pass are placed on their web site:

http://smis.iki.rssi.ru/data/monitor/reg_s_e.shtml

During one of my regular explorations of their site I noticed that they specifically included an image of the Baikonur region! Times certainly have changed during the last 15 years. The site carries each pass from NOAA-12 and NOAA-14 in *gif* format as quick-look data, together with the same passes in *tdf* format, requiring further analysis.

Dundee Satellite Receiving Station is in Dundee, Scotland, UK, and provides free access to APT images, though you are requested to register (at no cost); this helps to justify funding for the project. HRPT images are available by separate registration but are chargeable.

http://www.sat.dundee.ac.uk/

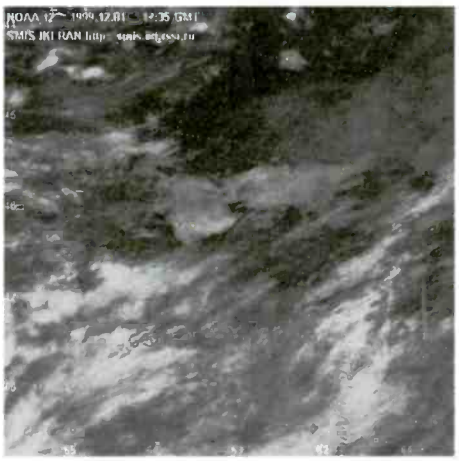

FIG 4: *Baikonur NOAA-12 December 4, 1999, 1235 UTC courtesy SMIS Laboratory, Russia.*

FREQUENCIES

NOAA-14 transmits APT on 137.62 MHz
NOAA-15 transmits APT on 137.50 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
Resurs 1-4 transmits APT on 137.85 MHz
Okean-O, Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz
GOES-8 and GOES-10 use 1691 MHz for WEFAX

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National Interagency Fire Center

During the last several months we have experienced extremely dry conditions here in the southeast United States. This raised the fire danger and wildland fires broke out in several states. As is usually the case, manpower and communications were strained to the maximum. When the call went out for help, the National Interagency Fire Center (NIFC) answered the call. Almost overnight a whole new set of frequencies appeared in the federal spectrum as NIFC brought in the extra gear and manpower needed to stop the wildland fires.

But what is the NIFC and where can you hear their communications?

The "Boise" Interagency Fire Center, established in 1965, evolved from separate efforts by the Bureau of Land Management and Forest Service to improve fire and aviation support throughout much of the Great Basin and Inter-mountain West. The Weather Bureau soon added its fire weather forecasting capability to this unique venture. Efforts to pool fire and aviation resources proved so successful that three more natural resource agencies – National Park Service, Bureau of Indian Affairs, and Fish and Wildlife Service – joined the Center in the 1970s. By that time, participating agencies' missions had become national in scope. In early 1993 the Center's name was changed to "National" Interagency Fire Center (NIFC) to more accurately reflect its national mission.

The National Interagency Fire Center located in Boise, Idaho, is the nation's support center for wildland firefighting. Wildland fire does not respect jurisdictional boundaries. No single federal, state, local, tribal, or volunteer agency alone can handle all wildland fires that may occur in its jurisdiction. Seven agencies work together to exchange support, protection responsibilities, information, and training, providing an efficient method for protecting lives, property, and natural resources.

U.S. Forest Service (USFS)/U.S. Department of Agriculture: USFS manages 191 million acres of national forests and grasslands. State wildland fire organizations are represented at NIFC through the forest service's cooperative state and private forestry authorities.

Fish and Wildlife Service (FWS)/U.S. Department of the Interior: FWS manages more than 92 million acres of national wildlife refuges and wetland areas. The FWS national division of refuges – Fire Management Branch, is headquartered at NIFC.

National Park Service (NPS)/U.S. Department of the Interior: NPS administers 80 million acres of national parks, monuments, historic sites, natural areas, and other federal lands. Its national branch of fire and aviation is located at NIFC.

Bureau of Land Management (BLM)/U.S. Department of the Interior: BLM manages 264 million acres of public lands, provides fire protection for 388 million acres, and is the host agency at NIFC. BLM's National Office of Fire and Aviation is also headquartered at NIFC.

Bureau of Indian Affairs (BIA)/U.S. Department of the Interior: BIA provides wildland fire protection for 60 million acres of Indian reservations and other trust lands. BIA's national wildland fire and aviation staff is headquartered at NIFC.

National Weather Service (NWS)/U.S. Department of Commerce: NWS provides vital weather analysis, forecasts, and training to all fire management agencies. During fire season, NWS provides daily weather briefings to NIFC.

Office of Aircraft Services (OAS)/U.S. Department of the Interior: OAS provides aircraft, and technical and administrative aviation services to governmental organizations. OAS, is part of the Office of the Secretary of the Interior and is headquartered at NIFC.

So the next time a major wildland or forest fire breaks out in your area, be sure to keep the frequencies in Table 1 close at hand. You will be able to stay on top of the situation by monitoring the NIFC.

TABLE 1: US NATIONAL INTERAGENCY FIRE CENTER/NATIONAL INCIDENT RADIO SUPPORT CACHE

(Mode is narrowband FM unless otherwise indicated)

National Interagency Fire Center

36.650	Low band non-incident aircraft
36.750	Low band non-incident aircraft
36.950	Low band non-incident aircraft
38.350	Low band non-incident aircraft
38.550	Low band non-incident aircraft
38.750	Low band non-incident aircraft
38.850	Low band non-incident aircraft
41.350	Low band non-incident aircraft
122.850	Air-to-air/air-to-ground rotor wing (AM mode)
122.925	Air-to-air/air-to-ground rotor and fixed wing (AM mode)
122.975	Air-to-air rotor wing (AM mode)
123.025	Air-to-air/air-to-ground rotor wing (AM mode)
123.050	Air-to-ground rotor wing (AM mode)
123.075	Air-to-air/air-to-ground rotor wing (AM mode)
135.975	National air-to-ground (air tanker bases) (AM mode)
163.1000	All government agencies itinerant (Nationwide)
166.6125	NIFC Command 4 repeater output/input 168.400
166.6750	NIFC Air Tactics 1 (air-to-air)
166.7250	Interior Department Tactical 1
166.7750	Interior Department Tactical 2
167.1000	NIFC Command 5 repeater output/input 169.750
167.9500	NIFC Air Tactics 5 (air-to-air)
168.0250	US Forest Service Law Enforcement Nationwide
168.0500	US Forest Service Tactical 1
168.0750	NIFC Command 3 repeater output/input 170.425
168.1000	NIFC Command 2 repeater output/input 170.450
168.2000	US Forest Service Tactical 2
168.2500	Interior Department Tactical 3
168.3500	All government agencies itinerant (Nationwide)
168.4750	NIFC Command 6 repeater output/input 173.8125
168.5500	NIFC Call-up and smoke jumper use
168.6000	US Forest Service Tactical 3
168.6250	NIFC Air guard nationwide
168.6500	NIFC Standard Flight Following (all aircraft)
168.7000	NIFC Command 1 repeater output/input 170.975
169.1500	NIFC Air Tactics 2 (air-to-air)
169.2000	NIFC Air Tactics 3 (air-to-air)
169.3500	Federal Aviation Administration - simplex
170.0000	NIFC Air Tactics 4 (air-to-ground)
414.6500	NIFC Logistics 1 repeater output/input 410.775
415.4000	NIFC Logistics 2 repeater output/input 411.400
415.5000	NIFC Logistics 3 repeater output/input 411.500
417.3000	NIFC Logistics 4 repeater output/input 411.750
417.3500	NIFC Logistics 5 repeater output/input 411.925
417.5000	NIFC Logistics 6 repeater output/input 412.150
417.8000	NIFC Logistics 7 repeater output/input 412.200

TABLE TWO: FEDERAL FREQUENCY ALLOCATIONS: 169-169.9875 MHZ

169.0000	Air Force, Army, Bureau of Land Management, Energy Department, EPA, FAA, Federal Law Enforcement Training Center, Geologic Survey, NASA, Navy, Post Office, Smithsonian Institute, Veterans Administration
169.0125	(No reported activity)
169.0250	Bureau of Land Management, Energy Department, Environmental Research Lab Nationwide), FBI, Fish and Wildlife Service, Forest Service (Region 5), Geologic Survey, National Bureau of Standards, National Weather Service, Veterans Administration
169.0375	(No reported activity)
169.0500	Bureau of Prisons, Energy Department, Environmental Research Labs (Nationwide), FBI, Geologic Survey, National Gallery of Art, National Ocean Survey, National Weather Service, NOAA Data Buoy Office, Smithsonian Institute
169.0625	(No reported activity)
169.0750	Army, Bureau of Land Management, Commerce Department, Energy Department, Environmental Research Labs (Nationwide), Forest Service (Region 4), Interior Department, NASA, National Marine Fisheries Service (Nationwide), National Ocean Survey (Nationwide), National Weather Service, USIA
169.0875	Interior Department (Nationwide)
169.1000	Army, Bureau of Reclamation, Energy Department, Forest Service, Housing and Urban Development (Nationwide), Nuclear Regulatory Commission (Nationwide), Post Office, State Department (Nationwide)
169.1125	Interior Department (Nationwide), Post Office, Veterans Administration
169.1250	Agriculture Department (Nationwide), Bureau of Indian Affairs, Extension Service, Fish and Wildlife Service, Forest Service, National Park Service, Soil Conservation Service, Veterans Administration
169.1375	Forest Service
169.1500	Agriculture Department (Nationwide), Agriculture Research Service, Animal and Plant Health Inspection Service, Bureau of Indian Affairs, Extension Service, Forest Service, National Park Service, Smithsonian Institute
169.1625	Forest Service
169.1750	Agriculture Department (Nationwide), Agriculture Research Service, Animal and Plant Health Inspection Service, Army, Bureau of Indian Affairs, Bureau of Land Management, EPA, Fish and Wildlife Service, Forest Service, National Park Service, Navy, Post Office, Veterans Administration
169.1875	Animal and Plant Health Inspection Service, Forest Service
169.2000	Agriculture Department (Nationwide), Army, Extension Service, DOE, Food Safety and Inspection Service (Nationwide), Forest Service, Smithsonian Institute, Veterans Administration
169.2125	FAA, NASA (Nationwide)
169.2250	Army, Bureau of Land Management, Capitol Police, FAA, Geologic Survey, Post Office, Soil Conservation Service
169.2375	(No reported activity)
169.2500	Bureau of Land Management, Coast Guard, FAA (Nationwide), Geologic Survey, Los Angeles Federal Executive Board Radio Network
169.2625	(No reported activity)
169.2750	FAA (Nationwide), Post Office, Soil Conservation Service, Veterans Administration
169.2875	Interior Department (Nationwide)
169.3000	FAA, Veterans Administration
169.3125	FAA
169.3250	Air Force, Bureau of Land Management, FAA, Forest Service, National Park Service, Soil Conservation Service
169.3375	(No reported activity)
169.3500	Bureau of Land Management (Nationwide), Commerce Department, FAA (Nationwide)
169.3625	Interior Department (Nationwide)
169.3750	Energy Department, FAA, Geologic Survey, Navy, Post Office, Smithsonian Institute
169.3875	(No reported activity)
169.4000	Army, Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, Forest Service, Geologic Survey, Interior Department, NASA, Navy, National Park Service, TVA
169.4125	(No reported activity)
169.4250	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
169.4375	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
169.4450	Low power, wireless microphones up to 54 kHz bandwidth, 50 milliwatts maximum power
169.4500	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
169.4625	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
169.4750	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
169.4875	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
169.5000	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
169.5050	Low power, wireless microphones up to 54 kHz bandwidth, 50 milliwatts maximum power
169.5125	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
169.5250	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
169.5375	(No reported activity)
169.5500	ATF, Bureau of Indian Affair, Bureau of Land Management, Bureau of Reclamation, Customs Service, Energy Department, Federal Highway Administration, Federal Law Enforcement Training Center, Federal Reserve System, Fish and Wildlife Service, Forest Service, Interior Department (Nationwide), National Park Service
169.5625	(No reported activity)
169.5750	Air Force, Army, Bureau of Mines, Corps of Engineers, Energy Department, EPA (Nationwide), FAA, FBI, Forest Service, Geologic Survey, House of Representatives, Marine Corps, National Park Service, Navy, Post Office, Social Security Administration, Veterans Administration
169.5875	(No reported activity)
169.6000	Air Force, Army, Bureau of the Mint, Coast Guard, Energy Department, FAA, Federal Law Enforcement Training Center, Forest Service, Geologic Survey, NASA, Navy, Post Office, Veterans Administration
169.6125	(No reported activity)
169.6250	Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Energy Department, FBI, Forest Service, Geologic Survey, Indian Health Service, Interior Department, Post Office, Smithsonian Institute
169.6375	(No reported activity)
169.6500	Army, Bureau of Land Management, Bureau of Reclamation (Nationwide), Fish and Wildlife Service, Interior Department (Nationwide), NASA, National Park Service, Post Office
169.6625	(No reported activity)
169.6750	Army, Bureau of Reclamation, Energy Department, FBI, Forest Service, Interior Department (Nationwide), National Park Service, Veterans Administration
169.6875	Interior Department (Nationwide)
169.7000	Bureau of Indian Affairs (Nationwide), Bureau of Land Management, Bureau of Mines (Nationwide), FBI (Nationwide), Fish and Wildlife Service, Geologic Survey (Nationwide), Interior Department (Nationwide), National Park Service (Nationwide)
169.7125	Interior Department (Nationwide)
169.7250	Energy Department, FBI, Fish and Wildlife Service, Forest Service, Geologic Survey, Interior Department (Nationwide), National Park Service, Smithsonian Institute, TVA
169.7375	(No reported activity)
169.7500	Bureau of Land Management (Nationwide), Bureau of Mines (Nationwide), Interior Department (Nationwide), National Park Service (Nationwide), Navy
169.7625	(No reported activity)
169.7750	Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Forest Service, Geologic Survey (Nationwide), Interior Department (Nationwide), National Park Service
169.7875	Interior Department (Nationwide)
169.8000	Bureau of Indian Affairs (Nationwide), Bureau of Land Management (Nationwide), FBI (Nationwide), Fish and Wildlife Service (Nationwide), Forest Service (Nationwide), Interior Department (Nationwide), National Park Service (Nationwide), State Department
169.8125	Interior Department (Nationwide)
169.8250	Bureau of Land Management (Nationwide), Bureau of Mines (Nationwide), Geologic Survey (Nationwide), Interior Department (Nationwide), Mine Safety and Health Administration (Nationwide)
169.8375	(No reported activity)
169.8500	Post Office (Nationwide-Postal Inspectors)
169.8625	(No reported activity)
169.8750	Agriculture Department (Nationwide), Agriculture Research Service, Animal and Plant Health Inspection Service, FBI, FEMA, Forest Service, Geologic Survey, Navy, Soil Conservation Service
169.8875	Forest Service
169.9000	Agriculture Department (Nationwide), Animal and Plant Health Service, Army, Bureau of Land Management, FBI, Fish and Wildlife Service, Forest Service, Post Office, Soil Conservation Service
169.9125	Forest Service
169.9250	Agriculture Department (Nationwide), Agricultural Extension Service, Army, Forest Service, Geologic Survey, National Park Service, Smithsonian Institute, Soil Conservation Service, White House Communications Agency (Nationwide-Delta)
169.9375	Air Force and Forest Service
169.9500	Agriculture Department (Nationwide), Agriculture Research Service, Animal and Plant Health Inspection Service, Energy Department, FBI, Forest Service (Law Enforcement), Immigration and Naturalization Service, Soil Conservation Service, Veterans Administration
169.9625	(No reported activity)
169.9750	Agriculture Department (Nationwide), Animal and Plant Health Inspection Service, Energy Department, EPA, FBI, Forest Service, Soil Conservation Service
169.9875	Forest Service, Interior Department (Nationwide)

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A Trunked System Demo

Last month we talked about the basic ideas behind trunking. This month we're going to dig a little deeper into the details of trunking systems and explain in some detail how they work.

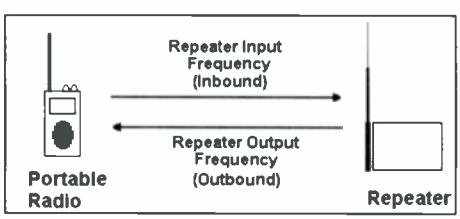
When you get right down to it, there are really only three things that make up a trunking system: repeaters, a controller, and radios.

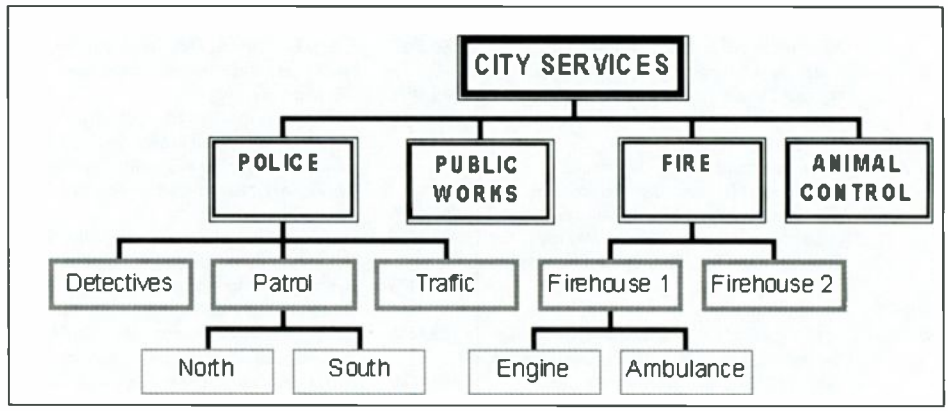
Repeaters are the large antenna towers and associated equipment that are situated around the service area. They have a simple job, which is to listen for signals on one radio frequency (called the *input frequency*) and rebroadcast them on another radio frequency (called the *output frequency*). These signals are sometimes referred to by direction, where *outbound* transmissions are from the repeater on the output frequency and *inbound* transmissions come to the repeater on the input frequency. Outbound transmissions are relatively strong, and this is what scanner listeners tune to. Inbound transmissions are usually low power, so they're often very difficult to receive on a scanner.

Repeaters are connected to a *controller*, which is a computer and some interface hardware that coordinates the activities of all the radios in the service area. It may also connect to the telephone system or other specialized equipment, depending on the needs of the system owner.

Mobile and portable radio units transmit to a repeater on the input frequency and listen to that repeater on the output frequency. These radios are usually the "push-to-talk" variety and are capable of rapidly switching from one frequency to another based on messages from the controller. Before being placed into service each radio is programmed with information it needs to operate correctly, including input and output radio frequencies for each of the repeaters in the service area.

Each radio is also a member of one or more "talk groups."





Talk Groups

Talk groups are the way a trunking system organizes users. A good way to understand how talk groups are formed is by example, so let's take a look at how a fictional city might be set up.

Trunked radio systems are not cheap, so the city council wants to share the system among all the city services, including the police department, fire department, public works, and even the dogcatcher (called animal control these days). Some of these departments are internally organized into divisions according to what they do or where they operate. For instance, the police department in our fictional city has patrol officers, detectives, and traffic control units. The patrol officers are further split into a group for the northern patrol area and another group for the southern patrol area. Likewise, our city is protected by two firehouses, one of which also has an ambulance. The public works department has a group for water and another for sanitation. Animal control has no divisions.

We can list these individual groups and assign a unique "talk group" number to each one.

NUMBER	GROUP	SUB-GROUP
1	Police	North Patrol
2	Police	South Patrol
3	Police	All Patrols
4	Police	Detectives
5	Police	Traffic
6	Police	All
7	Fire	Firehouse 1 Engine Company
8	Fire	Firehouse 1 Ambulance
9	Fire	Firehouse 2
10	Fire	All
11	Public Works	Water
12	Public Works	Sanitation
13	Animal Control	

In this example, each police officer working the northern patrol area would have a radio programmed to be part of group number 1, and those in the southern patrol area would have radios that were part of group number 2. Since the radios in our city can be members of more than one group at time, we can program every patrol officer radio, whether they work in the north or in the south, to also be a member of group number 3. Since talk group number 3 is shared among all patrol officers, it is the one to use if someone wanted to contact every patrol officer at once. Looking at our chart, talk group 6 would be programmed into every police radio regardless of who was using it, and this is how every member of the police department could be reached simultaneously.

Using the group number chart, the radio for each of the police officers listed below would be programmed with the corresponding talk groups. The dispatcher would have a radio set with all the talk groups in order to reach any group.

OFFICER	TALK GROUPS
North Patrol Officer Jones	1, 3, 6
North Patrol Officer Davis	1, 3, 6
South Patrol Officer Smith	2, 3, 6
North and South Patrol Sergeant Miller	1, 2, 3, 6
Detective Foster	4, 6
Traffic Unit Baker	5, 6
Police Dispatcher	1, 2, 3, 4, 5, 6

When the dispatcher wanted to call the officers in the southern patrol area, he or she would select talk group 2. To reach every detective, the dispatcher would use talk group 4, and so on. In our example Sergeant Miller covers both the northern and southern patrol areas, so Miller's radio is a member of both talk groups 1 and 2.

Channels

A repeater input frequency is always paired with an output frequency. A frequency pair is referred to as a *channel*, and a trunked radio system may have anywhere from five to more than two dozen of them. In many systems one of these channels is assigned to act as a *control channel* while the rest serve as *voice channels*. Voice channels are sometimes referred to as *traffic channels*.

The outbound control channel carries a continuous stream of digital messages from the repeater to the radios. This data includes system information, channel assignments, and messages describing which talk groups are active on which channels.

Because the repeater assigned to control channel duty is transmitting continuously, many trunked systems spread the wear and tear by rotating the control channel among a set group of channels to avoid making one repeater do all the work. This is usually done every 24 hours, so don't be surprised if the control channel of the system you're monitoring changes every day.

Our fictional city has been assigned five channels (note that these frequencies are rounded to the nearest megahertz for clarity of explanation):

CHANNEL	INBOUND	OUTBOUND
1	816 MHz	861 MHz
2	817 MHz	862 MHz
3	818 MHz	863 MHz
4	819 MHz	864 MHz
5	820 MHz	865 MHz

The Trunking Process

With our fictional city all set up, let's walk through the steps of a typical trunked conversation. (Old hands at trunking may recognize some clues to the type of system used by our city. For instance, systems sold by Motorola all have centralized controllers where other manufacturers may not.)

When a mobile or portable radio is first turned on it scans each of the channels (the repeater output frequencies) programmed in its memory until it finds the control channel. If it can't find a control channel it will report an error to the user, otherwise will start decoding the data stream sent from the controller.

A portable radio in our fictional city would first tune to 861 MHz and listen for control channel data. If it didn't find any, it would automatically retune to 862 and listen again, and so on up through 865 MHz. Let's say that control channel today is number 4, so the radio will end up being tuned to 864 MHz.

During the times when the radio is not involved in a conversation it will continue to monitor the control channel, decoding the data stream and looking for a message containing one of the talk groups programmed into it. The user won't hear anything while this is going on because speaker is muted – the buzzing digital hash only makes sense to the decoding circuitry.

Channel Assignment

When a user decides to talk, he or she chooses the proper talk group (usually with a selector knob) and keys the microphone with a push-to-talk (PTT) button. The radio immediately transmits a burst of digital data to the repeater on the control channel. The repeater forwards this data to the controller. The controller, in turn, locates an idle voice channel and assigns it to the talk group associated with the requesting radio. It then transmits a message back out on the control channel to inform everyone of the channel assignment. This entire process normally takes less than half a second.

In our example, let's say the patrol sergeant wants to speak with the officers assigned to the northern patrol area. He turns the selector knob to talk group 1 and presses the PTT button. His radio transmits an inbound message on 819 MHz, the inbound side of our current control channel. The message gets to the controller, which finds that channel 2 is idle, and so assigns it to talk group 1. The controller then instructs the repeater to transmit a message on the outbound control channel informing everyone that talk group 1 will be active on channel 2.

Since every idle radio is tuned to the control channel, every radio hears the channel assignment message. Radios that are part of the talk group automatically switch to the assigned voice channel. Radios that are not part of the talk group ignore the message and continue monitoring the control channel.

The radios of Jones and Davis, because they're programmed as part of talk group 1, automatically tune to channel 2 and begin listening to the voice channel coming from the repeater on 862 MHz. The dispatcher's radio will also tune to 862 MHz.

Sergeant Miller's radio automatically switches to channel 2 and has a quick digital conversation with the controller to confirm that the retune was successful and everything is ready. At this point the sergeant will hear a couple of beeps from his radio, indicating he may begin speaking.

Conversation

As the sergeant speaks, his radio transmits his voice to the repeater on 817 MHz. The repeater rebroadcasts his voice on 862 MHz, along with some additional information carried as *subaudible data*. As the name implies, subaudible data are made up of tones that are below the normal threshold of human hearing. Radio users and scanner listeners won't hear them, but decoding circuitry can identify the tones and make use of the data.

The radios for Officers Jones and Davis, and the dispatcher, will decode the subaudible data on 862 MHz and use it to confirm that they're tuned to the right channel. If everything matches the radio will unmute the speaker and Sergeant Miller's voice will be heard.

When the sergeant is done speaking he releases the PTT button. His radio sends a message to the controller (via the repeater) telling it that his transmission is finished. Other members of the talk group may now participate in the conversation, and the repeater will continue to retransmit their voices.

During the course of the conversation the controller monitors the voice channel for activity. If there is no activity for a certain amount of time (meaning no one is talking), the controller will release the voice channel.

Channel Release

The controller transmits a message on the voice channel (channel 2 in our example) instructing all the radios to return to the control channel. It then marks channel 2 as idle and puts it back in the pool of available channels.

This is the basic procedure for transmissions in a trunking system. There a number of details and variations that we'll cover in future columns, including priority talk groups, radios with talk-around capability, channel spacing in the various trunking frequency bands, and emergency preemption.

Until then you can reach me by electronic mail at *dan@decodesystems.com*, or check my web pages at **http://www.decodesystems.com**. Until next month, happy monitoring!

SERVICE SEARCH

SCANNER GUIDE TO THE RADIO SPECTRUM

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Public Safety Frequency Pool - Part II

This month's *Service Search* column will be taking an in-depth look at the rest of the public safety frequency allocations we have not covered in previous months. This month we will cover the remaining PX UHF assignments. Frequencies marked "PX" can be allocated by any Public Safety Coordinator to any public service organization authorized frequencies from the public safety pool, except the Special Emergency Coordinator.

Frequencies marked "PT" are without any coordinator specified and may be coordinated by any coordinator certified in the Public Safety Pool. These frequencies are currently being licensed by the Federal Communications Commission. Scanner listeners should be listening for newly allocated splinter channels (VHF 7.5 kHz/UHF 6.25 kHz) to become active in their areas.

453.0125	PX	Mobile	
453.0250	PX	Central control, fixed base, or mobile	
453.0375	PX	Base or mobile	
453.0500	PX	Base or mobile	
453.05625	PX	Base or mobile	(1)
453.0625	PX	Base or mobile	
453.06875	PX	Base or mobile	(1)
453.0750	PX	Central control, fixed base, or mobile	
453.0875	PX	Base or mobile	
453.1000	PX	Base or mobile	
453.10625	PX	Base or mobile	(1)
453.1125	PX	Base or mobile	
453.11875	PX	Base or mobile	(1)
453.1250	PX	Central control, fixed base, or mobile	
453.1375	PX	Base or mobile	
453.1500	PX	Base or mobile	
453.15625	PX	Base or mobile	(1)
453.1625	PX	Base or mobile	
453.16875	PX	Base or mobile	(1)
453.1750	PX	Central control, fixed base, or mobile	
453.1875	PX	Base or mobile	(2)
453.2000	PX	Base or mobile	
453.20625	PX	Base or mobile	(1)
453.2125	PX	Base or mobile	(2)
453.21875	PX	Base or mobile	(1)
453.2250	PX	Base or mobile	
453.23125	PX	Base or mobile	(1)
453.2375	PX	Base or mobile	(2)
453.24375	PX	Base or mobile	(1)
453.2500	PX	Base or mobile	
453.25625	PX	Base or mobile	(1)
453.2625	PX	Base or mobile	(2)
453.26875	PX	Base or mobile	(1)
453.2750	PX	Base or mobile	
453.28125	PX	Base or mobile	(1)
453.2875	PX	Base or mobile	(2)
453.29375	PX	Base or mobile	(1)
453.3000	PX	Base or mobile	
453.30625	PX	Base or mobile	(1)
453.3125	PX	Base or mobile	(2)
453.31875	PX	Base or mobile	(1)
453.3250	PX	Base or mobile	
453.33125	PX	Base or mobile	(1)
453.3375	PX	Base or mobile	(2)
453.34375	PX	Base or mobile	(1)
453.3500	PX	Base or mobile	
453.35625	PX	Base or mobile	(1)
453.3625	PX	Base or mobile	(2)
453.36875	PX	Base or mobile	(1)
453.3750	PX	Base or mobile	
453.38125	PX	Base or mobile	(1)
453.3875	PX	Base or mobile	(2)
453.39375	PX	Base or mobile	(1)
453.4000	PX	Base or mobile	
453.40625	PX	Base or mobile	(1)
453.4125	PX	Base or mobile	(2)
453.41875	PX	Base or mobile	(1)
453.4250	PX	Base or mobile	
453.43125	PX	Base or mobile	(1)
453.4375	PX	Base or mobile	(2)
453.44375	PX	Base or mobile	(1)
453.4500	PX	Base or mobile	
453.45625	PX	Base or mobile	(1)
453.4625	PX	Base or mobile	(2)
453.46875	PX	Base or mobile	(1)
453.4750	PX	Base or mobile	
453.48125	PX	Base or mobile	(1)
453.4875	PX	Base or mobile	(2)
453.49375	PX	Base or mobile	(1)
453.5000	PX	Base or mobile	
453.50625	PX	Base or mobile	(1)
453.5125	PX	Base or mobile	(2)
453.51875	PX	Base or mobile	(1)
453.5250	PX	Base or mobile	
453.53125	PX	Base or mobile	(1)
453.5375	PX	Base or mobile	(2)
453.54375	PX	Base or mobile	(1)
453.5500	PX	Base or mobile	
453.55625	PX	Base or mobile	(1)
453.5625	PX	Base or mobile	(2)
453.56875	PX	Base or mobile	(1)
453.5750	PX	Base or mobile	
453.58125	PX	Base or mobile	(1)
453.5875	PX	Base or mobile	(2)
453.59375	PX	Base or mobile	(1)
453.6000	PX	Base or mobile	
453.60625	PX	Base or mobile	(1)
453.6125	PX	Base or mobile	(2)
453.61875	PX	Base or mobile	(1)
453.6250	PX	Base or mobile	
453.63125	PX	Base or mobile	(1)
453.6375	PX	Base or mobile	(2)
453.64375	PX	Base or mobile	(1)
453.6500	PX	Base or mobile	
453.65625	PX	Base or mobile	(1)
453.6625	PX	Base or mobile	(2)
453.66875	PX	Base or mobile	(1)
453.6750	PX	Base or mobile	
453.68125	PX	Base or mobile	(1)
453.6875	PX	Base or mobile	(2)
453.69375	PX	Base or mobile	(1)
453.7000	PX	Base or mobile	
453.70625	PX	Base or mobile	(1)
453.7125	PX	Base or mobile	(2)
453.71875	PX	Base or mobile	(1)
453.7250	PX	Base or mobile	
453.73125	PX	Base or mobile	(1)
453.7375	PX	Base or mobile	(2)
453.74375	PX	Base or mobile	(1)
453.7500	PX	Base or mobile	
453.75625	PX	Base or mobile	(1)
453.7625	PX	Base or mobile	(2)
453.76875	PX	Base or mobile	(1)
453.7750	PX	Base or mobile	
453.78125	PX	Base or mobile	(1)
453.7875	PX	Base or mobile	(2)
453.79375	PX	Base or mobile	(1)
453.8000	PX	Base or mobile	
453.80625	PX	Base or mobile	(1)
453.8125	PX	Base or mobile	(2)
453.81875	PX	Base or mobile	(1)
453.8250	PX	Base or mobile	
453.83125	PX	Base or mobile	(1)
453.8375	PX	Base or mobile	(2)
453.84375	PX	Base or mobile	(1)
453.8500	PX	Base or mobile	
453.85625	PX	Base or mobile	(1)
453.8625	PX	Base or mobile	(2)
453.86875	PX	Base or mobile	(1)
453.8750	PX	Base or mobile	
453.88125	PX	Base or mobile	(1)
453.8875	PX	Base or mobile	(2)
453.89375	PX	Base or mobile	(1)
453.9000	PX	Base or mobile	
453.90625	PX	Base or mobile	(1)
453.9125	PX	Base or mobile	(2)
453.91875	PX	Base or mobile	(1)
453.9250	PX	Base or mobile	
453.93125	PX	Base or mobile	(1)
453.9375	PX	Base or mobile	(2)
453.94375	PX	Base or mobile	(1)
453.9500	PX	Base or mobile	
453.95625	PX	Base or mobile	(1)
453.9625	PX	Base or mobile	(2)
453.96875	PX	Base or mobile	(1)
453.9750	PX	Base or mobile	
453.98125	PX	Base or mobile	(1)
453.9875	PX	Base or mobile	(2)
453.99375	PX	Base or mobile	(1)
458.0250	PX	Radio call boxes, fixed or mobile	
458.0375	PX	Mobile	(2)
458.0500	PX	Mobile	
458.05625	PX	Mobile	(1)
458.0625	PX	Mobile	(2)
458.06875	PX	Mobile	(1)
458.0750	PX	Radio call boxes, fixed or mobile	
458.0875	PX	Mobile	(2)
458.1000	PX	Mobile	
458.10625	PX	Mobile	(1)
458.1125	PX	Mobile	(2)
458.11875	PX	Mobile	(1)
458.1250	PX	Radio call boxes, fixed or mobile	
458.1375	PX	Mobile	(2)
458.1500	PX	Mobile	
458.15625	PX	Mobile	(1)
458.1625	PX	Mobile	(2)
458.16875	PX	Mobile	(1)
458.1750	PX	Radio call boxes, fixed or mobile	
458.1875	PX	Mobile	(2)
458.2000	PX	Mobile	
458.20625	PX	Mobile	(1)
458.2125	PX	Mobile	(2)
458.21875	PX	Mobile	(1)
458.2250	PX	Mobile	
458.23125	PX	Mobile	(1)
458.2375	PX	Mobile	(2)
458.24375	PX	Mobile	(1)
458.2500	PX	Mobile	
458.25625	PX	Mobile	(1)
458.2625	PX	Mobile	(2)
458.26875	PX	Mobile	(1)
458.2750	PX	Mobile	
458.28125	PX	Mobile	(1)
458.2875	PX	Mobile	(2)
458.29375	PX	Mobile	(1)
458.3000	PX	Mobile	
458.30625	PX	Mobile	(1)
458.3125	PX	Mobile	(2)
458.31875	PX	Mobile	(1)
458.3250	PX	Mobile	
458.33125	PX	Mobile	(1)
458.3375	PX	Mobile	(2)
458.34375	PX	Mobile	(1)
458.3500	PX	Mobile	
458.35625	PX	Mobile	(1)
458.3625	PX	Mobile	(2)
458.36875	PX	Mobile	(1)
458.3750	PX	Mobile	
458.38125	PX	Mobile	(1)
458.3875	PX	Mobile	(2)
458.39375	PX	Mobile	(1)
458.4000	PX	Mobile	
458.40625	PX	Mobile	(1)
458.4125	PX	Mobile	(2)
458.41875	PX	Mobile	(1)
458.4250	PX	Mobile	
458.43125	PX	Mobile	(1)
458.4375	PX	Mobile	(2)
458.44375	PX	Mobile	(1)
458.4500	PX	Mobile	
458.45625	PX	Mobile	(1)
458.4625	PX	Mobile	(2)
458.46875	PX	Mobile	(1)
458.4750	PX	Mobile	
458.48125	PX	Mobile	(1)
458.4875	PX	Mobile	(2)
458.49375	PX	Mobile	(1)
458.5000	PX	Mobile	
458.50625	PX	Mobile	(1)
458.5125	PX	Mobile	(2)
458.51875	PX	Mobile	(1)
458.5250	PX	Mobile	
458.53125	PX	Mobile	(1)
458.5375	PX	Mobile	(2)
458.54375	PX	Mobile	(1)
458.5500	PX	Mobile	
458.55625	PX	Mobile	(1)
458.5625	PX	Mobile	(2)
458.56875	PX	Mobile	(1)
458.5750	PX	Mobile	
458.58125	PX	Mobile	(1)
458.5875	PX	Mobile	(2)
458.59375	PX	Mobile	(1)
458.6000	PX	Mobile	
458.60625	PX	Mobile	(1)
458.6125	PX	Mobile	(2)
458.61875	PX	Mobile	(1)
458.6250	PX	Mobile	
458.63125	PX	Mobile	(1)
458.6375	PX	Mobile	(2)
458.64375	PX	Mobile	(1)
458.6500	PX	Mobile	
458.65625	PX	Mobile	(1)
458.6625	PX	Mobile	(2)
458.66875	PX	Mobile	(1)
458.6750	PX	Mobile	
458.68125	PX	Mobile	(1)
458.6875	PX	Mobile	(2)
458.69375	PX	Mobile	(1)
458.7000	PX	Mobile	
458.70625	PX	Mobile	(1)
458.7125	PX	Mobile	(2)
458.71875	PX	Mobile	(1)
458.7250	PX	Mobile	
458.73125	PX	Mobile	(1)
458.7375	PX	Mobile	(2)
458.74375	PX	Mobile	(1)
458.7500	PX	Mobile	
458.75625	PX	Mobile	(1)
458.7625	PX	Mobile	(2)
458.76875	PX	Mobile	(1)
458.7750	PX	Mobile	
458.78125	PX	Mobile	(1)
458.7875	PX	Mobile	(2)
458.79375	PX	Mobile	(1)
458.8000	PX	Mobile	
458.80625	PX	Mobile	(1)
458.8125	PX	Mobile	(2)
458.81875	PX	Mobile	(1)
458.8250	PX	Mobile	
458.83125	PX	Mobile	(1)
458.8375	PX	Mobile	(2)
458.84375	PX	Mobile	(1)
458.8500	PX	Mobile	
458.85625	PX	Mobile	(1)
458.8625	PX	Mobile	(2)
458.86875	PX	Mobile	(1)
458.8750	PX	Mobile	
458.88125	PX	Mobile	(1)
458.8875	PX	Mobile	(2)
458.89375	PX	Mobile	(1)
458.9000	PX	Mobile	
458.90625	PX	Mobile	(1)
458.9125	PX	Mobile	(2)
458.91875	PX	Mobile	(1)
458.9250	PX	Mobile	
458.93125	PX	Mobile	(1)
458.9375	PX	Mobile	(2)
458.94375	PX	Mobile	(1)
458.9500	PX	Mobile	
458.95625	PX	Mobile	(1)
458.9625	PX	Mobile	(2)
458.96875	PX	Mobile	(1)
458.9750	PX	Mobile	
458.98125	PX	Mobile	(1)
458.9875	PX	Mobile	(2)
458.99375	PX	Mobile	(1)
470-512	PX	Base or mobile	
806-824	PT	Mobile	
851-859	PT	Base or mobile	
928 and above	PT	Operational fixed	
929-930	PT	Base only, one way paging	
1427-1435	PT	Operational fixed, base or mobile	
2450-2500	PT	Base or mobile	No new, current renewed
10550-10680	PT	Base or mobile	No new, current renewed

(1) Bandwidth not to exceed 6 kHz
(2) Bandwidth not to exceed 11.25 kHz

TRUNKING SCANNERS FROM GROVE

Realistic PRO-92

Follow all three leading trunking systems—Motorola (I, II, I/II hybrid), GE/Ericsson (EDACS), and Johnson/Uniden (LTR)—as well as conventional communications with this potent hand-held! The **PRO-92** scans up to 10 trunked and conventional systems simultaneously, and you can enter alphanumeric identifications into its 500 memory channels for easy recognition!

Even better, this feature-packed portable receives local weather alerts (SAME), and has self-contained CTCSS decoding! An optional cloning interface automatically programs other units.

Covers 29-54, 108-174, 380-512, and 806-960 MHz (less cellular). Includes flex antenna and belt clip. Requires 6 AA alkaline or rechargeable cells, and/or AC adaptor/charger.

ACCESSORIES

ANT 14	Austin Condor flex whip	$29.95	PWR 22	AC wall adaptor/charger	$8.95
DCC 3	Universal DC adaptor	$12.95			

ORDER SCN 46 Only $329.95

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Uniden BC-245XLT

This hand-held communications marvel has captured the scanner marketplace with its dual trunking capabilities! Imagine scanning through conventional channels as well as both Motorola and GE-Ericsson EDACS channels simultaneously, stopping to hear any communications—your choice—on any of these systems!

With land, sea, and air frequency coverage of 29-54, 108-174, 406-512, and 806-956 MHz (less cellular), and 300 memory channels in 10 banks, this potent Bearcat even offers a nine-pin cable connector to permit downloading of computer databases. The information-packed LCD display is backlit for easy night viewing.

Factory pre-programmed search ranges target active police, fire/emergency, air, marine, railroad, and weather channels. Standard features include:

- Individual channel lockout
- Search
- Channel-selectable delay
- Data skip
- 10 priority channels
- Three-day memory backup without batteries or power, and
- Lightning-fast turbo scan!

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plus $12 UPS shipping or US Priority Mail

Realistic PRO-2052

For desktop scanning, the low-profile **PRO-2052** follows Motorola I, II, I/II hybrid as well as GE/Ericsson (EDACS) trunked systems. Extended frequency coverage provides 29-54, 108-512, 806-960 (less cellular), and 1240-1300 MHz! Built in weather alerts can be encoded for your specific SAME location. The RS232C serial interface invites computer control, data uploading and downloading, and similar-unit cloning.

With 20 priority channels, data skip, and search skip, this base unit operates from its own AC adaptor, or from an optional mobile cord. Includes detachable antenna and nationwide trunked frequency list.

ACCESSORIES

DCC 16	Cigarette lighter mobile power cord	$3.95
ANT 7	Scantenna with 50 feet coax	$49.95
ANT 30	Magnetic mount Stealth antenna	$34.95

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plus $12 UPS shipping or US Priority Mail

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800-438-8155 (US and Canada); 828-837-9200; 828-837-2216 (Fax)

7540 Hwy 64W; Brasstown, NC 28902; web: www.grove-ent.com; e-mail: order@grove-ent.com

Jean Baker, KIN9DD

Navigational Aids

Welcome aboard! We've had a lot of requests recently for material in the column about navaids (navigational aids). Today we are going to talk about them and how they operate. Since we hear a lot of reference to these when we monitor aero communications, it helps to know what they are and what they do. A big thank you for this information to Mark Weymouth, who is in the Air Force and stationed in Guam.

Instrument Landing System

The Instrument Landing System (ILS) is made up of a localizer and glideslope and provides guidance to inbound aircraft during low visibility.

The localizer is located at the stop end of the runway on the extended runway centerline and provides horizontal guidance. The glide slope is located beside the runway near the touchdown point and provides vertical guidance. Inbound aircraft "fly the needle," i.e., if an aircraft is left of centerline, the aircraft's navigation needle goes right, indicating the pilot must fly right.

The common localizer antenna configuration is made up of 14 log periodic dipole antennas (there are some systems with fewer antennas; however, 14 is the norm due to reflections of large buildings along the runway). The composite radiation pattern of 14 antennas create the left and right aircraft needle movement.

The glide slope antenna system has three variations depending on terrain: null reference (flat terrain) has two antennas equally spaced; sideband reference (down sloping terrain) has two antennas with the top antenna being three times the height of the lower; and finally the capture effect (uneven terrain) which has three antennas, all equally spaced on the mast. Each of the three systems accomplish the same thing – to move the aircraft needle up and down according to the glide path angle.

Note: ILS localizers and Distance Measuring Equipment (DME) transponders (100 watts) can be co-channel to provide DME information to ILS, non-TACAN (tactical air navigation) equipped aircraft.

Equipment configuration and ability to provide acceptable guidance determines what category the ILS will be certified as, and directly affects the pilot's decision point (when a pilot must be able to see the runway or call a "missed approach").

CAT I (category 1) requires one transmitter and one monitor; acceptable guidance to 1/2 mile and 200 feet.

CAT II requires two transmitters (one on cold standby), two monitors, an inner marker, and a TACAN/DME (or middle marker). Acceptable guidance to 1/4 mile and 100 feet above runway threshold. The standard CAT II minima is 100 ft. above TDZE (touchdown zone elevation) and between 1200-2400 ft. RVR (runway visual range).

CAT III requires two transmitters (one on hot standby), three monitors, an inner marker, and a TACAN/DME (or middle marker). CAT III minima depend on the category of CAT III; IIIa has a DA (decision altitude) of 50 ft. above TDZE and an RVR between 800-1200 ft.; CAT IIIb minima has no DA and requires an RVR of 600-800 ft.; and CAT IIIc is a 0/0 landing and is not authorized at most airports.

TACAN

The TACAN (TACtical Air Navigation) is primarily a military long range navigational aid sited with, or instead of a VOR. The transponder outputs a 3 kW pulsed RF signal between 962 and 1213 MHz (126 separate channels), and provides azimuth, station identification, and distance information. The system is usable up to 200 nm (nautical miles) and can supply distance information to 10 aircraft at a time. The system is more accurate than the VOR and can reliably maintain azimuth readings within 0.3 degrees by measuring phase shift of radiated signals upon occurrence of the transponder reference bursts.

VOR

The VOR (Very high frequency OmniRange) provides magnetic bearing information for long range navigation (up to 175 nm). The transmitter[1] outputs 25-100 W continuous RF from 108-118 MHz (160 separate channels), and provides bearing, station identification, and possible voice.

To provide bearing[2] information, the VOR uses two signals: a reference and a variable. The reference is an amplitude modulated 9960 (+/-480) Hz FM subcarrier which varies at a 30 Hz rate. The variable is a double sideband suppressed carrier varying at a 30 Hz rate. The maximum reference frequency (10440 Hz) occurs when the radiation pattern (clockwise rotating limacon pattern created by the variable space modulating the carrier) is pointing north. To determine bearing, the aircraft extracts the 30 Hz FM from the reference and the 30 Hz AM from the variable and measures their phase difference.

VORTAC

A VORTAC system – you guessed it – is a collocated (within 50 feet) VOR and TACAN. The two systems are frequency co-channeled and their identifiers are tied together. This way, VOR users can detect and use the DME function from the TACAN.

Marker Beacons

Marker beacons are designed to give a pilot an idea of their distance from runway threshold. The full beacon set has three markers: an outer (4-7 miles remaining), a middle (3500 ft. remaining), and an inner (1000 ft. remaining). Each marker outputs a specific tone and code (400, 2400, and 3000 Hz respectively) which can be heard by a pilot on course doing an ILS approach. The tones are also used to activate a marker indicator light on the pilot's panel.

Note: A full beacon is seldom used to mark an airfield – an inner and possibly middle is the norm (dependent on ILS category).

Miscellaneous

Other navigational and radar equipment include the following:

OMEGA and DECCA: Very Low frequency, continuous-wave, global radio navigational systems that were Coast Guard maintained (both now terminated).

MLS: Microwave Landing System (in use).

CHAYKA: Russian Version of LORAN (in use).

GLONASS: Russian GLObal Navigation Satellite System similar to U.S. GPS (in use).

NAVSTAR GPS: U.S. Global Positioning System (in use).

EGNOS - European Geostationary Navigation Overlay System. Satellite landing system designed to meet CAT I minimums (European version of WAAS; under development).

GNSS-2: A civilian-controlled international Global Navigation Satellite System. In simple terms, it is basically a combination of GPS and GLONASS (proposed).

New Technologies

The FAA is working towards a single navigation system to augment, then replace, ground-based radio navigation aids to include: VOR/DME, LORAN-C, OMEGA, ILS and TACANs. The new system is based on GPS (Differential Global Positioning System) technology and its enhanced accuracy over GPS (DGPS is traditional GPS with the addition of ground-based

"reference receivers" which provide error correction at surveyed points, particularly airfields, to create an Autonomous Precision Approach and Landing System (APALS).

The overall system is made up of WAAS (Wide Area Augmentation System) and LAAS (Local Area Augmentation System). WAAS will be able to provide long range guidance and will also meet CAT I minimums for aircraft landings. The LAAS will provide additional local reference receivers to provide increased guidance information to meet CAT II and III requirements. The end result is a system which provides total guidance from takeoff to landing with the premise of worldwide coverage (precision landings at other countries depends on their support of reference receiver installation).

The current FAA time line is a viable system by 2005 (Recommended by the White House Commission on Aviation Safety and Security).

DBRITE (Digital Bright Radar Indicator Tower Equipment): Provides Air Traffic Control, a graphical display of range and azimuth for aircraft within a 60 mile radius (known as primary radar). When combined with a TOZ-42 (known as secondary radar, IIF/SIF, beacon radar, or synthetic radar) and an automation system, the DBRITE can also display aircraft ID, beacon codes, altitude speed, trails, coast/suspend and arrival/departure lists, barometric pressure, and collision avoidance information on up to 128 aircraft all overlaid on up to five maps.

The TPX-42 has a range of 200 miles; however, the DBRITE can only display up to 60 miles. Primary RADAR information is received via the ASR (aircraft surveillance radar) and sent to the DSC (digital scan converter) at the RACCOON (Radar APproach CONtrol). The DBRITE can also be installed in a TRACON (Terminal Radar Approach Control). In fact, it can be pretty much installed anywhere. The DBRITE display itself is really a glorified TV monitor that displays radar returns for roughly a 60 mile area.

Secondary RADAR is received via the ASR and sent to the automation system (ARTS or Automated RADAR Terminal System), or PIDP (Programmable Indicator Data Processor). Data is converted into alpha-numeric and sent to the DSC where it is overlaid on selected maps. Once primary and secondary information are combined in the DSC, they are then sent directly to the ATC Tower via a combination of dedicated lines, modems and microwave links.

The PS&J (Power Supply and Junction) box in the ATC tower process BIT (built-in Test) information and switch position data. This information is sent to the automation system and DSC, where error codes and/or display data changes are initiated. In a common configuration there is one radar "dish" to transmit/receive returns, one DSC to interpret the data and create a video signal (overlay it on range markers, maps, trails, etc.), and up to 12 DBRITE displays.

Of course, this is a down and dirty overview, but it explains the system's "big picture" (there are actually many ways to configure the system).

Thanks, Mark!

Ramp rats and related activities

We all like to listen to pilots talking with air traffic control and company stations, but there are other groups utilizing communications at airports. These include airport police, fire companies, catering, etc. They can all be heard; however, you do have to be relatively close to the airport. Do a scan search.

Another group that's fun to monitor are the "ramp rats." These are ramp frequencies used by baggage haulers, gate attendants, ticket agents, and others. The frequency range starts around 460.700 and goes up the frequency scale from there. But the majority are found between 460.700 and 463.500 MHz. Let your scanner do the walking!

That's all for today. See you in March with more news and views. Until then, 73 and out.

There's a lot more to listen to at an airport than air traffic control. A scanner search turns up all kinds of conversations by baggage handlers, airport police, catering, and maintenance crews, like this one trying to get the door closed on a Delta aircraft. Harry Baughn caught the communications on his Optoelectronics Interceptor.

NOTES:

1 A *transmitter* sends information in one direction; a *transponder* both sends and receives info.

2 *Bearing* is the direction to get to the station, azimuth is your location from the station (aircraft due south of the station will get a bearing of 0 degrees, and azimuth of 180 degrees).

Doug Smith, W9WI
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Mailbag

Mail tends to come in spurts here on "DX Acres"; this month, along with all the junk mail came a number of good letters from readers. There's also big DX news north of the border, but we'll get back to that in a minute.

Eddi Gorham of Chattanooga asked if I'd caught the new Orlando expanded-band station, WTIR on 1680. Yes, they're pretty loud up here in the Nashville area. As of the deadline for this column, WTIR was still testing with a continuous tape loop. Eddi asked if they have an official start date – I have no idea.

She's also been DXing with a copy of the *World Radio-TV Handbook*, and has discovered (as many have) that it's rather lacking in its listings of North American medium-wave/AM stations. Eddi, your timing is excellent. (Grin!) I have just received a copy of the new 20th Edition *AM Radio Log* from the National Radio Club. This is generally regarded as the best reference of U.S. and Canadian AM stations for the DXer. You'll find all the information that's in the *WRTvH*, as well as programming information, antenna data, and more. And it lists *all* AM broadcasting stations (though not tourist-information outlets), not just those of high power. The book is $22.95 (there's a discount if you're a NRC member) from NRC Publications, Box 164, Mannsville, NY 13661.

Another letter comes from somebody who has no trouble receiving WTIR-1680. **Gary Hoel** lives near Orlando. He first heard WTIR testing on September 8. Also coming into the Orlando area is WAFN-1700 near Miami. This is the former WRNU; it has switched from a Spanish-language format to English-language all-sports broadcasts; the station now calls itself "The Fan."

Web pages are growing in popularity as reference material for the AM DXer. However, many DXers still prefer printed reference material. The NRC's* AM Radio Log *is an excellent printed reference.

The third letter this month comes from **George Appleton** in Las Vegas. George is using a metal Slinky (yes, the coiled toy that used to walk down stairs in the 1960s!), stretched out along 10 feet of PVC pipe and hanging under the eaves. The lead-in wire comes first through a coil (about 30 turns around a pop can – George doesn't say whether he removed the can after winding the coil) and then to ground. The coil then sits on top of his radio; the signal picked up by the Slinky is inductively coupled into the radio. There is no direct connection. George has used this antenna with both a DX-440 and a Sony 2010; he has also tried it with generic cheap pocket AM radios, with good success.

I know of another DXer having considerable success using Slinkys (Slinkies?) as antennas. The concept is commonly used by hams, as a "loaded whip" antenna, though theory would seem to suggest you'd need something much bigger than a Slinky to have much effect. But the proof is in the DX log!

Bits and Pieces

- Last month, I wrote "the former CBC frequencies 690, 740, 940, and 1580 continue to be open..." It couldn't last forever. The new occupants of 690 and 940 in Montreal are back on the air. Both have been testing with tape loops promoting their new all-news formats. 940 has been giving the calls CKNN (though official sources have not confirmed that callsign), and will broadcast in English. From their callsign, you can probably guess one of the news networks they'll use. 690 has not been giving any callsign, though on their old frequency of 850 they've been CKVL. This station will also be all-news, but in French.
- The Federal Communications Commission is holding its first auction of AM facilities. As you may remember, WOWO-1190 in Fort Wayne, Indiana, recently reduced nighttime power from 50,000 watts to 9,800 and changed its directional antenna pattern to accommodate nighttime operation of WLIB (also on 1190) in New York City. The WOWO changes also made increased nighttime power at several other stations. Five stations applied for increases, but not all five can be granted (or they'd interfere with each other). Under new FCC regulations, an auction will be held; the winning bidder will be allowed to build according to their application. The five stations in question are KPHN Kansas City; WNWC near Madison, Wisconsin; KEX in Portland, Oregon; KDAO Marshalltown, Iowa; and KKOJ Jackson, Minnesota. If KEX wins the auction (in my opinion, a reasonable bet) I would expect Oregon to become much less difficult – though not exactly easy – to DX from the East.

Do you use an exotic antenna or radio in your DXing? Write me at 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
George.Zeller@acclink.com

Focus on Pirate Radio Programming

Last month our column deadline was early because your editor went to Europe, among other things for a visit to **Swiss Radio International** in Bern where Bob Zanotti provided a fascinating tour. Scores of pirate loggings have piled up in the meantime. As a result, this month we profile current programming featured on North American shortwave pirates. The formats listed here can be useful things to know when you're trying to identify stations. These pirate shows clearly have much more diversity than you will hear on licensed commercial radio.

Low Power FM

The FCC web site lists comments that have been filed on its proposal to license low power FM stations in the USA. If you want to file comments, **http://www.fcc.gov/e-file.ecfs.html** provides instructions. Comments already filed can be reviewed at **http://www.fcc.gov/mmb/prd/pfm** on the internet.

What's on the Air

Our readers heard a huge collection of stations; let us know what you have logged lately! We list programming formats and contact maildrops:

Betty Boop Radio- Their tunes come from old Betty Boop movies. (Providence)
Blind Faith Radio- Dr. Napalm hosts a program of classic rock, but pirate radio commentary is usually included. (uses *blindfaithradio@yahoo.com* e-mail)
Brockett 99- This new one concentrates on American Indian themes. (None)
Free Radio America- Their live shows mix rock music and comedy. (Announces a telephone number for reports)
Jerry Rigged Radio- Like most pirates, rock music dominates their fare. (Providence)
KBLK- Their ethnic fare uses a slogan of "The Shortwave Voice of Black Oppression." (Providence)
KIPM- Announcer Alan Maxwell points out that *MT* unfortunately printed a typo on this one's ID late last year. His elaborate drama productions are among the most creative shows in pirate radio. (Lula)
KMUD- Their diverse music ranges from rock to jazz to religious chants. (None)
KRMI- Unrelated to licensed WRMI, pirate commentary and rock music are heard from Radio Michigan International. (None)
Last Resort Radio- A new one that claims to charge $38 for QSLs via the ARRL, but they don't provide a means to send in the reports or the money. (None)
Midi Radio- Computer generated instrumental versions of classic rock songs are featured. (uses *midiradio@yahoo.com* e-mail)
Radio Bingo- The pirate radio bingo game is still active occasionally. (None)
Radio Cochiguaz- When they're active, this South American pirate and others like Radio Blandengue ordinarily use 6950 or 6925 kHz; check both upper and lower sideband on weekends. (Santiago)
Radio Corbain- Logically enough, they feature Kurt Corbain's Nirvana music. (None)
Radio Free Speech- Veteran pirate Bill O. Rights entertains with a variety of music, comedy sketches, and commentaries on political rights. (Belfast)
Radio Garbanzo- Pirate radio legend Fearless Fred produces a fast paced collection of side-splitting comedy. (Belfast)
Radio Laws- Complex music and Star Trek sketches have been the programming on this so-far mysterious new one. (None)
Radio Metallica Worldwide- Dr. Tornado's 10 kW transmitter makes him the best known and best heard North American pirate. Shows combine rock music with commentary on whatever strikes the Doctor's fancy. (Blue Ridge Summit)
Radio Three- Sal Amoniac's shows are mainly rock music productions. (Providence)
Radio Toronto- Another new one broadcasting rock music from the 14th floor of Pitman Hall at Ryerson Polytechnical University in Toronto. (Merlin)
RBCN- Radio Bob's original comedy productions and rock music have a clear southern USA focus. (Lula)
The Radio- This generic name is hosted by a generic guy named "The Announcer," who plays rock music. (Belfast)
Voice of Captain Ron Shortwave- Captain Ron's programming is dominated by rock music. (uses *captainronswr@yahoo.com*)
Voice of Prozac- The female announcers here use a slogan of "The Relaxation Station." (Pittsburgh)
Voice of the Irky Pen- Inky the Pirate's new station plays some alternative rock, but mainly he renders pirate commentary while imbibing alcohol. (None)
Voice of the Runaway Maharishi- The Maharishi features rock music, drug advocacy, and occasional interviews with other pirates. (Belfast)
WBIG- Big Mike typically programs rock music, but comedy is part of his efforts. (Belfast)
WLIS- Jack Boggan's veteran station plays shortwave broadcast station interval signals as though they are hit tunes. (Blue Ridge Summit)

WHYP- A memorial station commemorating James Brownyard, a veteran local personality on licensed radio at the eastern tip of Lake Erie (uses *whyp1530@yahoo.com* e-mail)
WMFQ- This one seems like a rock music pirate, but all IDs are by a chanting male chorus who promote pirate QSLs with graphic language. (Providence)
WMOE- This new one plays novelty tunes with Three Stooges music as an interval signal. (uses *wmoe6955@yahoo.com* e-mail)
WRAY- Their unusual specialty is instrumental rock music, with a slogan of "All Ray, All the Time." (Belfast)
WRX- Jimmy the Weasel has become a semi-legend in pirate radio. His blunt and sometime gruff sarcastic comments about pirate radio stations and DXers are mixed with his mildly profane a capella singing. (Manomet)

Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 24, Lula, GA 30554; PO Box 1464, Manomet, MA 02345; PO Box 293, Merlin, Ontario N0P 1W0; PO Box 25302, Pittsburgh, PA 15242; and Casilla 159, Santiago 14, Chile.

Thanks

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail addresses atop the column. We appreciate material sent in this month by Shawn Axelrod, Winnipeg, Manitoba; Ranier Brandt, Hoefer, Germany; Ray Carmen; Ross Comeau, Andover, MA; Reuben Dagold, Baltimore, MD; Joe Filipkowski, Providence, RI; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Raul Gonzalez, Santiago, Chile; Paul Griffin, San Francisco CA; Steve Grubb, Fontana, CA; William T. Hassig, Mt. Prospect, IL; Bill Hochstatter, Colfax, WA; Mike Jurries, Evansdale, IA; Tom Katzele, St. Croix Falls, WI; Harald Kunl, Germany; Kurt Lucius, Tiffin, OH; Bill McClintock, Minneapolis, MN; Cachito Mamani, Santiago, Chile; Greg Majewski, Oakdale, CT; Alan Maxwell, Lula, GA; Michael Prindle, New Suffolk, NY; Jerry Revis, Houston, TX; Marty Sanchez, Rio-Rancho, NM; Clevis Svetlik, Cleveland, OH; Lee Silvi, Mentor, OH; DJ Stevie, Basel, Switzerland; and Niel Wolfish, Toronto, Ontario.

BELOW 500 KHZ

DXING THE BASEMENT BAND

Kevin Carey, WB2QMY
lowband@gateway.net

Prime Time

In North America, the month of February often brings the best LW listening of the year. It's not so much that signals are stronger, but you don't have to deal with the horrendous storm static that prevails during the warmer months. In general, the signal-to-noise ratio is much higher now, and this makes for far better DXing below 500 kHz.

This month, let's focus on targets in the Caribbean and South America. These regions give many beacon hunters their longest intercepts ever, with receiving distances of 4000 miles or more being reported under good conditions.

A directional antenna such as a loop certainly helps when trying to snag DX stations. Often, it will allow you to null a competing station and focus on a desired (and weaker) beacon signal. However, if you use a simple wire antenna, don't despair. Many times nature creates its own "directivity," allowing stations from one region to boom in for an hour or so, and then fade out, only to be replaced by signals from a completely different direction.

Dick Pearce (VT), *Loggings* Editor for *The Lowdown* (45 Wildflower Road, Levittown, PA 19057) was kind enough to share many of his DX logs from the Caribbean and South America. Selected picks from his list are shown in Table 1.

TABLE 1. SELECTED DX BEACONS

FREQ.	ID	LOCATION
212	UCF	Cienfuegos, Cuba
232	GT	Grand Turk Isle, BWI
232	UMZ	Manzanillo, Cuba
260	TOY	Tongoy, Chile
294	ZIP	Zipaquira, COL
300	SM	San Marcos, BRAZ
311	TBG	Panama City, PAN
318	SSB	San Sabastian, VEN
320	FLA	Florencia, COL
323	BSD	St. David's Head, BERM
326	BHF	Freeport, BAH
330	CZM	Cozumel, MEX
353	HOT	Higuerote, VEN
360	KIN	Kingston, JAM
370	UCM	Camaguey, Cuba
375	TGE	Guatemala City, GUAT
375	BUN	Buenaventura, COL
376	ZIN	Great Inagua, BAH
400	PIE	Bucaramanga, COL
405	BVI	Boa Vista, BRAZ
407	SWA	Swan Island, HOND
415	CBC	Cayman Brac, BWI
415	SLS	Salinas, ECU
450	PPA	Puerto Plata, D. REP
526	ZLS	Stella Maris, BAH

A New Home for Old Radios

Three years ago, I had the pleasure of joining fellow members of the Antique Wireless Association (**http://www.antiquewireless.org/**) on a trip to the Hammond Museum of Radio located in Guelph, Ontario (45 minutes west of Toronto). The museum was the brainchild of Fred Hammond, VE3HC, a past principal of Hammond Manufacturing Company.

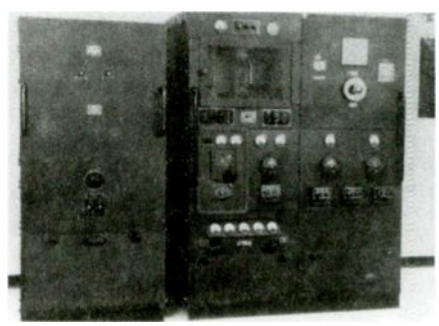
The museum collection included hundreds of ham and broadcast radios from every era, a huge tube collection (lighted), telegraph keys, vintage literature and dozens of broadcast microphones. It was a radio lover's paradise – and a day I'll never forget.

As a bonus, we also toured the nearby Hammond Mfg. Plant where one of the museum's pieces – a longwave transmitter – was kept in storage because it was too heavy to place on the wooden floor of the museum.

At the end of our visit, Fred told us of his strong desire to find a permanent home for the museum in a modern facility. He felt that the collection needed to be properly preserved in a fire-resistant building that offered easy access to the visiting public. It wasn't long before the wheels at the Hammond Company were turning with a plan.

In just two years, blueprints for the new building became a reality. It was announced that the new facility would occupy a site immediately adjacent to the Hammond Mfg. Southgate plant and would include all of the existing items, plus several new ones that could not be shown previously because of space limitations.

Sadly, Fred suffered a serious stroke prior to the completion of the museum project and was in poor health throughout much of its construction. Nevertheless, Fred's son, Bill Hammond, and his able staff oversaw its completion, and a ribbon-cutting ceremony was held on October 2nd, 1999. It was hoped that Fred could attend the ceremony but his health took a turn for the worse just before the event.



This Mammoth LW transmitter was too large and heavy for display at the old museum. It is now set up in all its splendor at the new Hammond Museum of Radio, Guelph, Ontario (http://www.kwarc.on.ca/hammond/index.html).

I attended the grand opening as a representative of the AWA, and was thoroughly impressed with the museum's new home. The entire collection could now be displayed (including the longwave transmitter) in one, well lit, spacious room. A new addition was Fred's personal ham station, tuned up and ready to go on 20 meters.

Your columnist taking a break from the museum tour to sit at the VE3HC console. This is one of two fully operating ham stations at the museum.

I am sorry to report that Fred became a silent key on November 7, 1999, after a long battle with his illness. He will be sadly missed by radio enthusiasts everywhere and fondly remembered as an ambassador for the hobby. More information about Fred Hammond and the Hammond Museum can be found on the web at **http://www.kwarc.on.ca/hammond/index.html**.

If your plans take you near the Toronto area, I highly recommend a visit to the museum. It can be reached as follows: Take Highway 401 to Highway 6 North in Guelph. Turn right onto Laird Road. Turn left onto Southgate Drive and then into the Hammond Mfg. parking lot.

To arrange for a tour or to obtain more information, please contact Ms. Noreen Irwin, Curator at (519) 822-2960 or drop an e-mail to *info@HammondMuseumofRadio.org*. You may also write to The Hammond Museum of Radio, 595 Southgate Drive, Guelph, Ontario N1G-3W6 Canada.

Continued on page 106

ON THE HAM BANDS ...

THE FUNDAMENTALS OF AMATEUR RADIO

Ike Kerschner, N3IK
email: n3ik@hotbot.com

An Introduction to Ten Meters

A few weeks ago, I spoke to a group of hams about operating and techniques. Most of the group were Tech plus with a sprinkling of Novice and General class hams. The surprising thing was a general lack of information concerning the various ham bands and what to expect from them. The majority of the group were FM operators concentrating on 146 and 440 MHz.

I expected a lot of comments concerning CW operation (why do we need it?): I was disappointed on that issue. Most of the group wanted to know what to expect from ten meters. The other thing that surprised me was the fact that only 4 out of 35 had any HF gear at all! Most of the group never listened to HF. Is this little sample representative of the average? Seems so. So let me tell you about ten meters.

28 to 29.7 MHz

These are the band limits for ten meters. From 28 to 28.3 MHz, CW and digital modes are allowed, and from 28.3 to 28.5 are the limits of the Novice/Tech band on ten meters. Operation on this part of the band is predominately single side band (SSB), although a smattering of slow scan TV (SSTV) shows up here on occasion.

From 28.5 to 29 MHz is exclusive territory for hams holding General class and higher licenses. The main mode of operation here is SSB, with some AM and SSTV. From 29 to 29.7 is the world of ten meter FM. You can hear both FM repeaters and simplex operation; many operators monitor 29.5 and 29.6, which are FM simplex calling frequencies.

What can you expect on Ten?

A lot really. When ten meters is closed or dead, it is still possible to work distances far in excess of what can be worked on VHF. I recall an AM net many years ago when ten was considered dead and still having stations from several states away call in. We had stations 50 miles out call in on a regular basis, and sometimes overseas stations would join us – so in truth ten is never really dead.

When conditions are good on ten, it is not at all unusual to work all continents in a few hours' time. Stations running a few watts can easily work 100 countries on ten meters during periods of high solar activity, such as we are presently experiencing.

Allowing Novice and Tech Plus operators on ten meters was one of the best moves the Federal Communications Commission (FCC) ever made. Most of the old timers would abandon ten when conditions started going downhill and would not come back till peak conditions were in full swing. The Novice/Tech operators restricted to ten (on SSB) showed the rest of the ham world that ten never did die; if you were active, there was always activity.

On FM I have a scanner constantly monitoring 29.5 and 29.6 MHz as well as three repeater frequencies. Many days it is possible to enjoy a rag chew on FM with stations half a world away with both stations running low power. Local friends can keep in touch on ten with better results than VHF most of the time. The shadow effect does not bother ten as much as the higher bands, so effective range is considerably longer. On FM, 40 to 50 miles reliable range is easy as long as you use an effective antenna (vertical is best).

Mobile on ten meters is really fun. One afternoon a friend and I were on a trip of about 150 miles, I had a Radio Shack ten meter rig in the car (25 watts) and we were called by a station in Japan just a few minutes after we started the trip. The QSO lasted till after the trip was over with S9 plus signals both ways. The friend was very impressed and decided to study for a ham ticket as a result of that trip.

Antennas

A half wave antenna on ten is 16 feet long, and, while a half wave dipole is very popular, the vertical quarter wave is one of the more common antennas in use (often being a converted CB antenna). Beams are not extremely large on this band and a four element Yagi or quad will really put some punch into your signal.

For mobile, I have a converted CB antenna magnetic mount on my van and am quite happy with the results. Of course a lot of guys go for the 8 foot whip which is a better choice if you can do it.

Gear

All of the HF rigs on the market today cover ten meters. Power averages 100 watts and is plenty for all operation. If a kW is what you want, go ahead; most of the time it won't make a lot of difference in what you work, though.

There are a few ten-meter-only rigs available; Alinco makes a ten meter FM rig with a power output of 20 watts. The main problem here is that the rig is FM only.

Radio Shack recently introduced its HTX-10, which regularly sells for $149. When this rig was first brought out in November of '99 it was nearly impossible to find one, as every one that reached the store was sold before it got there. I picked one up at the $139 sale price and gave it a try. The first day it was on the air (the antenna was an 80 meter sloper via transmatch) the Pacific was booming in. I worked New Zealand, Siberia, Marshall Islands and Japan in rapid order.

The HTX-10 delivers 25 watts on SSB and FM, and 7 watts on AM. There is no provision for CW on the existing unit. As soon as someone comes up with a mod I'll add it to mine!

Some of the other features are:

Step – lets you change the tuning increment from 1 to 100 kHz
Call – recalls a specific frequency in memory
Scan – scans the entire band stopping on active frequencies for five seconds
Last channel recall – returns to the last channel that was transmitted.
M-Load – recalls memories one to five
M-Save – saves up to five frequencies into memory channels
Noise blanker – reduces electrical noise
Shift – lets you set the frequency shift direction and offset frequency
T-Low – turns the high cut filter on or off
Fine – tunes in stations or interfering signals
RF gain – attenuates strong signals
Mic-gain – reduces microphone gain and SSB transmitting power

The HTX-10 is 6-1/16 x 2-3/64 x 9-41/64 inches in size and weighs in at 3.3 lbs. If you want to work ten meters, the HTX-10 is a rig you should consider. I like mine a lot! Now if we could only get Radio Shack to do a rig like this for six meters.

Clem Small, KR6A
email: clemsmal@bitterroot.net

Vehicular Antennas: Part I

In the early years of the last century, wireless, now usually called radio, was still an amazing new innovation. Wireless in an automobile was even more unusual. In those days antennas were primarily thought of as functioning as one plate of a large capacitor; the other plate being the earth or other nearby conductors. One of the most interesting pictures I've seen of an early-day auto antenna was a large metal cylinder perhaps two feet in diameter and eight to ten feet long mounted horizontally atop an early automobile (fig. 1). Such a contraption did provide a fair amount of capacity to the metal in the auto, and to earth.

Development of AM Broadcast Automobile Antennas

Later, in the 1930s, radios had become more common, and radios in automobiles weren't so rare. The autos of the day had wood-and-canvas roofs rather than metal as is common now, and chickenwire netting built into the auto roof was a commonly utilized antenna. With the coming of steel tops in automobiles these antennas were no longer effective, and other approaches were necessary. Some success was had with antennas mounted underneath the auto, between the auto and the road. Open-frame loop antennas were tried, but they proved impractical due to their size and shape. Various other ideas, including rather long whips, were tried with varying degrees of success.

Somewhere along the way we stopped thinking of antennas primarily in terms of their being a capacitor, and began thinking of them more as a resonant (tuned) circuit. Of course not all antennas are resonant circuits; however, most are designed with a resonant frequency in mind. But, with automobile antennas for AM broadcast band reception there are problems with trying to make the vehicular antenna resonant. One is the range of frequencies which the antenna must cover: spanning from around 500 kHz to more than three times that frequency the band exceeds a MHz in width. This is a forbiddingly wide band to cover with one compact, simple, resonant antenna design.

Another problem is that the physical length of wavelengths involved at these frequencies (from over 600 feet to almost 2000 feet) made it impossible to make linear antennas of a resonant design. And, unfortunately, as a linear antenna's length decreases from its resonant length, the antenna's efficiency decreases. Various loading schemes (such as loading coils and capacity hats) could be used to make a reasonable-length antenna resonant, but this would make the antenna unwieldy, and there would be considerable loss in a coil of the size needed to resonate such a short antenna at frequencies this low.

What has come to pass is that the automobile antennas which we now utilize for the AM broadcast band are extremely short (about a yard or so in length) in relation to the wavelengths received. Such short antennas present a very-high feedpoint impedance to a feedline and are used with very low-capacity feedlines to avoid excessive losses in the feedline. And so, in a sense, we're back to a capacitor antenna! That is, the short whip antenna of an automobile, rather than being a resonant circuit, is something like one plate of a capacitor which encounters the passing radio wavefronts, and passes the charge it receives along its feedline to the receiver.

An automobile AM broadcast antenna can be likened to an active antenna with a whip antenna-element which is much shorter than the wavelengths being received by the whip. The relatively small charge extracted from the passing wave by the whip is amplified by the first stage of the auto radio just as the relatively-weak signals received by the active-antenna's whip are amplified before being fed to the receiver being served by the active antenna.

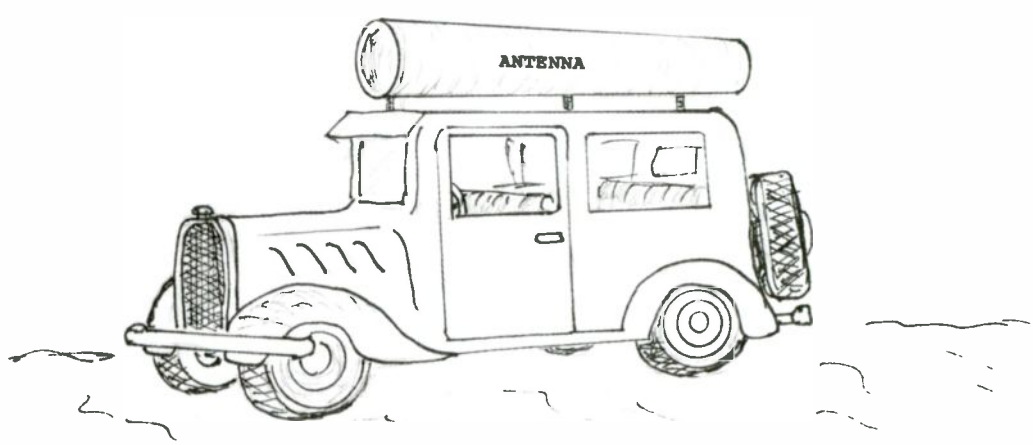
FM Broadcast Automobile Antennas:

The frequencies utilized for FM broadcasting are much higher than for AM. Therefore their wavelengths are much shorter than is the case just discussed for the AM broadcast band. Actually it would be reasonably practical to make the auto FM antenna resonant at any specific frequency in the FM broadcast band if that were desired. Such resonating of antennas is done in two-way mobile work, and so commercial two-way mobile antennas are usually resonant at the frequency of operation. This is often possible because the two-way radio is on a fixed frequency, or a relatively narrow band of frequencies. On the other hand the FM broadcast band is wide (20 MHz). And so, at least across most of the band, FM broadcast antennas are essentially untuned whips, although they may be resonant at some frequency within that band.

FM Diversity Antennas:

It is not uncommon for different portions of an FM signal to take different paths to a receiving antenna as the signals reflect from large buildings, towers or cliffs. Thus two or

FIG. 1. *An old-time "capacitor" automotive antenna*



more wavefronts from a single signal source may follow different paths to reach your antenna. These different wavefronts may or may not be in phase (i.e., arrive simultaneously), depending on the relative lengths of the paths which they have traveled from the transmitting-station antenna to your receiving antenna. If these wavefronts are in phase they will add together at the antenna, and the signal will be relatively strong. If they are out-of-phase, as they often are, they can partially, or even totally, cancel one another. As you drive along you will encounter wavefronts which have followed various paths, and the resulting addition and cancellation of these signals can cause fading.

One way to combat this fading is by the use of space diversity. Space diversity systems monitor the input from more than one antenna, and select the antenna with the strongest signal. Because antennas spaced only a few wavelengths apart can be receiving different wavefronts space diversity helps in reducing multipath fading. With modern technology it is quite practical to utilize diversity reception for FM broadcast reception in vehicles. At least one space diversity system has been developed for this purpose.

Speaking of Vehicular Antennas

Amateur radio operators have a long history of the utilization of antennas on vehicles in their mobile communications. At VHF several resonant antenna designs are small enough to be accommodated nicely on a vehicle. Even at HF it is possible to have reasonably efficient resonant antennas if care is taken in their design.

Don Johnson, a ham who has been instrumental in much of the pioneering work on HF mobile antennas, has written an excellent book on technology of amateur mobile HF antennas called *Everything You Forgot to Ask About HF Mobileering*. It is available from Radio Bookstore, P. O. Box 209, Rindge, NH, 03461 Phone 603-899-6957 or 800-457-7373, or **<radiobooks.com>** or **<radioware.com>** on the web.

This Month's Interesting Antenna-Related Web Site is:

http://www.newscientist.com/ns/19991127/newsstory7.html

Thanks to *MT* reader Henry LaViers for emailing me the address of this interesting site.

RADIO RIDDLES

Last Month:

I said: "I don't want to stick you with a riddle that will throw you for a loop, but I'll take a chance, and ask you 'what very old, last-century antenna design has been employed for decades as an embedded antenna in countless consumer radios?'"

Well, last month I defined an embedded antenna as one "attached to the circuit board as a small component." Small, ferrite, loopstick antennas have been attached to the circuit board in many small portable and pocket-size broadcast radio receivers for decades. That makes loopsticks one of the earliest embedded antennas, and, in that sense, far ahead of their time.

This Month:

I've mentioned resonant antennas several times above. Is it important, or even useful, for an antenna to be resonant?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, 73

Thanks to *MT* reader Huson A. Wilken for suggesting this month's topic.

Marc Ellis
email: mfellis@enteract.com

Battery Sets of the 1920s

In last month's column, we began to look at the designs of the radios first used to receive the rapidly proliferating broadcast stations of the 1920s. During this decade, most serious broadcast listening was done using vacuum tube sets powered by batteries. Crystal sets were still around, to be sure, but they had been already been outclassed by the much more sensitive and reliable vacuum tube receivers.

Though battery power was on the expensive side (and technology hadn't yet advanced to the point where a plug-in radio was possible), those who could afford it were definitely opting for the more reliable operation and louder signals made possible by tubes.

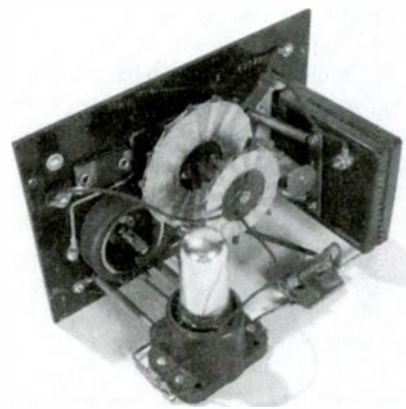


FIG. 2. *Interior shot of the Crosley 50 reveals its simple, sturdy construction.*

Regenerative Receivers

As mentioned last time, commercially-made broadcast radios of the early 1920s were apt to utilize a *regenerative* circuit. This design, developed by legendary radio inventor Edwin Armstrong, squeezed an amazing amount of performance out of a single tube. In the last column, we touched on the theory of operation of the regenerative receiver; this month, we'll take a detailed look at a specific model, the Crosley 50.

The 50 was a "bottom of the line" set using a single tube (type 11 or 12) whose filament was lit by a single dry cell. Advertised at $14.50 about 1925, it was probably the most widely sold regenerative receiver of its type. Crosley offered a very comprehensive line of "regen" sets which included the 2-tube Model 51, the 3-tube Model 52, and several other models.

Note the simple front panel of the "50," (Fig. 1), which boasted only four controls: a tuning dial (left), regeneration control (center top), bandswitch (center bottom) and filament rheostat (right). Antenna and ground binding posts are at left; binding posts for the filament and plate batteries are at right.

FIG. 1. *The diminutive Crosley 50 is only 8" across. Since it was inexpensive, many were made and the "50" is not hard to find today.*

The interior shot of the set (Fig. 2) shows its interesting unit construction. No breadboard or baseboard was used; all major components were hung from the front panel. Note the unusual "book style" tuning capacitor at right, a Crosley hallmark. One of the two metal-foil-backed plates was fixed, and the other hinged at one end and movable, controlled by the front panel tuning knob. The range of capacitance afforded by this design was limited; hence the front-panel bandswitch, which – by contacting various taps on the tuning coil – split the broadcast band into five segments, each small enough to be covered by the tuning capacitor.

The tuning/regeneration coil assembly is at center. By pulling or pushing on the front panel regeneration control knob, the distance between the regeneration, or "tickler," coil (the smaller one) and the tuning coil could be varied – changing the amount of regeneration, or feedback, introduced into the circuit. See last month's column for a more detailed explanation of regeneration.

The grid leak resistor, as was typical, is mounted in a fuse-like tube with metal contacts at the ends. You'll see it, clipped to the grid coupling cap, just in front of the tuning/regeneration coil assembly. The filament rheostat is at the far left, and we'll need to say a few words about its function.

In order to extract the maximum amount of energy from the filament battery(ies) (which, because of the higher drain, had a shorter life than the plate-supply batteries), the filaments of the early tubes were designed to operate on slightly lower than nominal battery voltage. For example, the type 12 often used in the Crosley 50 was rated at 1.1 volts, but operated from a 1.5-volt dry cell. The voltage was reduced to the required voltage by the rheostat.

As the battery aged and its voltage began to drop, the rheostat was adjusted to cut in less and less resistance – always keeping the voltage at the minimum amount necessary for good reception – until the dry cell could no longer provide even that. Then it was time for a new cell.

TRF Receivers

Towards the middle of the 1920s, Westinghouse purchased the rights to the Armstrong regenerative patents and held them very closely. It became difficult for other manufacturers to obtain licenses, and those wishing to enter the lucrative broadcast receiver market had to turn to less-efficient circuitry. As a matter of fact, it required three tubes (two RF amplifiers and a detector) to equal the performance of a single tube connected in a regenerative circuit.

The three-tube circuit required three tuned circuits (coil/variable capacitor combinations) for proper operation. That meant there were three dials to be manipulated in order to locate a station and tune it in. Sets of this design were called TRF (tuned radio frequency) receivers, and are familiarly known by today's collectors as "3-dialers."

A three-tube TRF set (like the single-tube regen circuit to which it was roughly equivalent) would provide only earphone volume. A power-hungry three-tube earphone set didn't make much marketing sense, so the typical three-dialer included the additional two tubes required to drive a loudspeaker. This, at least, was a feature that the single-tube regen couldn't match.

But the TRF circuit offered other advantages as well. In spite of the fact that three knobs had to be manipulated, the TRF was much easier tune than the cranky regenerative receivers, which had to be just on the edge of instability (oscillation) to obtain maximum sensitivity. Listeners who pushed the adjustment over the line would be treated to an earsplitting howl, which would also be broadcast through the antenna to the neighbors' radios.

The additional tuned circuits also provided extra selectivity, which became very desirable

as the broadcasting industry expanded and the radio dial became more crowded. Even today, operating a good-quality 1920s "three-dialer" is a very pleasant experience. The stations tune in and out with satisfying smoothness and the channels are easily separated.

The familiar coffin-shaped three-dial set would soon become a living-room fixture. The filaments of its five 01-A tubes, which glowed as brightly as small light bulbs, were powered by a rechargeable, auto-type, lead-acid battery. Plate voltages for the tubes were supplied by dry batteries. The 01-A filaments operated at five volts, a little less than the six volts put out by a fresh battery, for reasons already discussed. One or more filament rheostats were provided to control the voltage.

A typical TRF "three dialer" (this one is a "Polle Royale") is shown as Fig. 3. In Fig. 4, I've removed the cover to give you a peek inside. You can see the three coil/capacitor assemblies and the five 01-A tubes. The coils are of a somewhat unusual "pancake" design (similar to the coils on the Crosley 50) instead of the more common cylindrical air core design. The detection scheme used the familiar "fuse-style" clip-in grid leak (not visible).

As you become more familiar with three-dialer radios, you'll begin to notice that some of them sport the name "Neutrodyne" on their patent tag or as part of their model designation. This was a term used by the well-known manufacturer Freed-Eisemann to describe a proprietary circuit (also licensed to other manufacturers) for neutralizing the unwanted feedback or oscillation that was a common problem in the TRF's triode RF amplifiers.

FIG. 3. ***By the mid-1920s, three-dialers were among the most common home receivers. They gobbled up energy, but gave speaker volume.***

FIG. 4. ***A peek inside the set of Fig. 3 shows the set of five 01-A tubes and the three tuned circuits.***

To avoid paying for a license to use the elegant Neutrodyne solution, other manufacturers used cruder schemes to control oscillation. For example, Atwater Kent inserted resistors in series with the grids of the three RF amplifiers to limit their gain; Charles Freshman in his "Masterpiece" model cleverly mounted the tuning coils directly on the tuning capacitor frames, which degraded the performance of the tuned circuits to the point where oscillation would not be a problem. This was also a convenient and inexpensive way of mounting the coils. Of course the "losser" designs, as they were called, resulted in sets less sensitive than the Neutrodyne models, but performance was still perfectly acceptable.

Besides variations in circuitry, there were interesting physical variations from the three-dialer's typical coffin-shape. These included the intriguing Colin B. Kennedy sloping-panel, exposed-tube sets; the exotic Grebe models with their horizontal thumbwheel controls; and Atwater Kent's beautifully-crafted "open model" breadboard receivers.

Superheterodynes

In the mid-1920s, an extraordinary new radio design appeared. Like the regenerative receiver, it was a product of the genius of Edwin Armstrong. Unlike the TRF receiver (which amplifies the incoming RF signal at whatever frequency it happens to be received), the superheterodyne converts every incoming signal to a standard, much lower, frequency prior to amplification. By optimizing the amplification channel to operate on a single, standard, lower frequency, greater gain could be achieved without danger of oscillation and greater selectivity could be achieved.

Though the superheterodyne design would become ubiquitous by the 1930s, it was not widely seen in the 1920s. For one thing, the greater tube count and more complicated technology made the sets expensive – not to mention a bit of a drain on the batteries! For another, RCA owned and monopolized the patent on this technology. RCA did produce a number of "superhet" models during the period, in a variety of interesting cabinet styles.

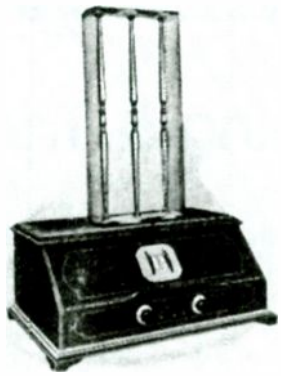


FIG. 5. ***This detail from a mid-1920s publication, though not the best quality, illustrates an RCA superhet (the Model 25). Note rotating loop antenna.***

The extra sensitivity of the superheterodyne circuit made it possible for these sets to operate without the usual outside antenna – though some models did come with a very large and prominent top-mounted rotating loop.

Next month, we'll begin with the advent of AC-powered "plug-in" radios. In the meantime, I'd be pleased to hear from you readers. Let me know your reactions to what has been published so far and send your ideas and suggestions for the future. Though it generally won't be possible to answer letters individually, all mail will be acknowledged in the column. Send e-mail to the address in the column heading or snail-mail to P.O. Box 1306, Evanston, IL 60204-1306.

John Catalano, PhD
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Plugging & Trunking with WiNRADiO

WinRadio, "the software radio," has now been around for a number of years. WinRadio's Rosetta Labs was one of the first companies to capitalize on the flexibility and economics of a computer-based radio. First they introduced the WR-1000 PC, an internal PC card model. Later Rosetta Labs introduced the stand-alone WR-1500 receiver. Both have been very successful in both the consumer and professional markets. However, because of a very aggressive hardware development schedule, the "software flexibility" aspect of the technology had not been fully explored. This has all changed in the past year.

First the company realized the power of making the software an open architecture. In other words, the operating system commands and protocol of the WR-1000/1500 were freely given to the users via the WinRadio website, **WinRadio.com**. Then the company developed, and provided free of charge, application development software.

The idea of giving away this software? Well, first consider all the nonprofessional and off-hours professional software talent around these days. Most of us have had a computer course or two in our education. Others have picked it up via self-teach CDs and videos. WinRadio was quite smart in providing the development package in a number of different computer languages to capture a wide audience.

The business logic goes that, if people spend time writing applications and getting familiar with the operating system they will become devoted, loyal WinRadio customers. Not just for today, but for the future. It is very good business sense, which has worked for people like Apple, Sinclair and almost for IBM. In this case, the old adage should be changed to, "Familiarity breeds repeat business."

Plug in and add on

WinRadio has made development of add-on, plug-in features such as times and function screens even easier with their XRS system. The XRS system provides software "hooks" which allows third-party developers to add options to WinRadio receivers. As the company puts it "XRS plug-ins ensure upward compatibility with all future versions of XRS-capable receivers."

FIGURE 1 - *XRS MicroPanel*

Currently, twelve XRS plug-ins are available for downloading from the WinRadio website for no charge. The plug-ins, which have been developed by various WinRadio users, currently include: Antenna Switcher, Frequency Memo, Hit Counter, Easy Tuner, Keypad, Quick Log, Timer, Watchdog, Waterfall Spectrum Scope, Memory Manager, MicroPanel, Icon for System Tray, and Frequency Memo

The XRS plug-ins are downloaded as Zip files. Once extracted, most find your WinRadio program directory and install themselves within a few seconds. It really is that simple. A new menu appears at the top of the WinRadio screen, "Plug-ins." This pulls down to give access to all plug-ins you have installed.

Although all are useful, I found a few indispensable for WinRadio users. The MicroPanel puts a small version of the radio on the screen. See Figure 1. It can then be dragged to an unobtrusive location. Flipping between work screens, such as Microsoft Word and WinRadio in order to change the frequency, volume and/or mode is a thing of the past. The MicroPanel plug-in is a small, narrow window and takes very little screen area. For me, this is a great help that lets me easily do some monitoring while working on my computer.

Timing is everything

So the saying goes. Timer XRS plug-in insures that you will not miss that once-in-a-lifetime radio event. See Figure 2. The timer allows you to set an event's date and time. Then you can choose the type of event that will occur. For example, set the radio to a new frequency, log a frequency, set the volume level, or even turn the radio on. Twelve different event types are possible. Setting of multiple events at different dates and times is very useful for unattended monitoring.

FIGURE 2 - *XRS Timer - Stored Events displayed in right window*

The hits keep coming

The Hit Counter plug-in gives a visual indication of the activity in a frequency spectrum. I found it very useful while hunting for new frequencies in the air band. The screen is a bar graph and displays the scanned frequencies on the horizontal, for example 118 to 129 MHz. As the radio scans the "hits," or detects a signal present condition, it makes the line "grow" vertically at that active frequency. Leaving my WR-1500 "hit counting" all day showed exactly what frequencies were hot for air band communications.

All of the XRS plug-ins have their own usefulness and will be welcome additions to anyone using a WinRadio. And they are FREE!

Trunk tracking WinRadio style

The XRS approach is so convenient that WinRadio's new trunk tracking program is based around a pair of XRS plug-ins. The WinRadio Trunking Option, as they called it, works with two trunking systems: Motorola's Smartnet and the MPT1327. It requires a Pentium 100 MHz (133 MHz recommended), 8 MB of RAM, VGA display, a soundcard and Windows 95/98. Of course you will need a WinRadio receiver running an XRS compliant operating system (version 3.11 or higher). I used a WR-1500, running operating system version 3.17 and attached to a Pentium I 233 MHz based computer.

Quick and dirty trunking concept

Trunked communication systems use a series of set frequencies, thereby allowing the maximum number of conversations with a minimum of interference. The basic trunked system has a data frequency, which acts as the director. Member stations listen to the data channel and are automatically directed to clear frequencies within the system.

There are many variations on this trunking theme, and *MT*'s new "Tracking the Trunks" column will help unravel them. Some military communications systems embed the control data right on the voice communications channel. Very simply put, each member station's transmission is always slaved to the data director.

Using WinRadio trunking

The program installation is very similar to the XRS plug-ins; everything is automatic. The result is another menu item in the top-of-screen command line, "Trunking." Since the program must listen to the data channel, an audio connection is required between the receiver's audio output and the computer's soundcard line input.

Two configurations are possible. In the simplest, two receivers are used. One radio is always set to the control frequency and gives the communication frequency move commands. The second receiver is connected to the serial (coms) port of the computer and "follows" the data channels' commands.

For those of us not lucky enough to have two WinRadios, they have included a single radio mode. Here one radio does double duty. It acts as the control radio, listening for data. Then it moves to a voice communications frequency for as long as the communications channel stays active. Then it moves back to the data channel.

Take a look at Figure 3 to see the results after "listening" to a Motorola Smartnet trunked system. This screen utilized a single receiver approach. The details of the monitored system such as data (Control) and communication (Traffic) channel frequency, identification and system ID are stored by the program in a Trunking Database and shown in Figure 3.The information in Figure 3 has been changed "to protect the innocent."

FIGURE 3 - *Trunking Option Database Screen*

How did it work?

Pretty well. Finding a clean trunking control frequency turned out to be quite a chore. I started in the boonies of New Hampshire without any success. Then I pulled it along with me to Vermont where I found two trunking systems that I could capture reliably.

On a trip to New York City I thought I would lug the computer, radio and cables with me. "This should be the Mother-of-All Trunking Experiences," I thought.

Well, there were lots of strong signals. But it was so crowded that after an hour of monitoring I had not captured one trunking system reliably! Why? I'm not sure. But if I had to hazard a guess it would be that the signals were too strong and too numerous, proving more is not always better. I happened to have a Radio Shack handheld trunk tracking scanner with me ("never leave home without it") which fared no better. When I have more time in this NYC location I will try again. [*See Tracking the Trunks and this month's Scanning Report column for some insights into different methods of trunk following - ed.*]

A word of caution. I had VERY unpredictable results when I first started using the program. After many, many hours of hair pulling I found the problem to be associated with the receiver's audio to computer sound card cable. Since I wanted a longer audio cable than was supplied with the Trunking program package, I used a cable that I had in the shack. That was a mistake! The audio level indicators on the main screen pulsed up and down and no trunking stations were decoded.

The WR-1500 radio's audio jack, unbeknownst to me, is a stereo jack. Thus it has two audio channels. But a mono cable should work since we are just connecting one channel of audio, right? Wrong! The program uses one of the audio channels to send control data audio to the computer. But it DOES use the second audio channel to send communication channel voice audio to the computer's sound card. SO – use the included stereo cable.

The WinRadio Trunking Option is available from WinRadio's website (**http://www.winradio.com**) for $99.95, plus $15 shipping to the USA. It is also available from WinRadio distributors such as Grove.

Summary

The XRS plug-ins are "must-haves" for any owners of WinRadios, and the price is certainly right. The Trunking Option works well and should be considered by anyone with a WinRadio and an interest in trunked communications.

Next time, "Taming the AOR 8200 With Your Computer." Till then, Happy Valentines Day to the ladies.

Jock Elliott, KB2GOM
lightkeeper@sprintmail.com

Sharp's Neat OZ-750

Radio hobbyists these days have a lot to be thankful for. There is a ton of great radio equipment out there to enjoy. But most of the modern gear has one feature that I found both a blessing and a curse: memory channels.

It seems that virtually any receiver you can buy these days will have, at a minimum, several dozen memory channels where frequencies and other information can be stored for quick recall later. I have a handheld scanner, for example, with 200 memory channels in 10 banks; a shortwave receiver with 70 presets, and a base scanner with some 400 channels in 20 banks. That's the blessing.

Now, the curse: unless you're an absolute memory genius, there's no way you are going to remember what radio service is associated with each of those memory storage channels. To be fair, some scanners do offer the capability to enter alphanumeric information to be displayed with the frequency. But since a scanner is designed as a scanning radio receiver and not a data input device, the process of entering the information is often, to put it politely, less than friendly.

To make sure that I remembered the information associated with each frequency stored in the memory channels, I tried making a list. After a while, I couldn't find it. So I tried simply writing down a category name for each bank of memories – state police, fire, local police, aircraft, GMRS and FRS, and so forth – on a 3 x 5 card. Somehow, it took a walk. Clearly, additional pieces of paper in my already cluttered life are not the way to go.

(The strange disappearance of these pieces of paper fits neatly with one of my pet theories. I believe that scraps of paper are both sentient and animated. If they know you are looking for them, they run and hide. I know this sounds pretty "out-there," but it fits the facts. Why is it you can never find a piece of paper when someone telephones you, yet you had it in your hands just seconds ago? Fox Mulder really ought to look into this.)

A computer, of course, is great storage and retrieval tool, and it is really easy to input data, but I don't happen to have a computer next to my radio receivers. In addition, there are times when I'm using my handheld scanner that a computer – even a laptop computer – would be incredibly cumbersome. But then, at a business meeting, serendipity stepped in. A colleague pulled an electronic organizer from his pocket, and I began to wonder if one of these pocket-sized wonders would do the job.

A Whiz of a Wiz

So I called the nice people at Sharp Electronics Corporation in New Jersey, and they send me the Sharp Wizard designated OZ-750. (Get it? Wizard – OZ) This silver-tone beauty measures 6.4 inches wide, 3.2 inches deep and 0.9 inches high. It weighs just 9.5 ounces and features a large 40-character by 8-line screen, a QWERTY keyboard for entering data, and docking module that allows data to be downloaded from a PC.

The OZ-750 includes 2 MB of storage capacity, which translates into the ability to store literally thousands of items of information. It comes bundled with Sharp's custom Windows compatible Day-Timer Organizer 2000 for Wizard software. That means you can manage your calendar, daily schedule, to do list, birthdays and anniversaries, complete address and telephone book, memos, expenses, and more. In addition, you can customize what your Wizard OZ-750 does by downloading free information and add-on software from **http://mywizard.com**.

The Sharp Wizard OZ-750 can help you get your radio stuff – and maybe even your life – organized.

If you're looking for a way to successfully manage your radio-related information, plus a lot of other information that seems to be necessary to modern life, I can highly recommend the Sharp Wizard OZ-750.

Two things really impressed me about the OZ-750. First, it has, without doubt, the best screen I've ever seen in a pocket organizer. It's clean, crisp and highly readable. Even better, it has an absolutely superb backlighting setup that evenly illuminates the entire screen. It really makes the OZ-750 a pleasure to use.

Second, while the on-board keyboard works satisfactorily for entering data, it is almost effortless to download information from your PC once you have installed the necessary software (it's included on a CD-ROM that comes with the organizer). Further, the Day-Timer software imports data from Microsoft Outlook (a personal information management program) with just the click of a mouse. As a result, I downloaded a 75-person address book, a to do list, a frequency list, and a list of over 100 people who participate in a ham radio commuter network – and found that I'd used less than 2 percent of the available memory!

In short, if you're looking for a way to successfully manage your radio-related information, plus a lot of other information that seems to be necessary to modern life, I can highly recommend the Sharp Wizard OZ-750. Suggested retail price of the OZ-750, including software and docking module, is $149. For more information, contact 1-800-BE-SHARP or visit **www.sharp-usa.com**

Receiver News

Welcome! My name is Tom Sundstrom, W2XQ. I have been involved with shortwave listening for the past 48 years. I am honored to be asked to contribute to *Monitoring Times* with an update on shortwave industry news.

In 1993 the **Watkins-Johnson Company** introduced a marvelous high-end DSP (digital signal processing) receiver known as the HF-1000. The rack-mounted receiver, covering 5 kHz to 30 MHz, was expensive but nevertheless was sought after by enthusiasts.

In December 1999, the HF-1000A was discontinued. Service will continue to be provided to owners of the receiver. The model was based upon the WJ-8711A that will continue in production. The WJ-8711A has a suggested retail price of $5,110.

The Watkins-Johnson Company itself is changing. Last year the firm was sold off to several different buyers, and the merger and takeover processes are underway. The Watkins-Johnson name went to a firm in California. The Telecommunications Group manufacturing the receivers was sold to a unit of British Aerospace (formerly a unit of The General Electric Company). The proposed transaction, in which Watkins-Johnson will receive an estimated purchase price of $57.9 million – subject to a post-closing balanced sheet adjustment, was announced last August.

The new company name, contact information, Web URL and e-mail will be changing. Our sources cannot tell us if the Telecommunications Group will be moving. No further details are known as *Monitoring Times* goes to press. For now, if you have access to the Internet, check the press releases at the Watkins-Johnson Web site at **www.wj.com** and we will watch for developments.

The **Japan Radio Company** has a long history of building top-flight communications equipment, including the NRD-series receivers. The current flagship is the NRD-545 DSP receiver. We note endless questions in the Internet rec.radio newsgroups asking how to get in touch with the company. A move of offices was not widely publicized, but in August 1998 the staff moved from New York City to Seattle:

Japan Radio Company, Ltd.
1011 SW Klickitat Way, Bldg B, Suite 100
Seattle, WA 98134-1162

The telephone number is +1 (206) 654-5644; fax +1 (206) 654-7030. Last December, the Seattle staff finally opened a Web site at **http://www.jrcamerica.com/**. Everyone in the office now has an e-mail address and a direct-dial telephone number.

Unfortunately, in our opinion, the Web site is poorly designed. All the text on each page is a single large graphic. The combination of the text graphics and navigational buttons makes the site very slow to download.

And the singular failure of the JRC America Web site? There is absolutely no mention of the communications products — the NRD-345 and NRD-545 receivers, and the JST-245 transceiver — within the pages. We find it very strange. You'll have to look at the Japanese Web site — **http://www.jrc.co.jp/product/comm/e-comm/jst-e.html** — to view pictures and specifications.

Another bit of confusion in terms of the **Baygen** name continues. The Baygen company name disappeared in January 1999. The name of **FreePlay** was taken to reflect the variety of products — radios and flashlights — powered by the windup power source. The new Global Shortwave portable, carrying the FreePlay name, shipped last December. It is powered by the windup spring, a solar cell atop the radio and a 6 vDC power source. The receiver is analog, covering the AM and FM bands plus SW. There are two variations of the receiver, covering 3.8 to 12 or 5 to 18 MHz. In North America, it is the latter version that is readily available.

The USA headquarters address changed, too:

FreePlay Energy USA, Inc.
1 Ramland Road, Suite 155
Orangeburg, NY 10962

The telephone number is +1 (914) 680-2233; fax +1 (914) 680-9472. The new Web site URL is **http://www.freeplay.net/** and the e-mail is *freeplay@freeplay.net.*

The **NASA HF-5E** is a new receiver that has evolved from the HF-4E. It appears that the HF-5E, covering .3 to 30 MHz, has the characteristic simple appearance of the UK-produced receivers, and will be priced at less than $500 (excluding VAT) in Europe. The prototype was shown at a "ham radio fair" in Germany last summer. At press time, the HF-5E should be in production. The HF-5E looks promising, but we'll have to review a production model to determine a rating. We do not yet have information on availability, specifications, or dealers.

In 1981 Radio Netherlands, Hilversum, published its first ***Receiver Shopping List.*** It was merely a list of receivers and little more, but it was popular indeed. Now the 18th edition is available, completed in late December. It looks at more than 60 portables, porta-top and tabletop receivers, with photographs, pricing around the world and reviews. A 34-page abbreviated print edition is available free upon request to Receiver Shopping List, Radio Netherlands, PO Box 222, 1200 JG Hilversum, The Netherlands.

For readers with access to the Internet, read or search the Web edition by dialing up **http://www.rnw.nl/realradio/** — and have a read through the numerous resources for the listener.

Have a comment or question? We would like to hear from you. E-mail us at **trs@trsc.com** or write us care of *Monitoring Times*.

FROM THE EDITOR:

Monitoring Times is accepting reviews of shortwave equipment (including antennas) from qualified reviewers. If you would like to propose a review, please contact Rachel Baughn at *mteditor@grove-ent.com*, call 828-837-9200, or write PO Box 98, Brasstown, NC 28902.

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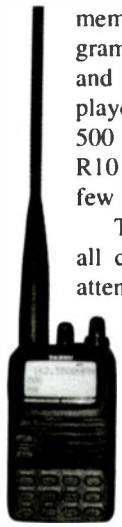
www.megsinet.com/parnass

Yaesu VR-500 Portable Scanner

The Yaesu VR-500 is a multi-mode, wide coverage receiver small enough to fit in one's palm. Its array of modes, wide frequency coverage, and 1000 memory channels with alpha labels, competes with the Alinco DJ-X10T (Nov. 1998 *MT*), ICOM IC-R10 (Mar. 1997 *MT*), and AOR AR-8200 (Oct. 1998 *MT*). Its diminutive size is in the same class as the ICOM IC-R2 (Apr. 1999 *MT*) and AOR AR16 (Aug. 1999 *MT*). All of these models can exchange frequency information with a computer when used with optional software and cable.

The VR-500 is advertised in the USA as covering 0.1 - 1299.9995 MHz, excluding cellular phone bands. Our VR-500 (s/n 9G031495) has three additional gaps above 600 MHz (see Measurements section). This is a compromise which permits the VR-500 to comply with new FCC regulations mandating a minimum 38 dB rejection of cellular phone signals.



Basic Features

The Japanese-made VR-500 detects NFM, wide FM, AM, USB, LSB, and CW signals. There are 13 step sizes ranging from 50 Hz to 100 kHz. Like most of the competition, the VR-500 sports an S-meter. It employs rotary volume and squelch knobs and a numeric keypad. The plastic belt clip fastens to the rear with a single screw which loosened a few times.

The VR-500's adjustable contrast display and keypad can be backlit for easy night viewing. Lighting is triggered by pressing any key. You can configure the backlighting to latch on or time out after 5 seconds.

Both the VR-500 and IC-R2 are powered by two AA batteries. The IC-R2 is sold with 800 mAH NiCd cells and a 7 hour charger, but none are furnished with the VR-500. Our VR-500 consumes only 73 mA while scanning, a 33% savings over our IC-R2. On the other hand, our VR-500 consumes more current while turned off. The VR-500 is fitted with an external power jack so the radio can be powered by a 9 - 16 VDC source.

Memory and Such

The VR-500 has one VFO and 1000 memory channels in 10 banks. You can program an 8 character label for each channel, and both the label and frequency are displayed while scanning or stopped. The VR-500 label scheme works better than the IC-R10 in which the label is only visible for a few seconds in manual mode.

The VR-500's RF attenuator is global to all channels and the VFO. The IC-R10's attenuator may be programmed on a per-channel basis.

Searching and Scanning

The VR-500 supports both VFO and limit searches with 10 pairs of frequency limits. You can designate a step size or have the VR-500 choose an "Auto" step size based on the frequency. Up to 100 frequencies may be skipped during a search and they are stored in separate memories which are retained until you clear them.

Smart Search resembles the auto store feature in other models but is quite limited. Program upper, lower, and start frequencies and the VR-500 will search for signals, storing active frequencies into temporary memory locations. We find the Smart Search to be dumb for these reasons: The scanner makes only one sweep through the designated spectrum. Smart Sweep memories can be read only after the sweep, become inaccessible when exiting the Smart Sweep mode, and are erased the next time you enter Smart Sweep mode.

Unlike the IC-R2, the VR-500 can scan various combinations of memory banks. The global rescan delay can be set from 1 to 12 seconds. Each channel has a "preferential" flag instead of lockout. You can option the VR-500 to scan all channels in selected banks or only channels with the preferential bit set. It sounds complicated but works well in actual use. The VR-500 supports a mode scan, but we can't think of a good use for it.

The VR-500 has a Dual Watch mode which is simply a way to scan pairs of channels. There are 10 dedicated pairs of Dual Watch memories which you can program with different frequencies and modes.

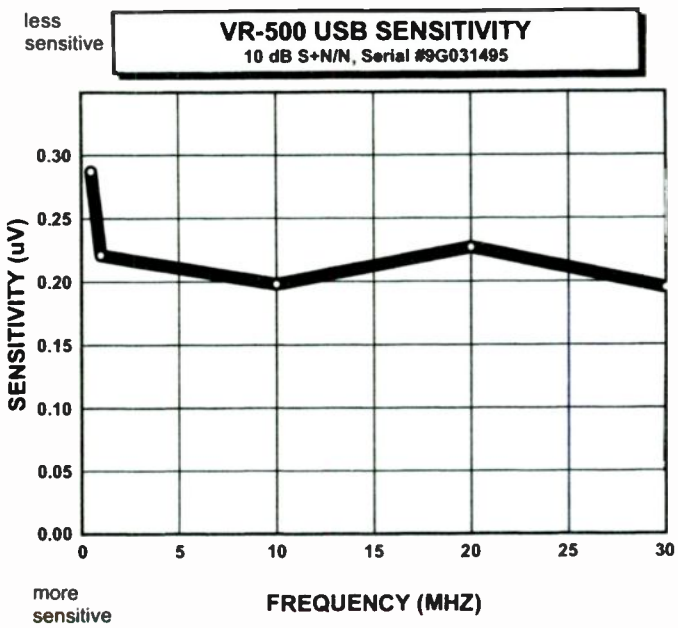
VHF/UHF Performance

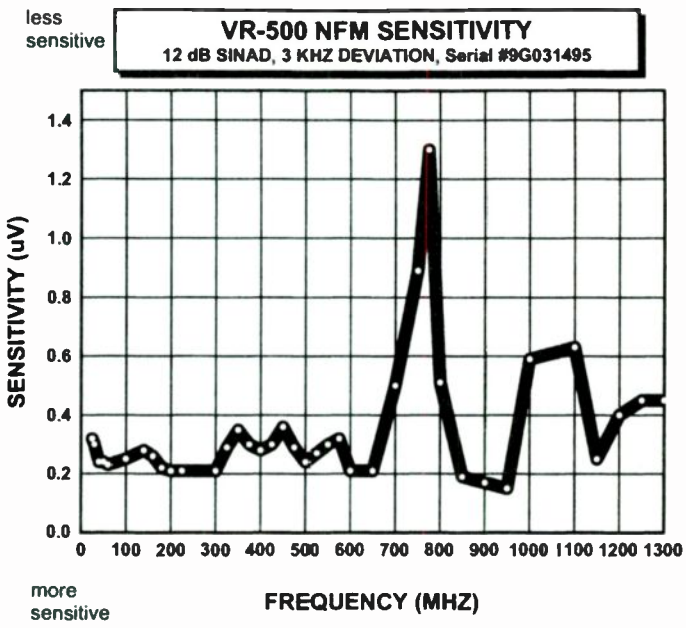
The supplied antenna uses a BNC connector and appears to be base loaded. Our antenna has a deep null centered near 159 MHz which extends a few MHz on either side. A local 159.15 MHz repeater barely produces an S-meter reading. The S-meter springs to almost full scale when using the antenna from a Uniden/Sportcat SC200.

MEASUREMENTS
YAESU VR-500 SCANNER S/N 9G031495

List price $399
Yaesu USA, 17210 Edwards Rd., Cerritos, CA 90703

Frequency coverage (MHz):
0.1 - 1299.9995 except gaps at cell phone bands and 620.9 - 629.3, 784.6 - 797.195, 807.1 - 819.695
Frequency steps (kHz):
0.05, 0.1, 1, 5, 6.25, 9, 10, 12.5 15, 20, 30, 50, 100
Sensitivity: see graphs
RF attenuator:
20 dB @ 40 MHz, 21 dB @ 155 MHz, 14 dB @ 460 MHz, 23 dB @ 860 MHz, 15 dB @ 1200 MHz
FM modulation acceptance: 11 kHz
Intermediate Frequencies (MHz):
429.1 / 248.45, 10.7, 0.455
Image rejection:
58 dB @ 40 MHz, 46 dB @ 155 MHz, 61 dB @ 460 MHz, 56 dB @ 860 MHz
Noise floor: -129 dBm at 14.02 MHz
2 tone IMD dynamic range:
49 dB @ 14.02 MHz, 20 kHz spacing, CW mode
Audio output power at earphone jack:
46 mW @ 10% distortion into 8 ohms
Practical memory scan speed: 9 ch/sec.
Search speed: 11 steps/sec.
Current consumption at 3.0 VDC:
off - 0.64 with peaks of 0.91 mA
manual - 66 mA
scan - 73 mA
full volume - 111 mA
lamps - 37 mA additional
Battery saver: after 5 sec. in Manual
Low battery warning: 2.02 VDC
Shutdown: 1.97 VDC





Birdies above 30 MHz strong enough to open squelch (MHz)

70.84 75.12, 76.0, 78.45, 91.225, 96.575, 104.6, 125.215, 130.55, 132.335, 193.175, 195.825, 201.175, 203.85, 264.665, 271.835, 305.775, 320.01, 324.29, 327.415, 330.47, 332.975, 340.48, 340.555, 340.595, 344.14, 344.855, 347.71, 348.175, 364.435, 371.84, 389.115, 394.185, 398.485, 402.6875, 406.7, 453.9875, 454.0875, 466.1375, 468.3625, 475.5, 475.575, 475.675, 521.5625, 526.9125, 531.25, 578.325, 579.25, 581.0, 581.425, 585.0125, 586.35, 589.025, 596.625, 602.1875, 631.825, 634.5, 635.8375, 638.5125, 639.85, 642.525, 660.95, 676.7375, 676.8, 679.475, 681.15, 683.9375, 689.0, 694.2375, 695.4875

Our VR-500's VHF/UHF reception is good with two exceptions. There are 20 birdies in the 225 - 400 MHz military band (see inset) and our receiver is prone to intermodulation in the 860 MHz range. We hear cellular phone and mixes of other signals when traveling in RF-rich areas.

Our 3rd order IMD (intermodulation) measurements show our VR-500 and IC-R2 roughly in the same league except in the 860 MHz range, where the IC-R2 has a significant advantage.

The squelch threshold remains the same for all modes except wide FM and there is a noise burst at the end of each NFM transmission. Our VR-500's audio is acceptable for a radio its size – better than our AR-16 with less treble than our IC-R2. You can disable the audio amplifier when the radio is squelched. This is designed to save current but produces a popping sound when the squelch opens so we leave the amplifier enabled.

Shortwave Performance

Our VR-500 is sensitive on shortwave and we measured a noise floor of -128 dBm (near 14 MHz). The IF bandwidth is fixed and it is wide for listening in a crowded band, especially on USB, LSB, and CW.

The VHF/UHF antenna supplied with our radio permits shortwave reception of high power transmitters and is hearing impaired for everything else. Better shortwave performance requires a different antenna and a 6 foot length of wire makes all the difference. A 132 foot dipole overloads our VR-500 and comparable models we tested when tuning shortwave. This is consistent with our VR-500's IMD (intermodulation) dynamic range measurement of only 49 dB (see Measurements).

Our VR-500 behaves better on shortwave when 40 dB or more of attenuation is added between the radio and the 132 foot dipole. The internal attenuator can furnish only about 20 dB. The bottom line is that our VR-500 and IC-R2 are quite usable for casual listening below 30 MHz if fitted with an antenna scaled to their signal handling abilities.

Tuning across a carrier in CW or LSB modes using .05 or 0.1 kHz steps produced a second, weak response.

Opinion(s)

We don't have the space to describe the bandscope or memory manipulation functions. A CTCSS/DCS decoding squelch would be more useful than the band display and mode scan facilities.

For everyday, nontrunking use, we think the VR-500 and IC-R2 are tops. They're great for low profile, stealth scanning when hidden in a shirt pocket.

The numeric backlit keypad, squelch and volume knobs, multibank scanning, and text labels make our VR-500 easier to use than the smaller IC-R2. Our VR-500's susceptibility to intermod in the 860 MHz band could be a problem for some listeners. We prize the IC-R2's CTCSS squelch and smaller size, but it hears signals it shouldn't in the 480 - 520 MHz range.

The VR-500's small size and long battery life are significant advantages over the DJ-X10T. As one VR-500 owner remarked, it seems to run forever on a pair of AA alkaline batteries.

The Yaesu VR-500 is available for $339.95 plus $12 shipping from Grove Enterprises (800-438-8155 or order@grove-ent.com)

WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

Uniden BC780XLT TrunkTracker

Slated for release in March is Uniden's latest trunk tracking scanner, the BC780XLT. The 780 is a mountable radio which includes the ability to track Motorola, EDACS and LTR (Johnson) trunked radio systems.

The 780 will come equipped with 500 channels and an alpha/numeric display. Channels can also be programmed using Uniden's SmartScanner technology, in which the radio is automatically programmed for a specific zip code area using either a computer or external modem.

Uniden's suggested retail price for the BC780XLT is $379.99. For information and availability, call Grove Enterprises at 800-438-8155 or visit **www.grove-ent.com** or **www.uniden.com**.

Aiwa self-powered radio

The whole world knows a good idea, and you can tell a good idea by how many manufacturers copy it. Aiwa has jumped on the emergency radio bandwagon with the introduction of its Dynamo FR-C151. The radio may be powered by cranking the dynamo (1 minute of cranking yields approximately 30 minutes of play), plugging the supplied AC adaptor into an electrical outlet, or by two C cells. The radio also powers a built-in flashlight for emergency illumination.

Frequency bands include AM/FM and weather channels. Its digital clock with backlit display comes equipped one alarm, plus sleep and snooze functions.

Early mentions of the radio quoted a price of $78, but the FR-C151 was found a couple of months later selling at $50. A web search should turn up several retailers, or try direct from the manufacturer at 800-289-2492 or **www.aiwa.com/catalog99/models/FR-C151.html**

Bright LED Flashlight

If you don't want to keep cranking for emergency light, you should be interested in this new approach to the traditional flashlight. The Pilot Light is slightly blue-white, but very bright, nonetheless! And highly efficient as well. R.F. Enterprises' new Pilot Light utilizes a cluster of three ultra-bright white LEDs instead of a conventional filament bulb; the extra efficiency means that a fresh set (3) of alkaline AA cells will power this brilliant beam for a *continuous* 48 hours before becoming noticeably dim – and even then it still keeps operating at reduced illumination!

Water resistant and virtually immune to environmental shock, heat, or cold, the 7-inch penlight is ideal for hunters, cavers, hikers, boaters, scouts – in short, anyone who needs a long lasting, brilliant, compact, dependable light source.

Rated at 100,000 hours, the LED flashlight comes with a flexible wrist clamp and strap.

The Pilot Light, RWF-3, is $34.95 plus shipping from Murphy's Surplus Warehouse, 401 North Johnson Ave., El Cajon, CA 92020. Quantity pricing from RF Enterprises, PO BOX 1081, Sausalito CA 94966; *rf-ent@worldnet.att.net*

Scanner Programming System

Scanner owners interested in programming their scanner for use in the United States' largest cities can spend an hour or more looking up and entering public safety and aircraft frequency information into their Uniden BC-245XLT or BC-895XLT scanner or software. The only alternative to programming the information in yourself (either manually or using PC software) is to use a pay-per-call "data dump." Scanner owners have often said, "I wish there was another way." Now there is!

The Scanner Programming System by Scannerstuff is available on-line and in stores on Windows9x CD-ROM. The CD contains WinScan Special Edition and WinScan frequency / trunked system data files for forty-two of the United States' largest metro areas.

WinScan Special Edition (by Pozilla Software) is a cross between the freeware WinScan Demo and the deluxe WinScan that retails for around $60 separately. WinScan SE allows the user to experience the full functionality and user-friendliness of WinScan for 15 days, after which only radio control and special functions are disabled. The ability to open and edit frequency data files, as well as upload the files to your BC-245 or BC-895 scanner, remains intact. This function makes the Scanner Programming System a great way for hobbyists to try out WinScan (using the SE version), without losing the ability to automatically program their radio in the meantime.

In addition to WinScan Special Edition, the Scanner Programming System CD will include data files for major metro areas like Los Angeles, San Francisco, Phoenix, Chicago, Denver, Miami, Boston, New York, and many, many more! These files include frequencies for police, fire, medical, aircraft, and public safety trunked radio systems in the area and allow you to program your scanner in less than a minute.

SPS puts trunked systems each in their own bank, as appropriate for each metro area. One or more banks are left open for personal use. Users can turn on and off banks depending on what they're interested in monitoring at the time, the way most users would program their own scanner. Text reports may be printed for each included city that clearly show how your scanner banks and channels are now set up.

Though certainly not perfect for every user, this flexible system is sure to save hobbyists hours of data entry work, while giving travelers the ability to program their scanner for another city in less than sixty seconds, without any prior frequency knowledge of that city.

Even if you don't own a BC-245 or BC-895 scanner (programmable by WinScan), the Scanner Programming System may be used to print simple, easy-to-read, bank and channel (300 ch) layouts for manual programming.

Simply print the data files for other cities and take them with you as you travel!

Suggested retail for the Scanner Programming System is $29.95, though you may find it for less in radio stores, including all 12 of Ham Radio Outlet's stores and on the HRO E-Commerce website (**www.hamradio.com**). For more information contact SPS's creator and distributor, Dan Rollman, KC7ANQ, at Scannerstuff, at *sps@scannerstuff.com* or visit **http://www.scannerstuff.com**

Amateur Radio – the first 100 years

This hardback coffee table book, with text by *MT* feature writer Ian Poole G3YWX, is lavishly illustrated using specially selected photographs from the Royal Society of Great Britain's extensive photo-library. Many of

the photographs (which were selected by George Brown M5ACN) have not been previously published.

Amateur Radio – the first 100 years details the story of ham radio since the first amateur station was set up in Woolwich Arsenal in London in 1898. Using both picture and word, it details the story of how amateur radio developed over the years, demonstrating how amateurs showed their real pioneering spirit in making new developments against all the odds.

Each numbered copy of this limited edition is beautifully bound and gold blocked. Without doubt, the "first 100 years" will become a valuable collector's item and serve as a particularly apt memento of achievements in radio over the past millennium.

Amateur Radio is published by the Radio Society of Great Britain, 1st Edition, 1999, hardback, 260 by 260 mm, 256 pages, ISBN: 1-872309-50-0. Price is £46.50 to non-members, plus £2 shipping and handling. Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, Herts, UK, EN6 3JE. Tel: +44 1707 659015. Fax: +44 1707 645105; **www.rsgb.org**

AM Logs from Overseas

Our feature this month by Larry Van Horn talks about logging mediumwave stations from all 50 states, but can you hear AM broadcasters from other countries? You bet you can, and the International Radio Club of America has the reception reports to prove it!

The 10th edition of the *Foreign Log* is now available from the IRCA Bookstore. This loose-leaf publication includes nearly three years of logs (9/96 to 7/99) of mediumwave reception across the Atlantic and Pacific Oceans and from South America. All logs are listed in frequency order by each of the three regions.

The *IRCA Foreign Log* is $10 to members of the IRCA or the National Radio Club; $12 to non-members; overseas delivery please add $2 additional. Order from the IRCA Bookstore, 9705 Mary NW, Seattle WA 98117-2334 (make checks payable to Phil Bytheway or IRCA).

WSM/Grand Ole Opry celebration

October 2000 is a very special month for WSM in Nashville, Tennessee. October marks 75 years of WSM on air *AND* 75 years together with the WSM Grand Ole Opry. It's also the 5th anniversary of *Inside WSM* – a newsletter which covers the historical side as well as the current lives of the artists, performers, the station pioneers and the evolution of radio.

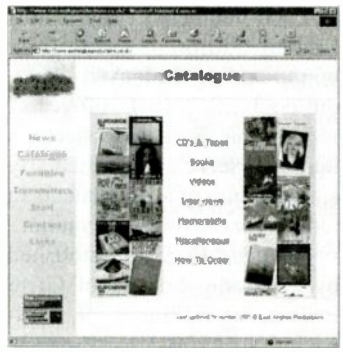
To commemorate the event, the station is hoping to document its history by publishing all 5 years worth of newsletters (including the first issue which has a picture of the solemn judge George D Hay on the cover) into book form. The cover will be a collaborative effort with the Hatch Show Print company which printed poster art for Bill Monroe and thousands of others.

In order to finance the project and meet the October deadline, however, WSM needs 3,500 prepublication orders by June 1. Interested readers can send a check or money order for $19.95 plus $4 shipping and handling to *Inside WSM, the First 75 Years* at 2644 McGavock Pike, Nashville, TN 37214. Orders will be shipped in mid October 2000 if the minimum order is met in June.

Pirate Products

East Anglian Productions has several new CDs, videos and books among its latest catalog offerings recalling the heyday of European pirate radio. Radio Northsea International, Radio Scotland, Radio London are among the featured stations and some rare video footage of actual broadcasts are included among the videos.

Standard fare in EAP's catalog are documentaries, interviews, jingles and commercials. You'll also find CDs of classic rock from US stations from 1955 to 1970 in EAP's "Cruisin'" series. There are even posters, clothing and other paraphernalia from



Radio London and Radio Northsea International.

To request a catalog, write East Anglia Productions Ltd., Studio House, 21-23 Walton Road, Frinton-on-Sea, Essex. CO13 0AA UK, or email eap@compuserve.com; or you may view the catalog at **www.eastanglianproductions.co.uk**

WOW Thing!

By its name, you can tell this product wasn't targeted to DXers, but radio hobbyists may still be interested in this audio accessory. The small box connects between an audio source and most speaker systems or headphones to enhance the audio depth and dynamics. The box is reputed to greatly improve the audio quality of internet broadcasting and games, as well as home theater systems. Why shouldn't it make DX listening more tolerable as well? For only $29.95 plus $8.95 s/h, you can't lose.

Order directly from SRS Labs at 1-800-2HEAR3D (800-243-2733) or via the Web at **www.wowthing.com** *(info@wowthing.com)*

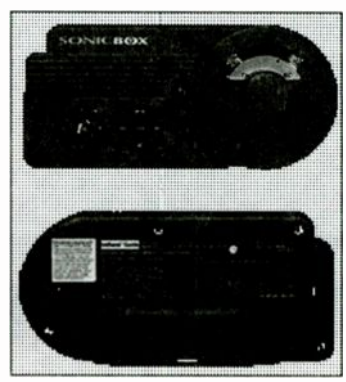
But is it radio?

If it looks like radio, sounds like radio, tunes like radio, it must be ... the internet? A start-up company is testing a new product called Sonicbox which will give you access to internet broadcasters and then rebroadcast the transmission to your home stereo system, clock radio, or any device with an unused FM channel.

"We considered the idea of a standalone device," co-founder David Frerichs said. "But then we just decided to target broadband. Most users already have a PC and a radio, so why duplicate the functions of those devices in a standalone unit?"

Required is a broadband Internet connection (128 kbps or greater), a computer with Pentium processor or equivalent running Windows 98 or more recent, 64 MB of RAM and 40 MB free disk space, a sound card, and Real Player 7 or Windows Media Player 6.4.

No longer do you have to be within earshot of the computer to listen to internet "radio." Sonicbox is being beta tested, and is expecting release of the product this spring. See **http://www.sonicbox.com** for the latest developments.



Bargain for SWLs

The Association for International Broadcasting is marking Y2k with a great bargain for international broadcast listeners. Effective with the December 1999 edition of the AIB's popular *Global Broadcasting Guide* (formerly the *Global Radio Guide*), they're cutting their prices in HALF! It's a permanent two-for-one sale. SWLs can now get two editions (a full year) for a new low price of $5.75 in the U.S., or £3.50 in Europe.

The *Guide* contains the schedules for English language broadcasts from some 85 international broadcasting stations worldwide, along with contact details for each station. In early 2000 it will be possible to update the compact and easy to use *Global Broadcasting Guide* at any time via the AIB's Internet website.

The Global Broadcasting Guide can also be ordered via the AIB's Internet website – **www.aib.org.uk** , where you'll find an order form which that can be printed out and mailed to the appropriate AIB address.

"While the Association for International Broadcasting is a non-profit, professional trade association for everyone involved in international broadcasting, we also have the interests of the listener very much in mind," says Ian McFarland.

Orders from Europe should be sent to: The Association for International Broadcasting, P.O. Box 4440, Walton, CO14 8BX, U.K. Orders outside Europe should be sent to: Marbian Productions Intnl.(AIB), P.O. Box 41063, 2529 Shaughnessy St., Port Coquitlam, BC V3C 5Z9, Canada. Customers from US and Canada may pay by personal cheque or by International Money Order, payable to Marbian Productions Intnl.

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or e-mailed to mteditor@grove-ent.com.

The Icom W32A Transceiver

By Gary Webbenhurst AB7NI

Wow! This is a great scanner!

That is the conclusion I have arrived at, after evaluating my new Icom W32A amateur transceiver. Like most ham radio operators, I keep waiting for the "perfect" handheld transceiver (HT.) Over the years, I have owned more than a dozen radios from all the major manufacturers. They all have their advantages and disadvantages. But I think I finally found one that comes very close to perfection.

Here is my checklist of the features for the perfect HT.

1. The alpha numeric display must be large and easy to read.
2. Display and keypad must be *brightly* backlit.
3. Audio speaker must be adequate to the task for clear, crisp sound.
4. Display of the battery's current voltage status.
5. A real time clock display.
6. Good mechanical battery release button.
7. Extended wide band receive coverage.
8. Computer programmable.
9. Direct keypad input.
10. Small cheatsheet and/or a summary of instructions.
11. Easy to understand programming booklet.
12. A good antenna for the intended ham bands.
13. The keypads must be large and spaced for the average fingers.
14. True dual band capabilities.
15. External power jack.
16. Standard earphone and microphone connection.

Until now, only the Yaesu 530 came close. But, alas, my 530 has died and good used ones are impossible to come by. Thus I began a new search. Now, there have been many really good HTs. I loved one model, but it had a fatal flaw: The battery release button had a 100% duty cycle. That meant that every time I went to slide the radio unto my belt, the battery would come loose and fall to ground, usually damaging the battery pack.

Applied to the checklist, the W32A is good for 15 out of 16. (No clock.)

The Icom 32A shown with its computer interface cable plugged into the speaker jack. Alongside are my trusty Optoelectronics Scout and its FM and VHF paging filters.

Great scanning features

While I was evaluating the W32A as a ham transceiver, I noticed that it had many features that would make it a *very good scanner*. Here are several features of the W32A that are really handy for the scanner enthusiast:

- Expanded coverage of 108-135AM, 136-199, 300-399, 400-599 and 600-999 MHz

To enjoy these ranges, one can perform a simple *keyboard modification* of holding the SQL and Band buttons down, while powering on the radio. Of course, we all know that just because the radio displays a certain frequency, that is no guarantee that the radio can actually receive such a frequency. I had mixed luck in the TV audio range. Depends on the antenna and literally how you hold the radio. I could move the radio from vertical to horizontal or three feet from the previous location and now the station came in clear. Other times nothing. Reception on the aircraft and 800Mhz range (cellular blocked) was excellent. You can check the internet for the hardware modification to open the transmit frequency range for MARS/CAP operation.

- The radio can be configured for **dual display** (and simultaneous scanning) of Very High Frequencies (VHF) and Ultra High Frequencies (UHF.) The choices include the following combinations:

Wx/VHF	10 preprogrammed weather channels	136-199.995
VHF/UHF	108-135.975AM	300-399.995
VHF/UHF	136-199.995	400-599.995
UHF/UHF	435-454.975	600-999.990

This is a true dual band radio! Image the possibilities. You can scan the aircraft frequencies on one side, the ham bands or public safety on the other side. Listen to the audio of the five o'clock TV news while also listening for a ham buddy on the two meter band. Or monitor your favorite 440 MHz repeater while simultaneously scanning the fire department channels. How many scanners will do that?

- Another great feature is the five programmable search ranges. These begin with memory channels M1A (lower) and M1B (upper). The others are shown below with the particular ranges I wanted on the VHF side. Of course you could program anything you wanted.

My favorite setup for the VHF side:

M1A	145.110	M1B	147.995	Ham repeaters on two meters
M2A	118.950	M2B	128.000	Local airports
M3A	151.145	M3B	151.465	Park Rangers and forestry
M4A	153.740	M4B	154.445	local fire departments
M5A	154.650	M5B	156.150	local police departments

UHF possibilities:

M1A	440.000	M1B	450.000	Ham repeaters on 440
M2A	406.000	M2B	412.000	Trunked military systems
M3A	412.000	M3B	419.900	Various Federal Agencies
M4A	453.050	M4B	453.975	local public safety
M5A	460.025	M5B	460.625	local police/fire departments

To use this feature, you simply press Scan while in the Variable Frequency Oscillator (VFO) mode. It will begin searching in the first range 145.110 to 147.995. To search any of the other ranges just press 2, 3, 4 or 5. This is way too easy! Even my brother-in-law figured it out! UHF has its own five search ranges.

• You can select the scan pause mode for each of the five ranges. Choices are: 15 seconds, 10, 5 or carrier activated. I prefer carrier activated so as not to lose any radio traffic.

• An excellent cheatsheet and an easy to understand instruction programming booklet

• CTCSS (Continuously Tone Coded Squelch System). An impressive list of 50 different PL tones. You can use the correct tone squelch to keep out the annoying intermod noise and unwanted signals. Set the radio to a frequency in VFO mode, activate Tone Squelch, then press scan and the radio will search for the correct tone. Cool!

When set to a specific frequency and tone squelch pocket beep, it will ring like a phone (or other sounds that you can program.) This also means I can use the W32A to act as a CTCSS-activated pager – great if you are a volunteer firefighter or Emergency Medical Service (EMS) person.

• 100 memory channels for the VHF side and another 100 for UHF, plus the 10 memory band scan edge channels for both VHF and UHF.

• A special memory channel, the **Call** channel. This allows one button touch access for your favorite frequency on VHF and UHF. While my ham buddies and I refer to this as the "Charlie" channel, it is in reality a two meter ham radio simplex frequency. You can program anything you desire.

• A power saver feature can be activated to reduce the current drain while in manual mode.

• Automatic power off at 20, 40 or 60 minutes. This is great, because I often forget to turn my radio off. No more dead batteries for this guy. This feature can also be toggled on/off.

My fanny pack, ready to go with both of my W32As. (Yes, I liked it so much I bought a second one.) Since the radios are identical, I can use the same speaker microphone and power cords.

• The display backlight can be set for 5 seconds or on/off toggle. This is a great feature. If you are monitoring in poor light conditions, you can keep the backlight on *continually* until you decide to turn it off. The four LEDs draw minimal current from the battery. If you are using an external power source, the backlight is not an energy concern.

• Keypad beep tone can be easily disabled or reactivated.

• Select step size. Available in any of these kilohertz steps: 5,10, 12.5, 15, 20, 25, 30, 50!

• Select LCD contrast setting.

• Ten preset NOAA Weather channels.

• Display can show frequency or channel number plus an eight digit alpha numeric (AN). The potential here is great. If the local police have 8 channels, I program them into the radio's Channels 1-8. On the 8 character AN label, I can use anything I want such as South, Records, SWAT, Chase, Downtown, car-2car, on-scene, white, blue etc.

I can also use the common abbreviations such as SO for Sheriffs Office, CP for Command Post, DOT for Department of Transportation, CDF for California Division of Forest and Fire Fighting. DNR for Department of Natural Resources, HP for Highway Patrol, SP for State Police, FBI etc. Thus I end up with a display reading "CH 1 $_{\text{Downtown}}$"

• When used with the CS-W32 software and connection cable, the W32A can be programmed from a create-your-own database of frequencies. You can program the receive frequency, transmit frequency, PL tone, offset etc. You can have several databases. I have one for each of the major geographical areas I visit. I also have one just for airshows. You can trade data files on the internet. I have several to swap!

• And finally, extra cost battery pack and alkaline battery case are available. Size and feel are good: not too big, not too small. Belt clip and handstrap are included. It has a large and easy-to-read display, and priority channel feature.

Disadvantages

• The W32A does *not* do trunk tracking. You can use the conventional method of locking out the 800MHz data channels.

• No 30-54 MHz low band coverage.

• There are no banks like a conventional scanner. You have a bank of 100 memory channels on each side and you can lock out (skip) any channels you desire.

• No cellular coverage, but who cares?

• The scan rate is good, but not nearly as fast as other scanners and radios.

• No clock! Oh well. Many agencies now give the time as part of their radio procedure. Car: "Adam 56 is 10-8" Dispatcher: "at 10:32"

Street price of the Icom W32A is around $300.

Next time you are in the market for a scanner, consider an amateur radio transceiver. You don't have to be a licensed ham to buy amateur radios; just don't transmit. Ah, what the heck – get your license.

LETTERS TO THE EDITOR

CONTINUED FROM PAGE 7

reader Charlie Curtis, N3RCK, if we might quote from his monologue on new versus old technology. We suspect his view is typical of most readers.

"I felt sad upon reading that your column was being dropped from the new combined magazine formed from *Electronics Now* and *Popular Electronics* (called *Poptronics*).

There are a million me-too computers and electronic devices, and a million me-too magazines about them, with a million me-too columnists writing reams of copy about news with a half-life of two weeks and other stuff nobody really cares about, but your columns had character.

I'm a computer scientist for a living, and I have to say that I'm jaded from all the barrage of marketing spin and BS from Microsoft and others. As a ham, electronics tinkerer, and old radio buff, I increasingly turn to the old stuff when I want to get in contact with the 'real world.'

A crammed multilayered board, filled with microscopic surface mount devices, with tiny unreadable labels, that are impossible to manually install, fix, or breadboard, just doesn't give me the same satisfaction as a solid metal chassis with hefty resistors, big solid caps, a humming transformer, and a living breathing tube that lights up and heats up.

Today we throw megabytes of memory and gigabytes of hard disk at applications, substituting massive, sloppy and wasteful overkill for careful design and engineering. It disgusts me to see the bloatware marketed by companies such as Microsoft, while having to put up with and work around the consequences of their lousy quality control.

Engineers in the past had far more limited resources, and while popular devices like AM radios had their share of me-too designs, there were many glorious examples of exquisite engineering, like the old communications receivers.

I am not putting down advances in electronics. When I go to airshows and see the limited radios and navigation equipment our WWII flyers had at their disposal, it is obvious that a lot more of our boys would have come home if such modern wonders as GPS had been available back then. And I love my big-screen TV, DVD player and home theater system.

To me, radio has always been a living breathing thing. But as more and more SW stations go off the air, and commercial radio broadcasting seems to be turning into strings of me-too pop-rock stations owned by conglomerates, more and more of radio's character seems to be disappearing as well.

As an example, today's version of DXing means connecting to the BBC or some other distant SW station over the Internet. To me it just doesn't have the same excitement as hunching over an old receiver twisting the bandspread knob back and forth while attempting to separate a pileup of whistling and fading DX signals, and going out to the back yard to see if you can do something to your antenna to bring in Europe a bit better.

One of life's little enjoyments has always been that I used to fall asleep listening to the soft rhythmic chirping of utility stations. Even that's going away, as today's digital transmissions sound like angry wasps and aren't relaxing at all. At least WWV is still the same!

Yeh, I know that the ship captain likes his nice reliable satellite digital communications a lot better than the erratic idiosyncracies of the shortwave bands. And it's nice to know that UPS can trace my package right down to the second the electronic signature of the recipient was registered on the electronic clipboard.

But when I want to relax and enjoy some great engineering, I often find myself looking to the past.

Back when I was young, my interest in electronics was fanned by all the old equipment in my grandfather's attic, the old sets with big tar-sealed transformers, the cotton-covered wires, big heavy headphones with braided cables and metal tips connecting to fahnstock clips on big wooden breadboards, with ceramic sockets and tubes as big as light bulbs, and all those summer nights playing with the cat's-whisker on the piece of galena looking for a better spot.

Somehow, typing BBC.com ain't the same.

So I have always read your columns with great interest, as you have described the details of the great old designs, and how they still work wonderfully when brought back to life. I hope you find another interesting outlet for your wonderful talents now that *Poptronics* has decided (erroneously in my opinion) that its readers don't need to hear about the old stuff any more."

– Charlie Curtis, N3RCK

MT *subscriber A.L.B. Jansen of Utrecht, Holland, sent pictures of his receiving equipment along with his magazine renewal. The two pictures fit together for a wide-angle view of this phenomenal radio shack.*

You can't find a more interesting outlet than *Monitoring Times* – we hope you're enjoying it, Charlie! Your letters, opinions, and contributions are welcome at Monitoring Times, Rachel Baughn, Editor, PO Box 98, Brasstown, NC 28902 or ***mteditor@grove-ent.com***.

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Programming Spotlight, continued from page 69

There also is a web site (<http://www.radiohc.org/Distributions/arnie.html>) that catalogues propagation reports, many of the projects described on the program and other useful data.
[**Tuning In**: *On shortwave:* weekend edition A 2105, S 0136, 0336, 0536; midweek edition T 2205, W 0142, 0342, 0542.]

6 DXing with Cumbre
WHRI, Indiana
KWHR, Hawaii
WHRA, Maine

Marie Lamb presents a leisurely half-hour of current DX tips, interspersed with bits of great jazz. The content largely reflects the philosophy of the program's namesake – the *Cumbre DX* newsletter – which emphasizes timely, uncommon and difficult shortwave broadcast DX loggings. The primary benefit here is that you can be pointed in some interesting listening directions that you might not otherwise have known about. Editions of this classy program are archived at <http://www.cumbredx.org/cumbaud/>.
[**Tuning In**: *On shortwave:* A 0230 on 7580; 0300 on 17510; 0600 on 5745, 7315, 17780; 0800 & 0930 on 11565; 0830 on 5745, 7315; 1330 on 15105; 1530 on 6040; 1900 on 13760; 2230 on 17650; 2330 on 9495. S 0000 on 17510; 0200 on 7580; 0400 & 0530 on 5745; 0600 on 17780; 0930 & 1300 on 11565; 1500 & 1600 on 15105; 1530 on 6040; 1830 on 9930.]

Until March, good listening!

Below 500 kHz, continued from page 88

■ Winterfest

Also in the "things to do" department is the Winter SWL Festival, coming up March 10th and 11th in Kulpsville, PA. The 2000 Festival is being organized by Richard Cuff and *MT*'s own John Figliozzi. It marks the 13th year for this successful event which is known for having something for just about everyone—from VLF through UHF.

As usual, the SWL Festival will be held at the Lansdale-Kulpsville Holiday Inn, 1750 Sumneytown Pike, Kulpsville, PA 19443 (Tel. 215-368-3800). More information and a map can be found on the web at **www.trsc.com/winterfest.html**.

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CLOSING COMMENTS

By Bob Grove, Publisher

Millennial Musings

It is December 16, 1999, as I write this, and I think it's probably safe to assume that if you're reading it the world didn't come to an end on January first. Were there a few glitches? Probably. Will there be more? Probably. Even without the Y2k scare, there are a host of other causes to take their toll on digital equipment.

My fears as the new year approached, however, did not center around computer problems, but around people problems. Anytime there is an excuse, there are those opportunists who will rise to the occasion to claim their 15 minutes of infamy. It may manifest itself in savage terrorism or quick-turn profit, but it inevitably will rear its ugly head.

These parasitic elements of our species have always been with us, manipulating us with misinformation, preying on our fears, our needs, and our trust. From innocuous advertising to malignant fraud, if someone has something of value, someone else is ready to take it away.

Naturally, we have come to expect, even accept some kinds of manipulation to separate us from our hard-earned cash. Infomercials, shopping channels, Internet banners, program commercials. The list seems endless. Did you feel a need to send Christmas cards? How many presents did you buy? Did that seasonal discount special catch your cash? Did you buy a self-powered radio from Grove Enterprises? (Whoops, how did that one get in there?).

Hard sell or soft sell, advertising can turn cash flow from a trickle into a raging current. It also alerts us to the endless variety of products available, as well as lets us know who the competition is. But there are more malignant manipulators with unconscionable designs on our hard-fought earnings.

The Food and Drug Administration (FDA) dropped the curtain on the old time medicine show's spurious patent medicines, but other stage shows continue under the protection of our own Constitution. Article I of the Bill of Rights guarantees freedom of expression, including the press and religion. But while this provision guarantees freedom of religion, unfortunately it doesn't provide us freedom *from* religion.

Before any of my readers gets the impression that I'm a radical, anti-religious bigot, let me reassure you that I have deep philosophical convictions, and am very protective of an individual's right to hold dear what he believes. But I'm skeptical of many organized faiths, and of the motives of their leaders.

A quick sojourn across the electronic spectrum – TV, local AM/FM radio, shortwave, satellite – will reveal a host of religious broadcasters catering to the masses. Whether it's the Sunday morning TV evangelist or the all-day, all-night preachers, they are there for every taste.

Show me the money

Some conservative political groups claim that there is an international government conspiracy to control mankind globally (the "New World Order"), and they have among their supporters the fire-and-brimstone preachers. Curiously, however, if we check the airwaves, we find that many government-sponsored broadcasters are having to abandon their efforts due to lack of funding, and it is the religious broadcasters and the advocates of such paranoia who are propagating. That must be, then, where the money and the power are.

We are understandably hesitant to question religious exercises and practices for many reasons, including the prospect of getting on God's bad list, avoiding the repression of true religious conviction, and violating the Constitution. Thus the law protects conventional faiths, witches' covens, new age cults, and snake handlers alike.

But because of this protective cloak we must resign ourselves to being besieged by a constant deluge of fervent pitches for "gifts" and "love offerings" to insure the salvation of our souls. Best of all for the perpetrators, it's tax free money!

When I was growing up in northern Ohio, attending my alma mater, Kent State University, I frequently drove by TV evangelist Rex Humbard's "Cathedral of Tomorrow," an enormous, arena-like church near Akron. Nearby sat Humbard's palatial ranch home. I often asked myself incredulously, doesn't anyone see the connection? But he thrived.

So what's ol' Rex up to these days? According to the fringe watch Web site http://www.bible.ca/tongues-photogallery-pentecostal-trinkets.htm that keeps tabs on these folks and their antics, he has been peddling prayer cloths, miracle oil, faith nails, and blessed coins.

This marketing-to-the-faithful ploy isn't new; during the early Christian era, Roman Catholic priests sold to their believers thousands of pig parts as the "bones of St. Peter." Biblical scholars estimate that the pile of "holy relics" would have been about ten feet tall and a hundred feet across!

Supply and demand?

While this kind of duping for profit is now discouraged by the Church, believers still flock to see weeping and bleeding religious paintings around the globe, even after the ruse has been exposed. Consumers still buy the PowerTip antenna "as used by the military" to improve car radio reception even though it's been exposed as nothing but an eye protector.

So what? Aren't these businesses and churches just giving people what they want?

Responsible institutions not only provide a service to meet a real need; they care about the welfare of their members and customers, refusing to earn the easy buck by resorting to emotionalism, sensationalism, or fear-mongering. Some religious stations never ask for money; some TV stations are responsible in their programming; some businesses refuse to sell the customer a product that does not work. But others will use any trick in the book to reach their objective, without regard for the individual.

To what extent the government should step in to protect the gullible is one of those debates that defines the nature of our democracy. Our forefathers may have intended to preserve the right to believe, but so far, it also seems to bring along with it the right to plunder the believers.

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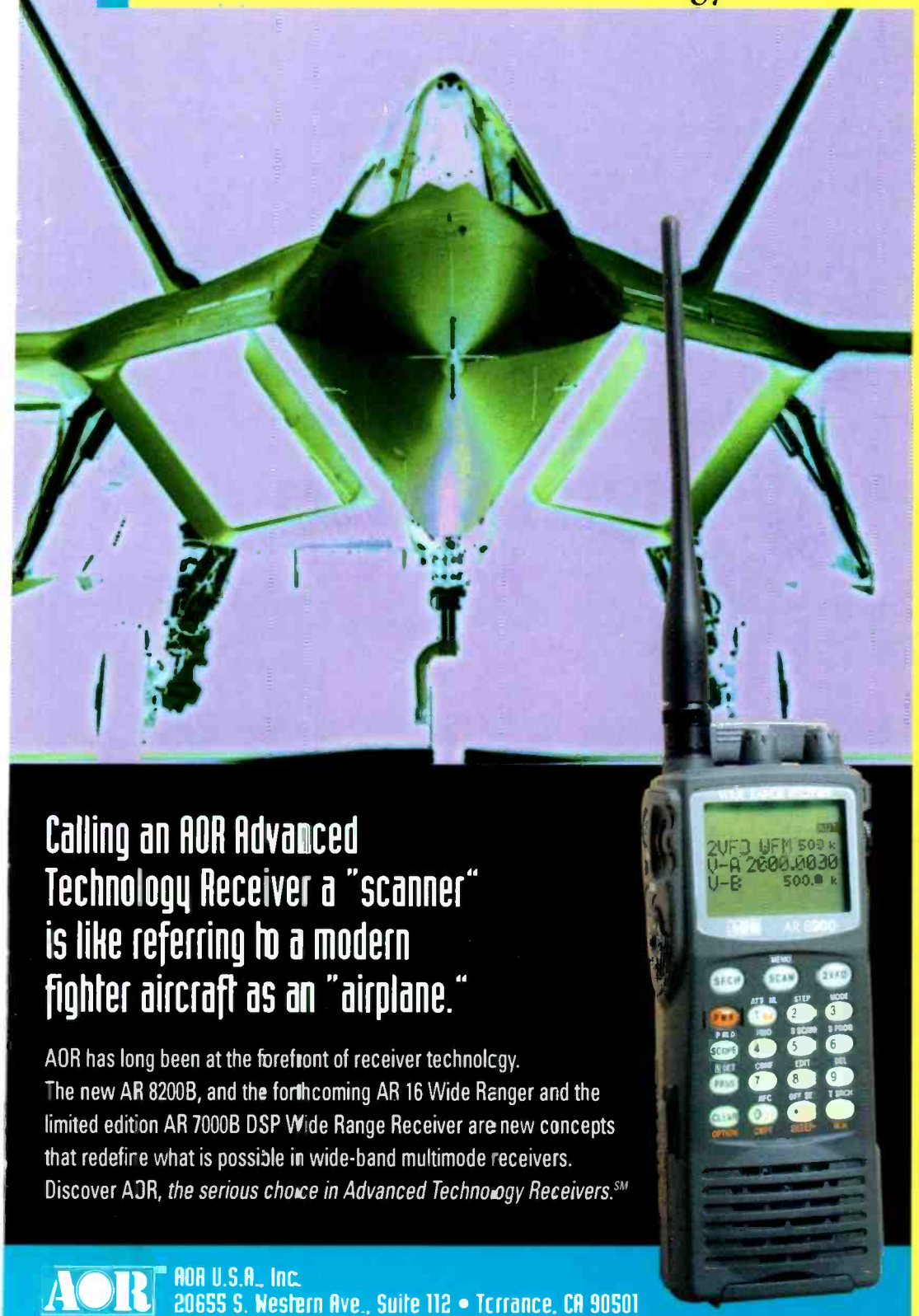

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