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

Monitoring Times

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May 2004

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Hamming Across America

Also in this issue:

Dave Boyd N3ICN, Bicyclenomad
Vintage Ham Radio Operating
Amateur Radio Signals from Space
MT Reviews the Uniden BC796D Scanner

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Some words of caution — The ARD25 is not effective on systems that use encryption or digital modulation other than APCO Project 25. It cannot translate signals from receivers that do not have a 10.7 MHz IF output, as the full channel bandwidth is needed to convert the signal from digital to analog. The ARD25 does not add trunking capabilities to your receiver. Some jurisdictions may limit the use of devices such as the ARD25.

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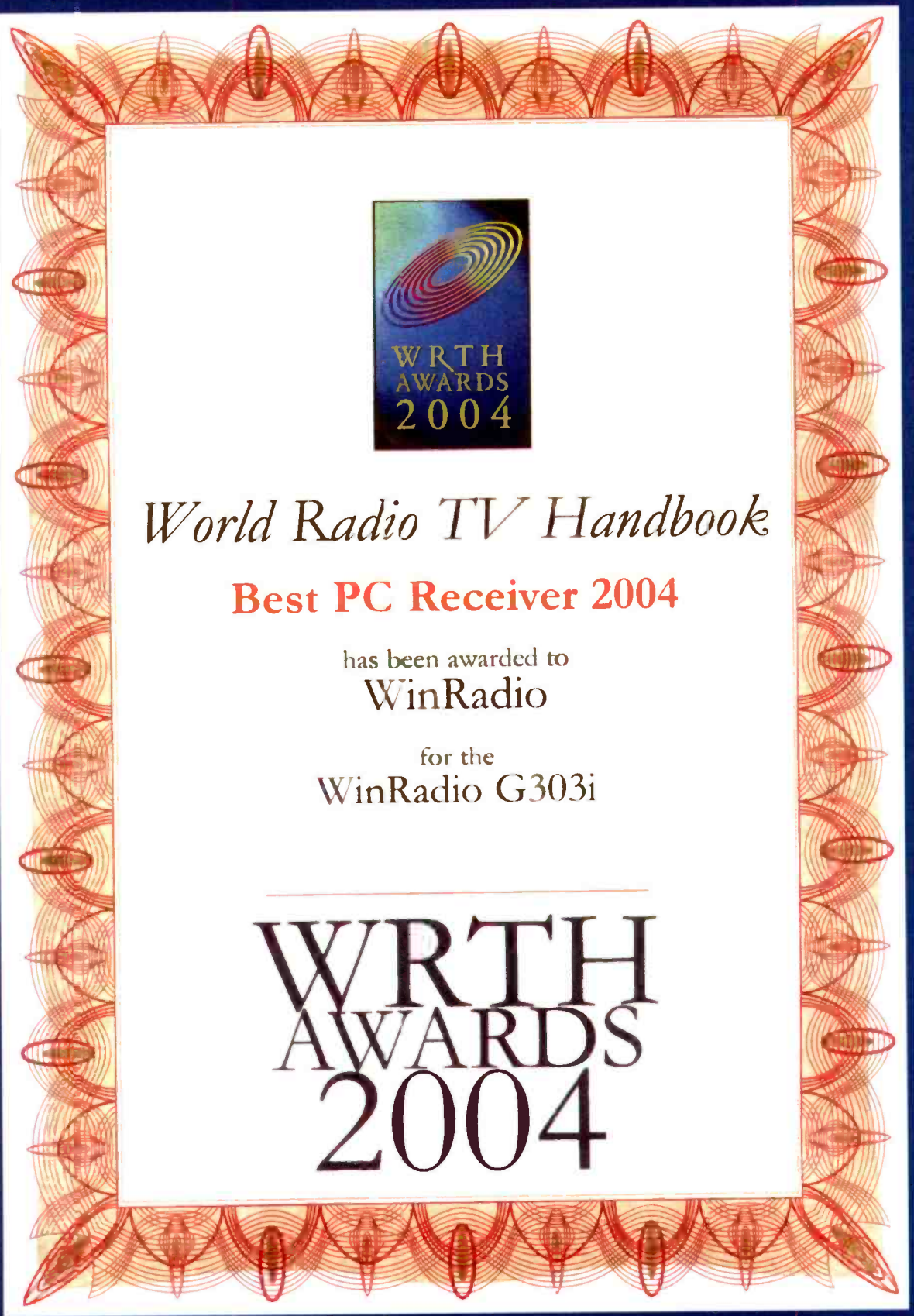

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Monitoring Times

Vol. 23, No. 5 May 2004

Cover Story

In Honor of Amateur Radio

This month *MT* tips its hat to the Amateur Radio Service – May being the month for the Dayton Hamvention, a pilgrimage every amateur or radio or computer hobbyist should make at least once in his or her lifetime.

So this month you'll find just a bit more coverage given to the *transmitting* side of radio. Past surveys have shown that about 50 percent of *MT* readers do hold an FCC license, but you'll find these articles have applicability, no matter what your favorite flavor of listening may be.

On our cover: Dave Boyd N3ICN, and his base of operations, *Bikezilla*. Photo by Ken Reitz.

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Reviews:

Last month Bob Parnass looked at the hand-held model of Uniden's new scanners capable of following digital trunked systems. This month he puts the **Uniden BC796D** through its paces. It's currently the only tabletop model capable of digital trunk tracking (page 78). Its performance bested the earlier BC785D, which Parnass previously dubbed "the scanner enthusiast's scanner."

What the VCR did for television, **Replay Radio** does for internet radio – it allows unattended recording of desired audio programming for later playback – only it's easier, says John Catalano. Are you going to miss a desired program on Radio Netherlands? Set up Replay Radio to record the internet audio stream and you won't miss a thing (page 80).

"The **PAR Electronics' Stressed Moxon** is an ingenious variation on the Moxon Rectangle," say this month's reviewers, Ken Alexander and Kevin Carey. For VHF amateur operation, it's a perfect antenna for "hill-topping, rover work, or emergency operations" (page 82).

Our Gadget Guy goes far afield this month with his review of the **Olympus C-750 Ultra Zoom** camera ... but at least he takes a picture of an antenna with it (page 86)!

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THE VERY BEST IN SHORTWAVE RADIOS

YB 400PE AM/FM/ Shortwave Radio

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

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

$149.95

YB 550PE AM/FM/ Shortwave Radio

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

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

$99.95

S350 AM/FM/ Shortwave Radio

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

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

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FR200 AM/FM/ Shortwave Emergency Radio

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

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

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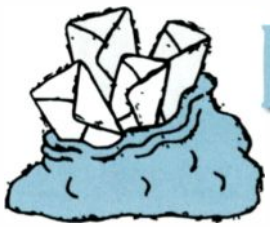

LETTERS TO THE EDITOR

Greetings from Baghdad

"Hello All ...

"Attached some photos of amateur radio fair to introduce the amateurs to the staff of University of Baghdad. Held in 8-March-2004.

"Accept best regards."

- Diya YI1DZ

Homemade amateur radio equipment on display at the "Baghdad Hamfest"

Budget Busters

"I just read *Spend A Little Save A Lot* (Closing Comments, Jan issue). I think we are in such a sweeping transition period that the hobby could literally be near a make or break situation, Rachel.

"If the hobby were depending on too many guys like me it would be in real trouble. I can't afford or justify trying to buy into the new digital stuff on the market now. I have been in radio since high school and a ham for 21 years. All of my equipment is probably considered boat anchor material now.

"My hope is that most involved with radio monitoring are well off and will support the hobby to a great extent. I will always want to see radio keep advancing and I think it is a great privilege to have the freedom to do what we want in this wonderful hobby .

"At this point I will just keep using SSB and CW on ham radio. Maybe I can soon justify a sub to *Monitoring Times* also. A hearty 73 to you and everyone at *MT*.

- John Tomlinson

Believe me, we understand. But there's room in the hobby for everybody. Digital isn't necessary if your area hasn't switched communications en masse to digital trunked systems. An *MT* subscription is a good way to get maximum value out of your radios; and if you have a computer, the cheapest way to get a full year of *MT* is by purchasing the past year on CD.

Following is an excerpt of a letter from a longtime reader who lives in an isolated area in British Columbia. He's become an expert at "making do" with whatever equipment he can cobble together.

- Rachel KE4OPD

"On 'playing radio,' my AOR 8600MKII is hitched to my rarely used MFJ reader. Ham RTTY on 14.0873 LSB is being received into its memory for me to read later.

"Well, after 11 years of heavy use my Lowe HF 150 is in poor shape. Sensitivity way down, noise level way up. Volume control shaft wobbly. The keys in the keypad to got metal fatigue – I replaced them with a pad from a junked marine VHF transceiver. It's a case of needing much TLC or replacement.

"I bought an AOR 8600MKII from Grove last February. The 8600 is quite usable on shortwave (though the 8600 revealed how bad a shape the HF is in) – the October 2000 review by Bob Parnass was extremely well done.

"Shortwave reception has been strange this past fall and winter owing to the Sun's behavior. Many auroras seen. One time, all I could receive was one WWV channel – that is, it was the *only* signal in MF/HF except for AM broadcasting. Other times, the WWV could be received on 2500, 5000, 10000, and 20000 kHz.

"I've been listening to Radio New Zealand International (on now at 2309 Z) evenings. Radio 'Oz' mornings. Get occasional good reception of the Northern Territory MF stations at Alice Springs, Tennant Creek, and Katherine in the early a.m.

"I like tuning into ZBC on 4910 kHz Zambia Radio Corporation just before they sign-on. I love the African Birdsong (and) I enjoy their music.

"The piece by Gail Van Horn on PNG in October's *MT* encouraged me to put all the frequencies in the 8600's memory. Ten years ago, 400 mi. south, I used to get good (occasionally) reception of the stations using the HF 150. Poor reception here using the 8600.

"I really enjoyed the *Urban DXpedition* piece by Bob Bennett. A sort of polar opposite of my DXing. My idea of a DXpedition is to take my 8600 or Pro-2006 up a 300 ft. peak about one third mile distant. I keep a marine VHF antenna on top of a tree (only 30 ft. high) with a coax (now squirrel damaged) to its base. Get marvelous VHF, DX from there. So far I've kept my 8600 out of treetops – remembering how my 2006 dropped 90 ft. into thick moss (and survived).

"Perhaps I should write an article called 'Treetop Monitoring Posts'! Perhaps at 68 I should cease scampering up trees – However, when I'm no longer able to scamper up trees then I'll admit to being *old*!"

- John B. Musgrave, Oona River, BC

Testimonials

"Let me give you guys a pat on the back. *Monitoring Times* is my primary source of information for my listening needs. I actually start reading it as I walk from the mailbox when it arrives. Your articles seem to be right at the level I need and want.

"I have been listening to radios for pleasure most of my 63 years. Started out with an old Allied Knight kit and a crystal homebrew back in the mid fifties. Have always had a rig of some type ever since. Now have seven scanners, Yaesu FT 101-B, two Drakes, Radio Shack DX-398 and other analog receivers. Amateur License WA3QVR.

"Ran a MARS Station in Vietnam and Okinawa while in the Marine Corps (20+ years)."

- Bill Rickrode

"Keep up the good work with the *MT* Magazine and the recent technical article on *How Receivers Really Work* (Feb issue). It was wonderful and I think that most of the *MT* readers will appreciate those kinds of in depth technical articles."

- Charles N4UMJ

"As a recently converted scanning enthusiast, I rely on *Monitoring Times* for up-to-date and useful frequency information. I especially enjoy Larry Van Horn's listings. Keep up the great work!"

- Chris Boyd, Redondo Beach, CA

To Skip Arey, *On the Ham Bands*: "Just wanted to say thanks for your inspiration. You got me to do something I been wanting to try for about 35 to 40 years.

"I was reading one of your *On the Ham Bands* and you gave information on where to go on the web to try and see what kind of questions are on the Amateur Radio License test. I found out it's not as hard as I expected, thanks to you.

"So late December I picked up a copy of *Now You're Talking* to study for the Level 1 Technician License. In mid January 2004, I went and took the test and got my ticket.

Now I not only can listen to everything I have been for a lot of years, now I can also talk on the air as well. Thanks again for your inspiration and help.

- Joann Haines KG6TJJ

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

Happy monitoring!

-Rachel Baughn, KE4OPD, editor

Monitoring and the Law

Jorge Rodriguez
jorgerodriguez@monitoringtimes.com

Scanners in the UK

In May 2002 I flew to England with my stepson who was moving there to begin a one year internship in Landscape Architecture.

Living in a foreign country can be a completely different experience from visiting one. As we got him settled in, I found myself browsing the many electronics shops crowded in along Oxford Street and Totenham Court Road in Central London. As a scanner and two-way radio hobbyist for over 20 years I could not help but marvel at all the scanners and monitor radios they had available in the United Kingdom. Models and frequency ranges I'd never even heard of peered out at me under the bright halogen lights, each with its own florescent colored card announcing the model, features and price in both British pounds and Euros; the new currency of the European Union.

We didn't buy any radios on that trip, but the next month, when I heard of Paul Wey, I got to questioning if all that monitoring could be legal in the United Kingdom. After all, this is a country that even requires licenses to use a television set. In the UK, if you use or install television-receiving equipment to receive or record television program services, you are required by British law to have a valid TV license.

In June of that year, the BBC had invited Paul Wey, a British radio hobbyist, to London for an interview on how anyone with a scanner could eavesdrop on security communications. Once in London, the BBC secretly videotaped Paul on the roof of a parking garage showing the reporter what he could do with an ordinary handheld scanner. Paul was shown the next evening talking about how one could listen to the frequencies used by the British Prime Minister's protection team, bodyguards of foreign heads of state visiting London, and police and military communications. A British intelligence officer interviewed for the story told the BBC that he would like to see scanners and their possession made illegal, since in his opinion they can only be used for illegal activities. However, scanners are not illegal in the United Kingdom as long as they are used correctly.

The rules for listening are published by the Office of Communications – a sort of British equivalent to our Federal Communications Commission. Until last year, the task had fallen to the Office of Radio Authority, but last December 2003 the Office of Radio Authority in the United Kingdom ceased to exist, its duties assumed by the newly formed Office of Communications (Ofcom).

Ofcom is the new communications sector regulator in the UK and has wide-ranging responsibilities. Among them, Ofcom inherits not only the duties of the Radio Authority, but of four other regulators: the Broadcasting Standards Commission (BSC), the Independent Television Commission (ITC), Oftel, and the Radiocommunications Agency.

According to Ofcom, scanners and monitoring radios can be legally sold, bought and used in the United Kingdom, without the need to obtain a license, provided they only receive radio services meant for general reception by the public. In the UK such services include Citizens' Band, Amateur, licensed broadcast radio, weather and navigation broadcasts.

It is only illegal to use scanners to listen to licensed private services such as the police and taxi radio transmissions and other prohibited or private broadcasts not intended for the public. Listening in on such broadcasts is an offence under Section 5(1) (b) of the Wireless Telegraphy Act 1949.

In order to help the public understand what it can and cannot listen to, Ofcom publishes a Radio Authority information sheet titled RA-169.

Anyone who intends to listen to radio transmissions should be aware of the following, it warns: A license is not required for a radio receiver as long as it is not capable of transmission according to The Wireless Telegraphy Apparatus (Receivers) (Exemption) Regulations 1989 (SI 1989 No 123). An exception to this is that it is an offense to listen to unlicensed broadcasters (pirate broadcasts) without a license and licenses are not issued for that purpose.

Although it is not illegal to sell, buy or own a scanning or other receiver in the UK, it must only be used to listen to transmissions meant for general reception – Amateur and Citizens' Band transmissions, licensed broadcast radio and weather and navigation broadcasts. It is an offence to use your scanner to listen to any other radio services unless you are authorized by a designated person to do so.

So possession of the equipment is allowed so long as it is not used to listen to prohibited communications in the UK.

From Ofcom's RA-169

There are two offences under UK law for illegal listening:

Under Section 5(1)(b) of the WT Act 1949 it is an offence if a person "otherwise than under the authority of a designated person, either:(i) uses any wireless telegraphy apparatus with intent to obtain information as to the contents, sender or addressee of any message whether sent by means of wireless telegraphy or not, of which neither the person using the apparatus nor a person on whose behalf he is acting is an intended recipient;

This means that it is **illegal** to listen to anything other than general reception transmissions unless you are either a licensed user of the frequencies in question or have been specifically authorized to do so by a designated person. A designated person means:

the Secretary of State;

the Commissioners of Customs and Excise; or

any other person designated for the purpose by regulations made by the Secretary of State.

Or:

(ii) except in the course of legal proceedings or for the purpose of any report thereof, discloses any information as to the contents, sender or addressee of any such message, being information which would not have come to his knowledge but for the use of wireless telegraphy apparatus by him or by another person."

This means that it is **also** illegal to tell a third party what you have heard.

With certain exceptions, it is an offence under Section 1 of the Regulation of Investigatory Powers Act 2000 for a person - "intentionally and without lawful authority to intercept, at any place in the United Kingdom, any communication in the course of its transmission by means of:

a public postal service; or

a public telecommunication system."

It is similarly an offence to intercept any communication in the course of its transmission by means of a private telecommunication system.

This means that it is illegal to listen to telephone calls, including mobile phone networks which are designated as forming part of the public telecommunications system.

Minnesota Scanner Listener Embroiled in Kidnapping Investigation

Monitoring and the Law is attempting to locate and speak with "Kevin," a Minnesota scanner listener who recently put himself at the center of a kidnapping investigation in which a boy was abducted at gunpoint from St. Joseph, Minnesota, on October 22, 1989.

Last fall, Kevin admitted to a U.S. Federal Marshal that he had heard the initial dispatch on the abduction case of 11 year old Jacob Wetterling fourteen years ago and drove to the crime scene, arriving before police did. Authorities are now investigating whether tire tracks found at the scene belonged to this scanner listener's vehicle and not to a possible suspect. Charges have not been filed against the scanner listener and he is not considered a suspect in the disappearance. If you know Kevin, how we can contact him, or more about this story, please contact us.

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The Bearcat 895XLT is superb for intercepting trunked analog communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning pleasure, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. **CAT895** Computer serial cable $29.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.

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BROADCASTING

Will There Be a VOA?

In the words of former VOA Deputy Director Alan Heil, speaking at the SWL Winter Festival, the Voice of America is being systematically dismantled. English is being cut from an already-reduced 19 hours of English to 14 hours (see p38), it recently lost 10 European languages, and there are plans to cut another three Balkan languages.

For a change, the budget is not the issue: Some staff suspect the Broadcast Board of Governors plan to phase out the VOA in favor of regional services which are not bound by their charter to journalistic integrity and objectivity.

John Figliozzi wrote, in an editorial for the Ontario DX Association, "My opinion? Put simply, eliminating the VOA eliminates the strictures of its Charter, something the State Department would like to be rid of. Eliminating the VOA allows more money to go to outsourcing, an ideologically popular approach to the commercial broadcasting interests which dominate the BBG.

"The VOA feel they've got the proven track record, they've got the integrity and trust of the audience – something that didn't come easily and without a protracted battle."

> ***"The more we hear from you, the more likely we are to survive." - Alan Heil, former VOA Deputy Director***

WSHB for Sale

At the end of February the Christian Science Publishing Society announced it would discontinue broadcasts from its shortwave station, WSHB, South Carolina.

"WSHB has been a very effective communications tool, and we're deeply grateful to its staff for their dedicated professionalism," said Catherine Aitken-Smith, Broadcast Director of Broadcast and Multimedia Services, "but it's become clear to us that we don't need to actually own broadcast facilities in order to distribute programs."

WSHB's owner, the Herald Broadcasting Syndicate, has put the station up for sale.

The Power of Radio

When people have a message they will search for a way to spread it, no matter how. Here are some recent examples.

Until recently, India did not allow private or local ownership of the airwaves, so, with some United Nations funding, the town of Boodikote started its own station based on cable – and almost immediately got action on some issues that had festered for years. "Community radio is not about playing alternative rock music," said Seema Nair who works at the station.

A women's group did run a low-power station for five months until it was shut down by Indian authorities in February 2003. "We don't think that villagers are equipped to run radio stations," said the Indian ministry of information and broadcasting.

Private citizen Abdulazis Alkhamis, head of London-based Saudi Center for Human Rights, has been broadcasting Reform Radio via shortwave radio and satellite to speak out against corruption and for a moderate Islamic government in Saudi Arabia. The satellite service is the only one not jammed.

Caribbean Magazine, an hour-long program broadcasting on KHPY-AM (1670) in California, gives a taste of music and news from home to hundreds of Haitians in Southern California.

Even Venezuelan president Hugo Chavez has resorted to small government-supported "pirate" radio stations like Radio Perola, which broadcasts to a few hundred homes on the edge of Caracas. Chavez is trying to counter the four big private television networks which paint him as an unstable dictator.

Low power community radio in the US was undercut when the National Association of Broadcasters raised fears of interference to existing broadcasters. When Congress ordered a study be done, the results, released last May, debunked the objections. Now, of course, the NAB claims the study was flawed, but Congress is in a mood to speed up licensing of new low power broadcasters.

Dismay over Ukraine closure

Five international radio broadcasters expressed dismay at the closure of Radio Kontinent, an FM radio station in Kiev. Radio Kontinent carried programs from the BBC, Deutsche Welle, Radio Liberty, Radio Polonia and the Voice of America before it was closed by Ukrainian authorities on 3 March. The Association of International Broadcasters called on Ukraine to allow Kontinent back on the air, providing access to free and impartial information from around the world for the citizens of the Ukrainian capital. - *AIB*

FCC & CONGRESS

Broadband Over Power Lines

According to a press release from the Amateur Radio Relay League, comments on the FCC Broadband over Power Line (BPL) Notice of Proposed Rule Making (NPRM) in ET Dockets 03-104 and 04-37 are due by Monday, May 3. The deadline for reply comments (comments on comments filed by others) is Tuesday, June 1. The NPRM text appeared March 17 in *The Federal Register*.

ARRL CEO David Sumner, K1ZZ, says the League recommends that members read the NPRM and develop their own thoughtful, considered comments that specifically address the FCC's BPL proposals, reflect positively on the amateur community and, if possible, offer alternative recommendations.

"It's important to remember four things," Sumner said. "First, this is not a proceeding to 'permit' or 'authorize' BPL. BPL is already permitted under the existing Part 15 rules.

"Second, the NPRM reaffirms the important principle that licensed services must be protected from harmful interference and are not required to protect BPL systems; this is good, but we can't take it for granted nor can we assume that the principle will be honored in practice.

Third," Sumner continued, "the NPRM proposes additional, new constraints on BPL to protect licensed services. The FCC did not go far enough, but at least the proposals aim in the right direction.

"Finally, while we continue to believe firmly that BPL is a very bad idea, arguing that the FCC should 'ban BPL' will not get us anywhere." – *ARRL*

Mere radio listeners receive no such protection, but it was suggested at the Winter SWL Festival that if you are unable to receive a licensed broadcast station and can prove it's due to interference from BPL, this may be grounds on which to appeal. Other services such as wireless internet providers and the Department of Homeland Security are also anxious about potential interference and will be watching developments closely. (See also p.69.)

Doing the Nextel Swap

After two years of review, the FCC may be close to a decision on whether to adopt an $850 million-plus proposal initiated by Nextel to solve their interference problems with public safety agencies in the 800 MHz band. There is no easy solution. Rebanding would mean public safety agencies face reprogramming tens of thousands of

May 1: Huntington Beach, CA
American Shortwave Listeners Club Meeting at the home of Stewart MacKenzie-WDX6AA (16182 Ballad Lane, Huntington Beach, CA 92649. Phone: 714-846-1685) 12:00 Noon - 2:00 pm *wdx6aa@earthlink.net* http://groups.yahoo.com/group/ASWLC/

May 1-2: Abilene, TX
Key City ARC Hamfest. For more information contact Peg Richard KA4UPA (325) 672-8889, *ka4upa@arrl.net*, or write Key City ARC, PO Box 2722, Abilene, TX 79604.

May 14-16: Dayton, OH
53rd Hamvention – the world's largest amateur radio gathering and trade show at the Haro Arena (1001 Shiloh Springs Road, Trotwood, OH). 500 inside exhibit spaces, huge 2500+ space outdoor vendor area, forums and much more. "If you can't find it at Dayton, you'll never find it!" Tickets $23 or $25 at door (3 days). Dayton Hamvention Ticket Sales, P.O. Box 1446, Dayton, OH 45401-1446 or via http://www.hamvention.com

May 15: Seal Beach, CA
Southern California Area DXers (SCADS) at Farmers & Merchants Bank Community Room (12535 Seal Beach Blvd), Noon to 4pm. Contact: Bill Fisher, 6398 Pheasant Drive, Buena Park, CA 90620 *billfishernow@netzero.net* http://groups.yahoo/group/SCADS

May 15: Greenville, NC
East Carolina Antique Radio Club annual swapfest radio show and sale at Kiwanis Club (177 Forelines Road, Winterville, NC), 8a.m.-3p.m., free admission. Contact Herman Schnur K4CTG, 3205 Brick Kiln Road, Greenville, NC 27858; 252-752-2264; *hschnur@cox.net*

radios (although the expense would be borne by Nextel), and rival companies claim Nextel would be getting an unfair several billion dollar windfall in the 1.9 GHz band without going through the auction process.

On the other hand, public safety agencies whose communications are stepped on daily by Nextel transmissions say a solution can't come too soon – Even if the proposal is accepted, it will be years before it can go into effect.

The next step is up to the commissioners and could come as soon as mid-April, but whether they accept or deny or request changes to the proposed order, sadly, one thing is for sure – the decision is sure to be appealed.

Indecency vs. Freedom of Speech

Janet Jackson's "wardrobe malfunction" at the Super Bowl halftime clinched an effort already underway in Congress to curb the broadcast media's steady slide toward the lowest common denominator. In March, the House voted, 391 to 22, to substantially raise fines for the holders of broadcast licenses and the entertainers. The measure would also force the Federal Communications Commission to act more quickly on complaints and move to revoke the licenses of repeat offenders.

A similar measure is emerging in the Senate, though the Senate bill would have to be reconciled with the House bill.

Some protest that the measure threatens free speech and amounts to government intervention on behalf of viewers who can make their own choices. But it's not the subscribers to TiVo the bill is intended to protect. (They chose to rewatch the Jackson-Timberlake incident more than any other moment in TiVo history.) It's the children who have no choice as well as those who didn't choose to be "flashed" the first time.

Alan Weiner, owner of WBCQ, a private shortwave station, said at the Winter SWL Festival in Kulpsville that the issue is one of the most important challenges to free speech to arise in our generation. The new fines would make the station providing the airspace responsible for the content of broadcasting, rather than punishing the person who commits the offense, and the fines could be devastating to a small station.

Ironically, FCC jurisdiction does not extend to cable or satellite broadcasting (including MTV who sponsored the half-time show). Congress has given the FCC authority to govern content on radio and television broadcasts that travel over the airwaves because that spectrum belongs to the public, and over-the-air signals are "uninvited guests." Cable and satellite channels, on the other hand, are privately-built systems received only by paying customers.

It's Everywhere

By the way, who's monitoring broadcasts in other languages? Hispanic entertainment is the fastest growing segment in the broadcasting industry and observers say it has its share of shock jocks. According to Raul Yzaguirre, of the National Council of La Raza, "Spanish-language radio is raunchier than English. And there is no accountability whatsoever."

The Performance Radio Network (PRN) instituted a 7-second delay for some of its NASCAR race coverage to avoid potentially disastrous FCC fines. Johnny Sauter was fined $10,000 for an expletive during a live interview, but PRN vice president Doug Rice said it could get worse. "You're looking at huge potential fines." The FCC levies a $27,000 fine per on-air "indecency." "We could be fined exponentially per number of affiliates – 460 for a Nextel Cup race... We're talking about global-killer type fines."

FINES AND FORFEITURES

For Indency

The Federal Communications Commission issued Notices of Apparent Liability for Forfeiture against the following stations and proposed the statutory maximum forfeiture amount in all cases because of the stations' history of violations relating to the broadcast of indecent material (see also p.68):

1. $247,500 against three subsidiaries of Clear Channel Communications for nine violations on the "Elliot in the Morning" on Stations WWDC(FM), Washington, D.C., WRXL(FM), Richmond, Virginia, and WOSC(FM), Bethany Beach, Delaware.
2. $27,500 against Infinity Broadcasting Operations, Inc. for indecent material in connection with "The Howard Stern Show" on WKRK-FM, Detroit, Michigan.
3. $55,000 against Capstar, a subsidiary of Clear Channel, for broadcast of indecent material over Stations WAVW(FM), Stuart, Florida, and WCZR(FM), Vero Beach, Florida.

Amateur Radio Service Enforcement Actions

1. Letter to Xcel Energy, Minneapolis, concerning power line interference to an Amateur licensee in Wellington, CO
2. Feb 26 Notice of Apparent Liability for Monetary Forfeiture to Best Wok, Westville, NJ, $10,000, issued by Philadelphia Office, due to unlicensed operation on Two Meter Amateur Band. Best Wok had been warned in January 2003.
3. Feb 27 letter to Richards, KG2IJ, concerning allegations of application fraud in obtaining call sign KB4VU and changing it to KG2IJ. Amateur in Florida claims to be the *real* Frank C. Richards and the *original* KB4VU.
4. Mar 3 Warning Notice to Glover, KE6TTL, Garden Grove, CA, concerning operation on Catalina Amateur Repeater Association repeater.
5. Warning Notice and notification of review of renewal application, Dreas, Fl., KE4GDX.
6. One downgrade and 4 cancellations pursuant to audit of W5YI VEC examination session of September 1, 2001, Yucaipa, CA; and ARRL VEC examination session of March 30, 2002, Los Angeles: Reynoso R. Salguet, Soledad, CA; N6REY: downgrade from Extra to Tech. Manuel M. Vega, Anaheim, CA; KG6GSP General Class: license terminated for failing to appear. Sun H. Kim, Cerritos, CA; KG6LDT, Technician Class; license terminated for mailing to appear. Karen S. Kim, Buena Park, CA; KG6LDU, Technician Class, license terminated for failing to appear. Dae Uk Hong, Los Angeles; KG6LDX, Technician Class, license terminated for failing to appear. All participating VEs removed from VE service by the VECs.
7. Station inspection, Byron R. Eggers, KR4GR, Advanced Class, Delray Beach, Florida, March 9, 2004 as a result of complaints regarding operation on 3.945 MHz.

Cases Closed, Maybe

(1) Nine years ago William and Dorothy "Dee" Quigley had feuded with their Jewish neighbors, Mitchell and Candice Aronson. The Aronsons contacted the Anti-Defamation League after listening to the Quigleys' phone conversations on a Radio Shack scanner. They said they heard the Quigleys discuss a campaign to drive them away with Nazi scare tactics.

The ADL advised the Aronsons to start recording the conversations. But after listening to the tapes, the Jefferson County police dropped the charges and ordered the Aronsons to pay the Quigleys $75,000 (apparently never paid).

The Quigleys won a $10 million verdict against the ADL in federal court in 2000. An appeals court upheld that verdict, and the U.S. Supreme Court refused to review the case, so now the ADL pays up.

(2) He's ba-a-ck. Jack Gerritsen of Bell, California, who briefly held amateur license KG6IRO until the FCC learned he'd been convicted of interfering with Los Angeles Police Department radio transmissions in 2000, has been up to his old tricks, illegally transmitting on repeaters and jamming public safety transmissions.

He's behind bars again for a few days on a different charge. Apparently Gerritsen ignored a posted entryway to the courthouse roof – reportedly with a portable transceiver and extra batteries wrapped in black plastic, resembling a bomb. Gerritsen received the maximum penalty on the trespassing charge – 30 days in jail and a $2500 fine plus court costs. If he doesn't pay up by May 15, the government will impose a real estate lien against Gerritsen's house. The judge apologized to hams that the illegal transmissions could not be considered in this case.

HOMELAND SECURITY

FBI at Your Back Door

A few years ago the FBI was successful in getting Congress to pass a controversial package (Communications Assistance for Law Enforcement Act - CALEA), which among other things, required telecommunications networks to provide police easier access to wiretaps through the maze of call forwarding, cellular phones, call waiting, etc. So far, the FCC has interpreted CALEA's wiretap-ready requirements to cover only traditional analog and wireless telephone service, leaving broadband and Internet applications in a regulatory gray area.

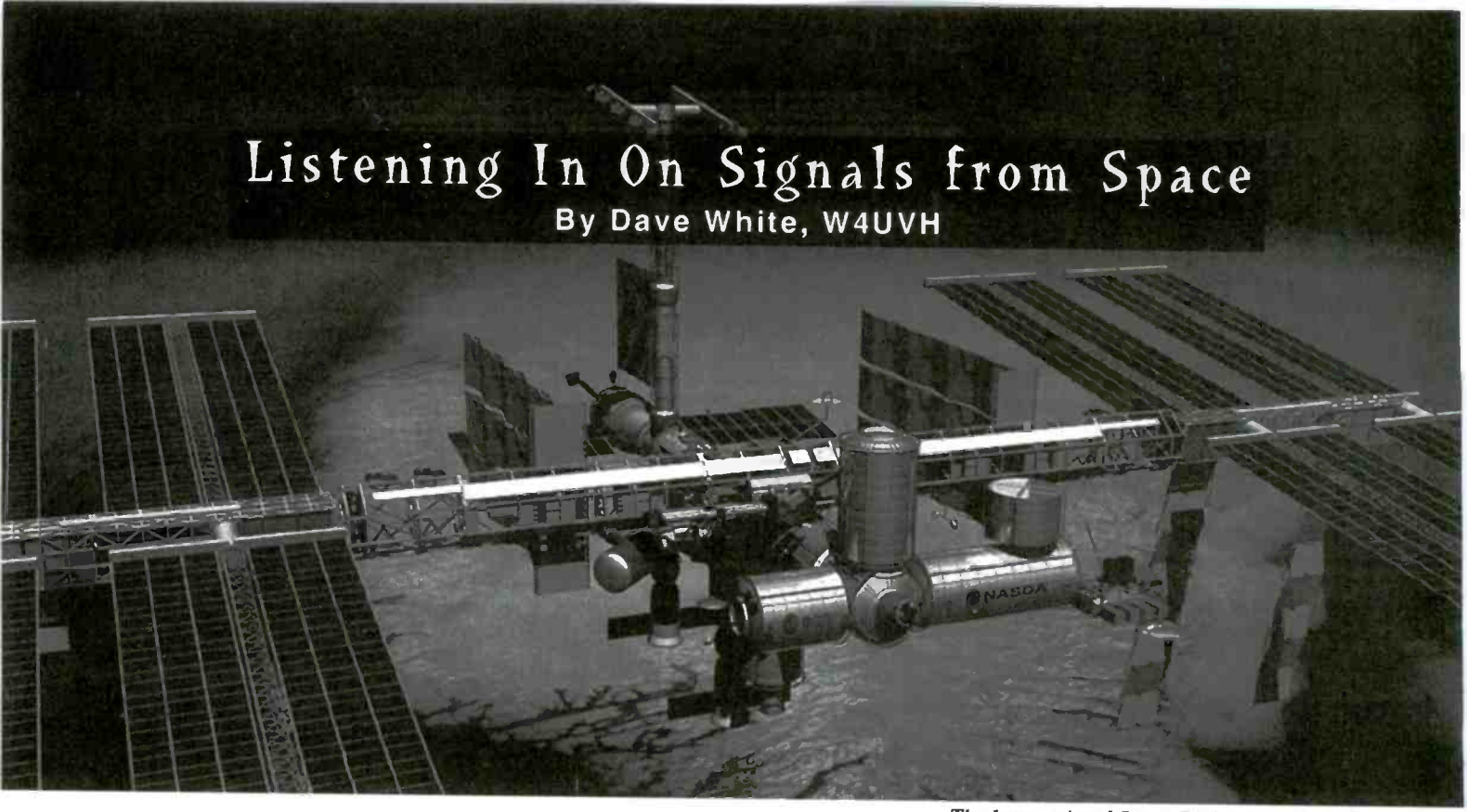
Now the FBI has approached the FCC asking to expand that requirement to include all broadband Internet providers, including cable modem and DSL companies. The proposal is also backed by the U.S. Department of Justice and the Drug Enforcement Administration.

With encryption becoming more standard on

continued on page 83

Listening In On Signals from Space

By Dave White, W4UVH



The International Space Station is a relatively easy extra-terrestrial target for radio monitors. Courtesy: NASA

Just when you think you've heard everything there is to hear on your scanner or shortwave receiver, out of the ether pops the voice of an astronaut transmitting from the International Space Station, or an image of Earth from an orbiting satellite.

Welcome to the world of hamsats! Since the first one was launched more than 40 years ago, the world's Amateur Radio operators have been sending voice, data, and images through low earth orbit (LEO) satellites and chatting with orbiting astronauts aboard shuttles and space stations.

If you're surprised that ham radio satellites have been around so long, you'll probably also be surprised at how easy it is to get started monitoring them, with minimal equipment that you very possibly have at your monitoring post right now!

In the Beginning

The space race was just beginning when the Soviets successfully launched the first manmade satellite, *Sputnik*, in the fall of 1957. It circled the Earth every 96 minutes in an orbit 500 miles high, transmitting an endless stream of beeps.

The first hamsat was launched on December 12, 1961. It transmitted "Hi" in Morse code, but wasn't equipped to receive signals. The third U.S. hamsat, launched in 1965, was the first that allowed two-way communication between hams on Earth, functioning as a repeater with a 590-mile high antenna! Although it worked for only 18 days, it facilitated contacts between more than a thousand hams in 22 countries.

Since that first OSCAR (**O**rbital **S**atellite **C**arrying **A**mateur **R**adio) launch, U.S. hams have been responsible for dozens more birds, not to mention RS (**R**adiosputnik) satellites sent up by the Russians, and various others sponsored by hams in 15 other countries. Today's hamsats have lifespans measured in years, and facilitate voice, digital, and image communications over wide areas.

Along Come the Humans

Owen Garriott, W5LFL, Mission Specialist on the STS-9 crew aboard the space shuttle *Columbia*, was the first human to communicate with earthbound hams while in orbit. That was in 1983. The crew of STS-37 in 1991 was made up entirely of licensed Amateur operators.

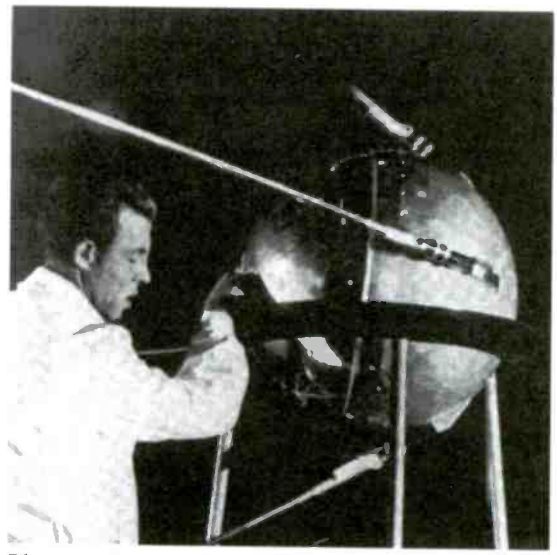
Ham radio was even used for communications between the Russian *Mir* space station and various U.S. shuttles. SAREX (**S**huttle **A**mateur **R**adio **EX**periment) has been part of more than two dozen shuttle flights. Most recently, and most tragically, three of the seven *Columbia* astronauts who died during their ill-fated re-entry last year were ham operators.

When the International Space Station (ISS) became operational, SAREX was joined by ARISS (**A**mateur **R**adio aboard the **I**nternational **S**pace **S**tation) in offering Earthbound monitors yet another target in space. The first ARISS contact, a ten-minute exchange between Commander "Shep" Sheperd, KD5GSL, and students at a Chicago elementary school, was in December, 2000. Since then, the space station's U.S. (NA1SS) and Russian (RS0ISS, RZ3DZR) callsigns have been heard many times back here on Earth.

How Do They Do That?

The commercial, government, and military satellites that routinely bring us everything from telephone calls to weather satellite images to *I Love Lucy* reruns are parked in geostationary orbits, which means that their height above the equator (about 22,000 miles) and orbital speed (the same as the rate of Earth's rotation) keep them in the same position at all times relative to a given point anywhere in the satellite's coverage area (footprint), which is usually about half of the planet's surface.

Because of the huge cost of placing a satellite in geostationary orbit, most hamsats, which are financed by private and corporate donations,



The era of manmade radio signals from space began when the Soviets launched Sputnik in 1957. Courtesy: NASA/Asif A. Siddiqi

Mission Commander Frank Culbertson operates the ham radio station in the International Space Station's functional cargo block. Courtesy: NASA

travel much closer to Earth. These low earth orbits – 200 to 1,000 miles up – in polar (north-south) or equatorial (east-west) orbits, bring them within radio "view" of a given point on Earth only a couple of times a day, for a few minutes at a time. A lesser number travel in a higher, elongated orbit that makes them receivable for longer periods of time in what is called a Molnyia orbit.

Because hamsats depend on solar-charged batteries to power radio equipment as well as onboard computers and guidance systems, their transmitters run at relatively low output power levels – a few watts at most. Happily, with antennas hundreds of miles up and an unobstructed line-of-sight, a few watts are plenty!

Like familiar repeaters here on Earth, hamsats are designed to receive incoming signals on one frequency and retransmit them on another. Yet another frequency sends a stream of telemetry that keeps ground controllers informed about things like the satellite's battery status, temperature, and attitude in relation to Earth.

Unlike terrestrial repeaters, however, hamsat transponders can repeat several signals at the same time. Some support a variety of modes. Depending on the satellite or spacecraft, you might hear (or see) FM voice, SSB (single sideband) voice, CW (continuous wave, *aka* Morse code), APRS (Automatic Packet Reporting System), conventional packet, or even SSTV (Slow Scan TV).

How Do You Do That?

In most respects, monitoring hamsats or spacecraft is no different than monitoring anything else you choose to target. You just have to know when and where to listen. By far the quickest and easiest way to determine when a given satellite will be "visible" at your location is to log on to Chris Peat's outstanding Heavens Above website (**http://www.heavens-above.com**).

The Heavens-Above website enables you to easily determine when hamsats and orbiting spacecraft will be in radio range of your monitoring post.

After initially setting up your login information and location, it's as simple as clicking on "Radio Amateur Satellites" to bring up a list that shows exactly when each satellite will be in range of your monitoring post for the next 24 hours.

If you're more of a DIY (do ityourself) type, there are several software packages available that will do the same thing, but you have to supply your geographic coordinates, as well as the latest orbital elements (known as Keplarian elements or "Keps") for the satellites you want to monitor.

As this article goes to press, there are 17 fully or partially operational hamsats in orbit, and ham operations are currently active on the International Space Station. That means you have a good many targets for listening in on signals from space.

No Special Equipment Needed

The downlink frequencies of the hamsats that are fully or partially operational are in the Amateur 10-meter (around 29 MHz), 2-meter (around 145 MHz) and 70cm (around 430 MHz) bands. Although it is possible to sometimes hear a satellite signal on a handheld receiver with its standard issue "rubber dummy load" antenna, you will need an outdoor antenna to hear more than an occasional burst of data or snatch of voice. A simple vertical antenna will work well for most of the satellites.

With a low-end ham transceiver (Icom IC-706) and an inexpensive dual band (144/440 MHz) vertical antenna on a 25 foot mast, I am able to easily hear hamsat and ISS downlinks on the 2-meter and 70-centimeter bands. The metal gutter and downspout on the back of my house work just fine for receiving the 29 MHz (10 meter band) downlinks from the AO-7 and RS-15 satellites.

Most any scanner that covers the downlink frequencies will yield some interesting listening. Be advised, however, that your receiver will have to be able to receive in SSB mode to hear some of the voice signals. Fortunately, some of the most interesting catches, including the space station, use the common FM voice mode used by most occupants of the VHF and UHF bands here on terra firma.

Data transmissions are mostly in standard formats – 1200 and 9600 baud packet, APRS, SSTV. If you are already equipped for data reception, you won't need any additional equipment or software unless you want to decode some of the telemetry data.

Doing Doppler

Think about how a fast moving freight train or race car sounds as it passes you. The sound is higher in frequency as it approaches you, then descends to a lower frequency as it moves away from you. The phenomenon is known as the Doppler effect, and it affects radio signals in the same way that it alters audio frequencies.

When a hamsat first becomes audible at your location on a given orbital pass, its signals will be about 5 MHz higher than its listed downlink frequency. As it moves toward you, the frequency gradually descends to the listed frequency, then continues to descend to about 5 MHz lower than the downlink frequency by the time it goes out of range.

Owen Garriott was the first orbiting astronaut to communicate with hams back on Earth. Courtesy: NASA

The International Space Station downlink, for example, is on 145.800 MHz. You would actually tune your receiver to 145.805 MHz at the beginning of a pass. As the signal starts to get noisy, you gradually tune down to 145.800 by the midpoint of the pass, eventually winding up at 145.795 by the time the station goes out of range. A typical ISS pass lasts about ten minutes, so the tuning is gradual.

A one-minute audio clip of a recent ISS contact with an Ohio school classroom, received at my location in middle Tennessee, demonstrates how Doppler shift affects the received noise level (**http://www.monitornashville.net**). Note that you will only hear the space station side of the conversation, the voice of Commander Mike Foale. I was much too far from the school to receive its signals on the ISS's 2-meter uplink frequency.

Keeping up with the Doppler shift for data transmissions is a bit trickier than for voice, and trickier for SSB than for FM. With a little practice you can get the hang of it without having to invest in software and equipment that automatically tunes your radio to compensate for the shift.

Continuing Education

Beware! Monitoring hamsats can be addictive! The more you learn about them, the more you'll want to learn. You'll want to know when new birds are launched, when any of the current crop of hamsats suddenly go partially or completely out of service, or when one suddenly wakes up after being dormant. You'll probably also want to know when the astronauts will be making scheduled transmissions when they are in range of your monitoring station.

U.S. hamsats carry the designator AO, which stands for AMSAT-OSCAR. AMSAT (The Radio **A**mateur **S**atellite Corporation) is the clearinghouse for all things hamsat, and one of the most complete resources you'll find. The AMSAT-North America website (**http://amsat.org/**) should be your starting place.

If you have the capability to receive SSB on the HF ham bands, there are several weekly on-air AMSAT nets that provide useful information for satellite newbies and veterans alike.

DAY	TIME	FREQ	NET
Sunday	1900 UTC	14282 kHz USB	AMSAT International
Tuesday	2100 EDT	3840 kHz LSB	AMSAT-NA East Coast
Tuesday	2100 CDT	3840 kHz LSB	AMSAT-NA Mid-America
Tuesday	2100 PDT	3840 kHz LSB	AMSAT-NA West Coast

The most current information about ham operations on the International Space Station can be found on the ARISS website (**http://www.rac.ca/ariss/**).

Coming Attractions

The newest generation hamsat, dubbed OSCAR Echo, is currently scheduled for a June 29 launch. This long awaited microsat-class bird will feature FM voice, packet, and PSK31 operations. With four VHF receivers and two UHF transmitters, Echo will be able to handle simultaneous voice and data communications.

Hamsats in various stages of development in other countries promise features ranging from a GPS receiver experiment to an orbital path around Mars. Even if the projects on the drawing board never see the light of day, you will still have plenty of targets for listening in on signals from space.

Operational Hamsats and Spacecraft

Satellite	Downlink (MHz)	Mode	Notes
ISS	145.800	FM	See ARISS website for scheduled voice operations
AO-7	29.4 - 29.5	CW/USB	On the web: http://www.experthams.net/ao7;
	145.925 - 145.975	CW/USB	semi-operational when in sunlight; download
	29.502	Beacon	program to decode telemetry at
	145.972	Beacon	http://www.qsl.net/k3tz/
	435.100	Beacon	
RS-15	29.354 - 29.394	CW/SSB	
	29.352	Beacon	Intermittent
	29.830	USB	Unofficial frequency for coordinating contacts
FO-20	435.800 - 435.900	CW/USB	Semi-operational
	435.795	Beacon	
AO-27	436.795	FM	On the web: http://www.ao27.org
FO-29	435.800 - 435.900	CW/USB	Download program to analyze telemetry at
	435.795	Beacon	http://www.ne.jp/asahi/hamradio/je9pel/
SO-41	436.775	FM	9600 baud packet, FM repeater
SO-50	436.795	FM	Voice repeater
UO-11	145.826	FM	1200 baud PSK; http://www.uk.amsat.org/
	145.825	FM	Beacon
AO-16	437.026	SSB	1200 baud PSK APRS digipeater
UO-22	435.120	FM	9600 baud FSK; http://www.sstl.co.uk/
IO-26	435.812	SSB	Telemetry only
NO-44	145.827	FM	APRS digipeater; http://pcsat.aprs.org
NO-45	437.095	FM	1200 baud AFSK
MO-46	437.325	FM	38.4k baud FSK
LO-19	437.126	CW	Telemetry only
GO-32	435.225	FM	Beacon only; http://www.iarc.org/techsat/
SO-33	437.910	FM	9600 baud FSK; semi-operational

Dave Boyd N3ICN: Bicyclenomad

By Ken Reitz KS4ZR

Some hobbies just aren't compatible, but if you can combine your radio hobby with another recreational activity you can double your fun. That's what David Hatch N9ZRT did when he combined his kite-flying and ham radio (see *MT* Sep. 2002). But, David still has to work for a living.

Not so with Dave Boyd, N3ICN. Boyd's passion for radio and bicycling is so great he decided to make both his life and has spent the last 14 years meandering through 37 states in a very slow paced journey of a lifetime.

Getting Off the Treadmill

Dave Boyd spent five years working in the press room at a large newspaper in southern California but what he liked to do in his spare time was ride a bicycle. There is something about the freedom of the road on a bicycle – the sensory exhilaration of open air riding at a pace much faster than running but much slower than a car – that must have gripped Boyd. The only release from that grip was to step off the treadmill, opt out of the mortgage/car payment cycle and hop onto the kind of cycle you have to push with your own power.

He started off with a simple road bike and a set of *panniers*, special saddle bags for bicycles, where he would stow his personal belongings. As the miles racked up and his on-the-road needs became more obvious he began to add a few more bags. Finally, he found what he really needed: a small trailer.

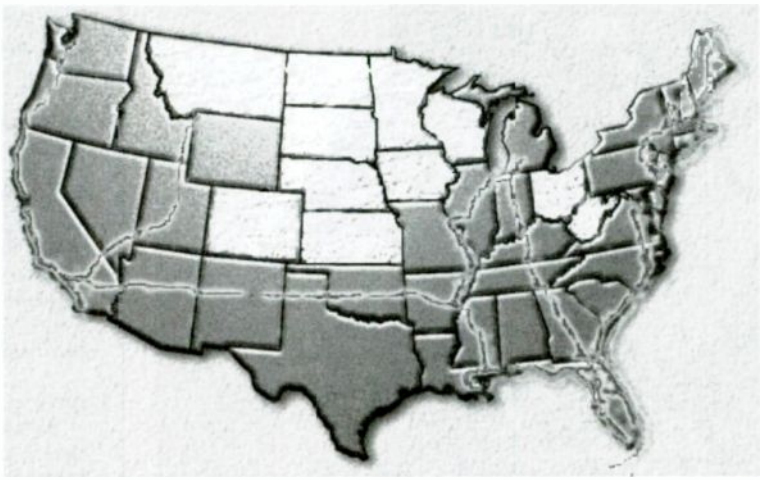
Pedaling the upright road bike, he was able to pull the necessities of his life along behind him, which by this time included tents and camping gear. As the miles continued to mount and his contact with other "technomadics" increased, he became aware that recumbent bikes (low profile bicycles sporting actual seats with backs and with pedals arranged so that transfer of energy was more efficient) made the 8 or 10 hour daily drive much easier.

Enter Bikezilla

He made the switch from upright to recumbent and little by little changed the basic structure of his bike to fit his evolving needs. He would add a fering (the housing on the front of the bike which helps cut wind resistance and protects vital electronic components from the weather), a bigger trailer, antenna rack, solar panel, and, most vital of all: truck style air horns, his defense against aggressive dogs.

Bikezilla is what he calls the bike and trailer and with good reason: it weighs in at over 700 pounds. He works a system of three sprocket sets and an enormously long drive chain to get 196 gears. Custom designed brakes bring this monster to a stop with a loud groan, yet the whole contraption is nimble enough to make a U-turn on a small road. He uses a custom "landing gear" to keep the bike upright when stopped.

Plying the blue highways he refers to as "seas of concrete," Dave Boyd is in no hurry. And that's a good thing because, thanks to the heft of this machine, he generally averages about 8 to10 mph (though in one of the scarier moments of his career he did have the bike careening down a hill at 50 mph). That's good enough to make an average of 50 miles a day which he considers to be a good day's work.



Map of Dave Boyd's journey of a lifetime and thousands of campsites along the way. Boyd is unperturbed by seasonal weather pedaling through rain, snow, heat and cold. (Courtesy http://www.bicyclenomad.com)

Evolving Technomadness

Early in his new bicycling career he had a CB radio which he found was helpful in getting directions or finding out about weather conditions down the road. But, one day in Maryland he was introduced to amateur radio and was excited about the idea of using 2 meter repeaters to talk to locals and summon help if needed. Other hams have helped him find metal workers to weld parts back onto Bikezilla's frame and bike shops to find or build esoteric parts.

It was short work for Dave to get his Technician Plus license which also gave him access to sideband voice on 10 meters. So, added to the dashboard were a Kenwood 2m/440 rig and a Radio Shack 10 meter transceiver. He plans to take the General Class exam and is hoping to find a really cheap all-band HF rig to round out his ham radio possibilities. He's already built an 80-10 meter mobile whip antenna in anticipation of finding a rig. That antenna joins the CB, FM, 2 meter, 440 and satellite radio antennas also on the trailer.

Dave has added a GPS receiver which, combined with 2 meters, allows him to use APRS so his friends can follow his progress on **http://www.findu.com**. He has a laptop computer which he uses to surf the web, send email and update his web site (**http://www.bicyclenomad.com**). He also has a cell phone to call places he just can't reach by 2 meters. For entertainment he has added XM satellite radio which he plays through a Jensen AM/FM/CD receiver which feeds a four speaker system with two speakers on the dash and two more mounted on the trailer!

A self-designed system of running lights, headlights, reflectors, turn signals and the aforementioned air horns are his only protection on a road where he takes up the space of a small car and moves at the pace of a jogger. Power for all these items is via a deep cycle battery charged by a solar panel. A volt meter on the dash tells him how the system is charging.

Dave Boyd's Website

Boyd maintains an updated web site which is a great resource for people interested in ham radio, bicycling and technomadics. He has links to various related web sites, background on his life on the road, a gallery of photos through the years, FAQ, press coverage and much more. Boyd has commercial sponsors who enjoy placement on his web page as well as prominent display somewhere on Bikezilla. Many of his needs are bartered.

There's also a link to the web site of the most famous technomadic, Steve Roberts (**http://www.microship.com/index.html**), whose pioneering bicycle, BEHEMOTH, is now resting in a west coast museum while he works on his latest project: building a water craft called Microship.

Details on Bikezilla's electronics are on the web site where you'll also find a log of his current activities. I found the FAQs to be interesting because it shows that it takes a lot of patience to explain what he's doing to the rest of us, and yet what he's doing is really inexplicable. Few of us can comprehend what it would be like to bicycle around the country for a few months, let alone 14 years.

Among the FAQs are: *Have you ever been hit by a car?* Answer: "Only 11 times while I was on it. Most of which were caused by New York City cabbies." This alone gives an insight into what it takes to be a technomadic.

What are the most extreme temperatures you've bicycled in? "15 degrees Dec. '98 Manhattan, NYC....112 degrees in the Mojave desert."

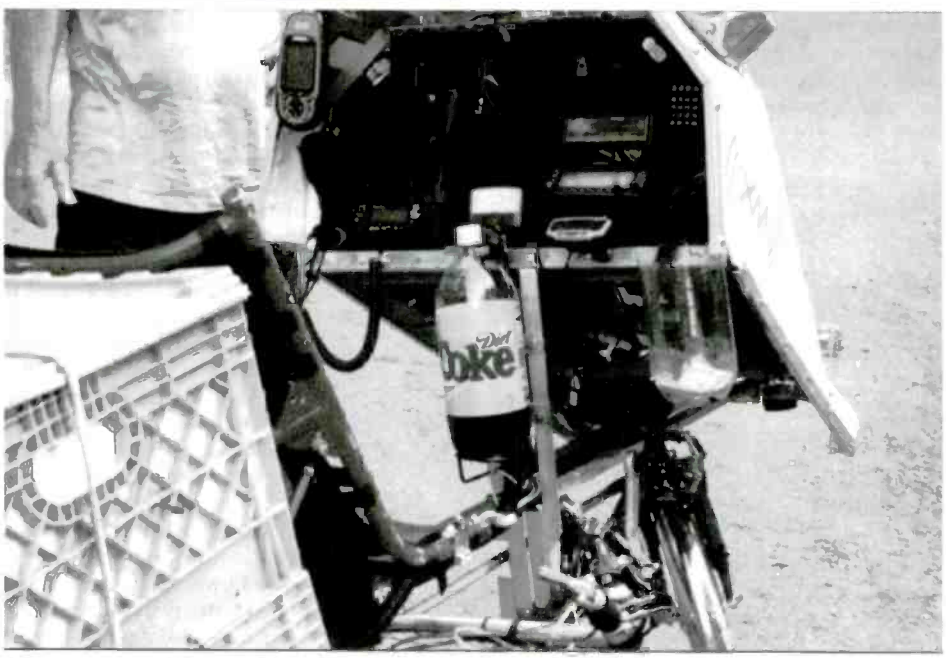
Where do you stay? "Generally I sleep in my sleeping bag in my portable hut next to the recumbent...I've camped on beaches, on cliff tops, in sand dunes, by lakes, on forest trails, bike paths, backyards, fire ant dunes, mosquito infested swamps and lots of other neat places."

Be a Part-time Technomadic

You don't have to dedicate the rest of your life to 'cycling the blue highways to get a taste of what Dave Boyd is doing. All you need is a bicycle and your own radio, even a two meter HT will do. Get a headset boom mike for the HT, put a push-to-talk button on the handlebars and start pedaling. Pretty soon the miles will fly by and you'll enjoy talking to folks all over your area.

For added fun pick up a nice 10 meter rig, fashion a mount for a whip antenna, outfit a space for a motorcycle battery and you can sign your call /bicycle mobile! You will also begin to understand how Dave feels. And, if you find it's a little addictive you can share your experiences with other bicycle mobile operators at **http://www.lafetra.com/bmha/**

I asked Dave if he ever got tired of life on the road, of wandering the highways season after season. He said, "No." It was a simple answer but I heard volumes about what he had seen, what he hoped to see and places he had never seen. There is no telling how long he will bike the open roads, but you can listen for him on a repeater near you or on ten meters in a nice long rag chew. Talk to him; you might learn something about yourself, too.



The control panel houses the radio gear protected from the elements and allows Boyd easy access to HF/2meters/440 transceivers, AM/FM/CD radio, XM satellite radio system and cell phone. (Courtesy Author)

Table One: Bikezilla Specs

The Bike:
Ryan Recumbent ('99) Vanguard

Weight (with trailer)
675 lbs plus rider

Rims:
Sun CR18

Shifting:
Front: Shimano LX Series w/3 Chaining
Midframe: Shimano LX Series w/ 8sp cassette
Rear: Shimano LX Series w8/sp cassette

Steering:
Under-the-Seat Steering(USS)

Brakes:
Shimano V-Type w/Avido lever (Front and Rear)

Electrical:
12v deep cycle battery for head light, air horns, two compressors, computer Amateur radio gear, scanner radios, XM satellite receiver and low voltage supplies. 6V for TV; 3V for LED lighting. two solar panels: 1 18v .5a 9w and 1 29.7v 1.8a 30w no-load AstroPower (AP30) single crystal.

Electronics:
Compaq Presario 1610 laptop, Magellan Meridan GPS, Radio Shack HTX-242 2 meter transceiver; Kenwood TM-D700A 2m-440 transceiver w/TNC; Radio Shack HTX-100 10 meter transceiver; Pioneer XM satellite receiver; Radio Shack 3.25" color TV; Nokia 252 cellphone; Jensen AM/FM/CD amp.

Lighting:
Blazer halogen lights (projection lens type 55w each); APC LEDs in Petersen cans (taillights); panel lights, clearance lights, Vista lights and tail strobe lights.

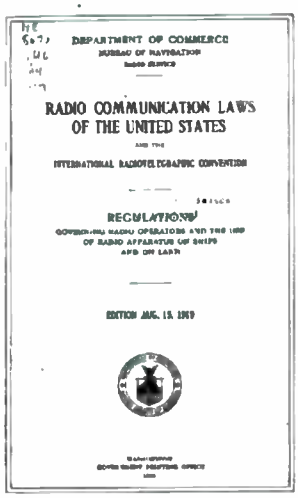
From Logs to Blogs:

Connecting Radio's Past with its Future

By David Doler WA3YAY

For most radio enthusiasts, keeping a logbook of their activities has been something akin to making entries in a personal diary. My old logbooks, especially the ones from my early days as a young ham operator are a special testament to the efforts that I made to use Amateur Radio to stretch out beyond the borders of my neighborhood. Not merely a record of my contacts, each entry was a detailed account of the event, and by way of comments and even my writing style at the time, provided a glimpse into what I was feeling about each contact at that moment.

For hams, the need to keep a logbook is no longer a specific requirement, except if a Federal Communications Commission (FCC) engineer feels it's necessary to assure that a station abides by the rules. For others, especially shortwave and utility listeners, its indisputable value is to provide proof of having heard and listened to a transmission from some radio source. In the pursuit of QSLs and reception confirmations from broadcasters and utility stations, providing solid factual data from a well-maintained logbook is one of the keys to success.



DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION
RADIO SERVICE

RADIO COMMUNICATION LAWS
OF THE UNITED STATES
AND THE
INTERNATIONAL RADIOTELEGRAPHIC CONVENTION

REGULATIONS
GOVERNING RADIO OPERATORS AND THE USE
OF RADIO APPARATUS ON SHIPS
AND ON LAND

EDITION JULY 15, 1919

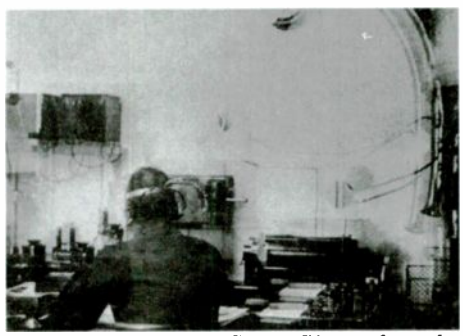
1919 Radio Communications Laws of the United States - FCC Source

Regular logbook entry practices started in the early days of wireless. Rapidly growing interest in radio development in the early 1900s, along with the acceptance of apparatus aboard ships at sea and the involvement of the United States in Word War I, prompted the Department of Commerce's Bureau of Navigation, Radio Service to produce the document "Radio Communications Laws of the United States" in 1919. Incorporating text from the 1912 "Radio Act," this document spelled out the regulations that governed the use of equipment on both sea and land.

Clearly stated in the text was the directive that the radio operators were to make a logbook entry every 15 minutes to prove a continuous watch. And entries should include the call signs of other communicating stations along with a few words from the intercepted messages if possible.

Life safety was the original reason that logbook maintenance was a significant part of a radio operator's tasks. Knowing that others at sea and on land were listening for you while you were on the water was not only of great comfort to seamen, but was instrumental in determining where possible rescue might be found if needed. The "Ship Act" of 1910 required all ships to have radios with two operators and auxiliary power, and that all transmitters be licensed. The 1912 *Titanic* tragedy served to drive home the value of this requirement.

Relay stations such as the Marconi Wireless Telegraph Company also worked the airwaves to handle the transmission of messages to ships at sea. With the increase in radio-based commerce, the potential for litigation grew and the operator's logbooks increased in detail and complexity as the importance of these records became evident.

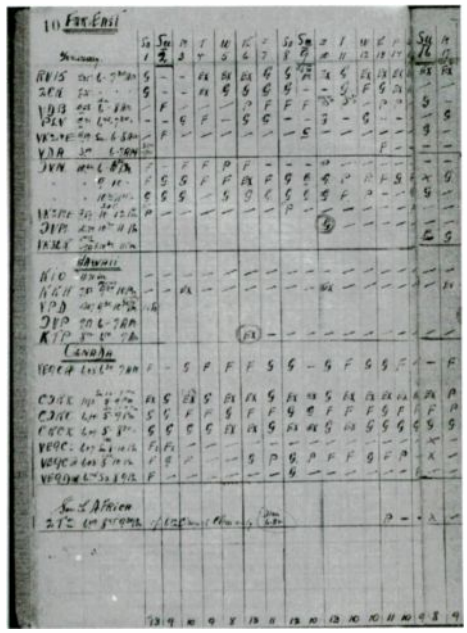


The Titanic's Marconi Room. Picture from the Fr. Browne collection.

What Information is Logged?

It might be fair to equate logbook journalizing to the art of storytelling. Consider the efforts of renown California DXer August Balbi. Laboring without the benefit of preprinted log sheets, he produced a meticulous record of the stations he'd heard, noting with great care the station call, dates and reception quality in a bound generic notebook. He even kept a separate record of the new stations heard in addition to the ones he'd been listening to and logging on a regular basis.

Unmistakable evidence of the high value he placed on radio listening, it wouldn't be inaccurate to relate the manner of his writing and the care that he exercised in scribing each entry to how much importance he placed on these observations. The logbook perhaps was not as



August Balbi's logbook images used with permission of Jerry Berg,
http://www.ontheshortwaves.com

much a story of the stations, times and places but about the enjoyment August clearly got from his efforts.

Balbi's logbooks were models of organization. The entire month was laid out in facing pages, divided into date columns and rows for entering the reception information. Balbi further divided the rows into country or geographic location areas that showed how he appropriated his listening time. Meticulous in his attention to detail, at each column intersection he placed his own version of a signal quality code.

Early wireless struggled to reduce the operator's workload by distilling message details into standard shortcuts and time saving strategies, each intended to streamline an often tedious task. During the time that radio was limited to the exchange of Morse Code, it was essential to shorten the number of characters required to impart the message to the receiving party. This was a practical matter essential to overcoming many of the costly and error-causing inefficiencies of radio at that time. These strategies, each built to satisfy the specific requirements of the services being employed, have become universally accepted within the radio community.

Call signs were assigned as character-efficient tags to easily identify a station. Within these codes was the important contact information, in its essential form that was the substance of the operator's log entries.

A Q-Code was developed to replace long, commonly-used phrases with short three-letter substitutes each starting with the letter Q, to act as a phrase's proxy. Assigning numerical value ranges to describe the signal quality or audio tone was the idea behind coding schemes like RST or SINPO. Typically, the lower the number, the poorer the quality of what was being measured. As the number increased within an established range, it indicated that things were improving for the better.

Most shortwave broadcasters expect to receive reception reports in the "SINPO" format. SINPO is short for signal *strength*, *interference*, *noise*, *propagation*, and reception quality with each item rated a scale of 1 to 5 scale. The reporting format used by hams is RST, which represents overall readability, signal strength and audio tone. Tone is really only applicable when the communications are in CW. The "R" in RST is on a scale of 1 through 5,while "S" and "T" are measured 1 to 9.

+ Depending on what aspect of radio operation or listening you're engaged in, there are subtle differences in how logbooks are kept. Amateur Radio operators account for the details of two-way communications, whereas shortwave broadcast or utility enthusiasts adjust their efforts to what was heard. The common thread is that a historical register of radio experience is being created, often for the express purpose of receiving confirmation from a broadcaster, utility or another ham in the form of a QSL card or to prove a high score in a contest. What makes a good logbook is how well it serves for the kind of listening and operating you do.

Changing Tools of the Trade

For many years, The American Radio Relay League sold a standard, spiral-bound log "booklet" that established a format for collecting information most needed to confirm a contact between hams. Produced by a well known organization that serves the interests of Amateur Radio in the United States, this administrative accessory became an integral part of the operation of a ham station.

By using this preprinted approach, a station licensee could be sure of complying with the log requirements prescribed by the FCC. The concept that the government could visit your shack anytime and inspect your station's documents including your logbooks was something that hams knew was possible. So if a friendly FCC Field Engineer should ever grace an Amateur's doorsteps, a warm welcome and a neat, accurate logbook could be presented by the ham with a sense of pride.

For hams, the latest version of the printed ARRL booklet wasn't challenged until the early 1980s when the new wave of personal computers found their way onto the desktop and the era of automated logging began. While large commercial broadcasters had already been using heavy computing iron to manage the business of their stations, both Amateurs and shortwave listeners were busy moving from pen to keyboard to deal with their station chores. New names like Apples and Commodores soon added their own glow next to the familiar Heathkit rigs that once dominated the shack.

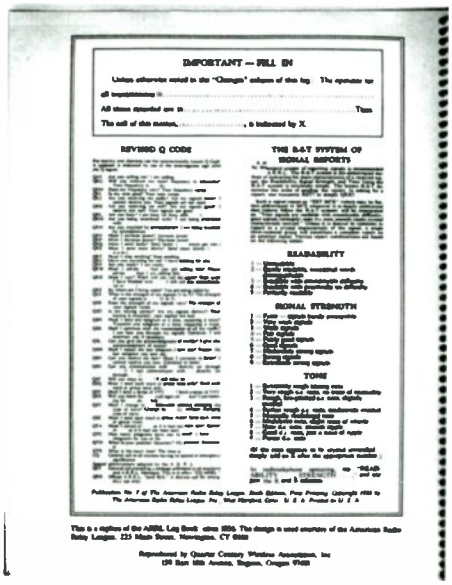
Logbook automation was one of the first things that hams and shortwave listeners tried to do with their new computers No longer a simple record of events, computer-based logbooks became true databases, with all the searching, duplicate finding and editing features that you'd expect from such tools. The information consistency that pre-printed forms attempted to achieve were taken to a higher level when applied to the computer. Even with the tiny amount of storage space (at least by today's standards) that were available on the early machines, a number of successful programs were created and put to work in the shack.

At first the programs merely duplicated the written format of the original paper logs. Instead of using a pencil or pen, information was entered with the keyboard. Later developments allowed for creation of lists containing predefined common items of data such as RST codes or country codes. With each small advancement in database technology available for the PC, the ease and consistency of logbook maintenance efforts improved dramatically.

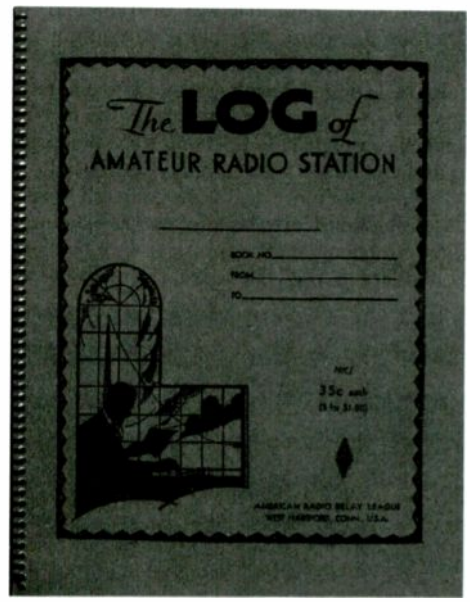
Of course, along with the growing use of these programs came the problem of potential data incompatibility. Nobody wants to retype hundreds of pages of log entries into another program. And as logging features were being integrated into new amateur digital communications applications, it became obvious that standards needed to be set for the easy exchange of data from one program to another.

Enter ADIF or the "Amateur Data Interchange Format." According to the developers of the standard, WF1B and WN4AZY, its purpose is "the standard interchange independent of operating system or programming language for amateur data that will permit easy and direct transfer of data conforming to the standard between various amateur programs as well awards and contest sponsors." That being said, it illustrates the point that as radio grows technically, complications and solutions follow in rapid succession. The complete ADIF specification can be found at **http://www.hosenose.com/adif**.

There are currently a number of low-priced or no-cost general applications available for evaluation from Amateur Radio or monitoring hobby-oriented sites. All make some attempt to automate the general log writing effort for their target audience, but a few stand out for integrating the handling of contests and other aspects of operating into one handy application.



1936 ARRL logbook image use with permission the Quarter Century Wireless Association, http://www.qcwa.org



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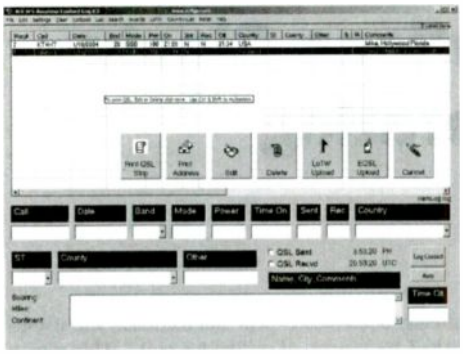
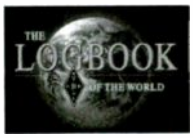


A good example of a multi-featured application is N3FJP's ACLog 2.5. It's a general purpose Amateur logbook with callbook look-up capability and rig interfaces for packet and CW. A general ADIF compliant logbook, it's one of several programs written by N3FJP for the specialized needs of the contest or DX operator.

Confirmation & Contesting

The American Radio Relay League has employed the power of the Internet to create the "Logbook of the World." This is a secure, web-based, multi-user logbook that is designed to streamline the process of confirming radio contacts during contest activity. By registering with the ARRL to use this new and exciting tool, hams can log their contest activity and have the ARRL's database system do all the work of confirming that your contact occurred by cross-referencing the other station's log entries to find the contact's match. Several logbook programs, including N3FJP's ACLog, can interface with the "Logbook of the World" to automate uploading of log data for confirmation.



Enabling greater levels of collaboration, Internet connected listener-contributed logbooks can go a long way towards giving shortwave broadcasters more timely feedback on program content and signal quality. It can also make it easier to confirm reception reports to provide listeners with the prized QSL cards that are the source of so much enjoyment in the radio hobby.

The Arrival of Web Logs

A surprisingly simple and recently popularized discovery on the Internet is the Weblog, or "Blog" for short. More of a diary than an organized log, it's a repository of thoughts and observations, usually created and maintained by an individual or small group on just about any of topic. Unlike a logbook, a Blog isn't structured at all. There are no columns and rows to fill in. In fact they're just an open page waiting to be filled with whatever's on your mind or that of a like-minded group.

Andy Sennitt, editor of Radio Netherland's Media Network Web and former editor of the *World Radio and TV Handbook* is a well-known contributor to the shortwave community and maintains a fascinating personal Web Log at **http://radio.weblogs.com/0121781/**. Here you'll find his insight to the world of shortwave broadcasting, sprinkled with pithy comments about everything from door-to-door salespeople to the Dutch National Football team. It makes great reading.

From a practical standpoint, though, a shared Web Log with group or public access can be a great tool for collaborating on radio listening or operating events. Consider the elusive nature of some pirate or spy stations: it could be useful to use a Web Log as a common notepad for an organized listening effort, each member logging freeform comments about the elusive pirate's habits.

It's quite difficult for most people to be at a radio for the better of the day or night, patiently waiting for that nearly impossible-to-catch spy or pirate station to show up. However, it's a lot easier to cover the possibilities by pooling the listening time of a group, locally or worldwide, by using a Web Log to post the transmitting habits of the stations over a fixed time period to give all members of the group a better chance of hearing the station.

Many Internet Service Providers can offer Web Log services for their clients. Some offer it for free in exchange for showing a few advertisements on their page. Check with your provider or consider starting your own Web Log by signing up at a free service such as **http://www.blogger.com**. And if you're a ham, be sure to let the world know by including your Web Log's Web address on your QSL card!

Making the Effort

With so much fascinating history and exciting new technologies to explore, it's natural that some of the more mundane aspects of radio, such as logbook management are often overlooked. But there's no escaping the fact that history is best served by keen and accurate observation by keen and accurate observers. There's no better way to contribute to radio's future and preserve its past than by being an enthusiastic scribe in the present.

A closing thought: We currently enjoy our right to monitor and use the airwaves within the laws of the international community and the country we reside in, but as new government responses to world events are introduced, we run the risk of inadvertently running afoul of these regulations. As illustrated in the abundance of rules introduced since the early days of radio, it seems beyond the scope of expectation for every hobbyist or professional to be aware of the possible opportunities to inadvertently violate some aspect of the law. If, in the unlikely event you are ever called upon to defend your operating activities, a well maintained and detailed logbook could be a valuable asset to demonstrate your good intentions.

References:

FCC Part 97.103(c) ...when deemed necessary by an EIC to assure compliance with the FCC rules, the station licensee must maintain a record of station operations containing such items of information as the EIC may require in accord with section 0.314(x) of the FCC rules.

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http://radio.weblogs.com/0121781
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http://remote.arrl.org/lotw/

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"HARRY IS VERY DEDICATED TO HIS HOBBY. HE'S DEDICATED ALL HIS FREE TIME AND MOST OF OUR MONEY."

Turning Back the Communications Clock: Vintage Ham Radio Operating

By Marc Ellis

Every year, licensed Amateurs who are members of the Antique Wireless Association have the opportunity to participate in four unique communications events. Each event turns the clock back to a different era in ham radio history – eras ending in the years 1929, 1946, 1930 and 1960. The operators enjoy working with home-built or commercial equipment appropriate for the periods and communicating with others who are doing the same.

The events are structured in low-key contest formats; participants submit logs of their contacts and scores are published in the Association's Quarterly Journal, The OTB. (I happen to be the editor of that august publication.) The high scorer of each event receives a handsome plaque, which is awarded at the AWA Conference held each year near Rochester, New York.

I'll put the "commercial" up front. Are you a ham radio operator who might enjoy recreating and/or operating vintage gear? If so, you'll want to consider joining the AWA – if you are not already a member – and putting together or acquiring some equipment to participate in the events of your choice. To learn a bit more about the AWA, take a look at the display ad that appears at the end of my Radio Restorations column in this issue. There you will also find the URL of our web site, where there is in-depth information.

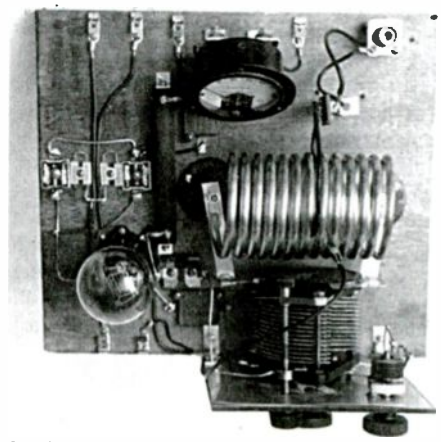
Before reviewing the details of the different events, let's take a look at what amateur radio practice was like during the eras being highlighted. Keep in mind, though, that even though innovations in "phone" operation are covered in these overviews, the events (except for the newly introduced "30s Night") are CW only. They are intended to help encourage and preserve the fine art of Morse code operation using CW (continuous wave).

The Contest Eras

1929

By 1929 the average ham – especially if money was short as it was apt to be then – would probably be transmitting with a one-tube, self-excited oscillator. In such circuits, the r.f. oscillations are generated by feedback – with some of the energy from the plate circuit being fed back into the grid circuit as in the famed Armstrong regenerative receiving circuit. In the receiving circuit, the feedback was adjusted so that the tube was just on the point of oscillation, where sensitivity would be the highest. In the transmitting circuit the tube was deliberately thrown into oscillation so that it would generate a radio signal.

Although crystal control methods of developing radio frequencies were known at this time, they were not widely used. For one thing, the circuitry was more expensive to build; for another, the radio amateur was restricted to a very few



Looking straight down on a breadboard Hartley oscillator rig put together for the 1929 contest. Most parts are vintage; tube is a type 45.

frequencies of operation since each frequency required a different crystal and the crystals were expensive.

If he had a self-excited oscillator, on the other hand, the radio amateur could find a clear spot on the band and set his rig to transmit there. But with such flexibility came greater responsibility. The operator needed to have reliable frequency-measuring equipment to make sure he was not transmitting outside an amateur band.

There were three major self-excited oscillator circuits in use – each employing a different method of establishing feedback between the grid and plate circuits. These were the Hartley, the Colpitts, and the TPTG.

In the Hartley, the feedback was established through magnetic coupling within the tank coil – with part of the coil being in the grid circuit and part in the plate circuit. In the case of the Colpitts, a pair of capacitors was used to establish feedback between the grid and plate circuits. The tuned plate tuned grid (TPTG) circuit – so named because tuned circuits were used at both locations – depended on the interelectrode capacities of the tube itself to set up the feedback.

Construction was done breadboard style, with all parts screwed down to a baseboard using standoffs where necessary. The tank coil was usually formed of copper tubing. A panel mounted in front of the tuning capacitor(s) and backed by a grounded aluminum shield helped minimize hand capacity effects while changing frequency.

The Hartley circuit was probably the most popular choice. The typical ham receiver of the late 1920s used a regenerative detector with one stage of audio amplification for good headphone volume.

The detector stage was the circuit developed by famed radio inventor Edwin Armstrong. It was very similar to the self-excited oscillator circuits already described except that feedback was established by means of a "tickler coil." This was a small coil in the detector's plate circuit that was placed near the main tuning coil which, of course, was in the grid circuit.

The distance between the two coils could be varied, thus providing control over the degree of feedback. Alternatively, the position of the coil was fixed and the degree of feedback controlled by a series capacitor. As mentioned earlier, the detector was at maximum sensitivity when it was poised on the verge of regeneration.

Sometimes a stage of r.f. amplification was placed in front of the regenerative detector. This added somewhat to the sensitivity of the detector and provided isolation that helped minimize the notorious problem of receiver instability caused by the antenna swinging in the wind. It also helped prevent any oscillations in the detector circuit from being radiated by the antenna and causing interference with nearby receivers.

The 1930s

This was a period of explosive development in radio technology, which was certainly reflected in the amateur radio construction practices of the time. Perhaps the most obvious change was the much greater variety of tubes now utilized in the various transmitter and receiver designs. The emergence of the screen-grid tube, which required no neutralization, simplified the design of driver and power amplifier stages.

During the 1920s, most transmitters had tended to be self-excited single-tube types. The MOPA (master oscillator-power amplifier) concept was certainly known, but such designs didn't appear as often in the literature. Single-tube rigs were also used in the 1930s, especially by beginners, but more often than not the frequency generating and power amplification stages were handled in separate stages. And (made possible by the greater range of available tube types and power supply components) power amplifier designs of many different wattages were in use (50 through 500 watt sizes were common).

Crystal control (known but not widely used in the 1920s) was also becoming very fashionable as amateurs began to value cleaner CW notes and more stable signals. But the use of crystals made bandswitching a little more difficult. One could change the operating frequency of a Hartley or Colpitts by switching coils, but the operating frequency of a crystal was fixed, and the lower frequency ones were much cheaper. As a result, multiband rigs began to sprout intermediate buffer/multiplier stages that could transform the output of a 160- or 80-meter crystal into the desired higher frequency band.

One popular circuit scheme was the "tri-tet" oscillator, which combined crystal oscillator and

The low-priced yet high-performing National SW-3, a 3-tube regen, appeared in 1932. It was manufactured until the beginning of World War II.

frequency multiplier stages in one tube. It used a technique similar to one that was coming into use in low-cost mass-market superheterodyne receivers – where oscillator and mixer stages were being combined in one tube.

The "tri-tet" employed a screen-grid (tetrode) tube such as the common 24-A. The screen grid was used as the "plate" of a triode crystal oscillator that also utilized the tube's cathode and control grid. A little later, when pentode tubes were introduced, the additional ("suppressor") grid was tied to the screen grid.

The plate circuit of the tube was tuned to the higher frequency multiple desired, forming, in effect, a frequency multiplier stage. The tri-tet could be followed by further multipliers and/or a final amplifier, or it might even be put on the air "barefoot."

Of particular interest in our "30s night" contest was the increasing popularity of amateur radiotelephony, or "phone" operation. The basis of a "phone" rig was a CW rig of standard design.

Voice was added by means of a properly-sized speech amplifier connected to the power amplifier plate, or plates, via a modulation transformer or through an audio frequency choke.

This was known as plate modulation – or Heising plate modulation in the case of the choke hookup. Modulation applied at other tube elements was also possible, including the control and/or suppressor grids. Grid modulation required less power, but was also considerably less efficient.

Though the handbooks of the era did show construction plans for the newly-popular superheterodyne receiver, it's a fair bet that not many hams ventured to build one of these complex sets even if they were in a position to invest the money to buy the parts. Most stations had home-constructed sets based on some version of the regenerative circuit. Increasingly, these would be three-tube versions, incorporating both r.f. and a.f. amplifiers.

Commercially-built amateur receivers, including superhets, were certainly available but, with one exception, didn't find many customers during that cash-strapped era. That exception was the bare-bones National SW-3, an inexpensive 3-tube "regen" priced to fit depression budgets. Appearing in 1932, its combination of high performance and low cost kept it (in various versions) on dealers shelves until the beginning of World War II.

1946

The 1946 cutoff date for this contest includes the early postwar era. Looking at the literature of the time, basic transmitter designs – including modulation methods – didn't seem to have changed much from those of their 1930s ancestors. Additional tube types were in use and the components had a more modern look. However, most rigs were crystal controlled – often using the "tri-tet" circuit – and had the usual string of frequency multipliers between oscillator and final. Yet there was now interest in becoming more frequency agile, and some hams were building variable-frequency oscillators (VFOs) to replace the fixed crystals.

Hams were beginning to experiment with the short-lived narrow-band FM method of modulation. An inexpensive NFM exciter used very little power and could modulate rigs with final amplifier inputs of hundreds of watts. The signal could be picked up on ordinary a.m. receivers with careful tuning and really didn't sound too bad. This was also the era when the government was dumping war surplus communication equipment on the market in huge quantities and at rock-bottom cost.

For instance, many a new ham got his start with the dirt-cheap, single-band "command" transmitters and receivers that had been used in our combat aircraft. Those with fatter wallets who wanted more of a continuous coverage receiver opted for the very popular BC-348 (used in bombers and other heavy aircraft) or BC-312 (used in communication vans and fixed communication centers by U.S. Army ground troops).

One of the very popular items on the post World War II surplus market was the 8-tube BC-348 aircraft receiver. It offered continuous tuning from 1.5 to 18 MHz and from 200-500 kHz.

"Cadillac" multiband surplus transmitters purchased by well-heeled hams included the fascinating and complex Collins Autotune (another aircraft set) and the BC-610, a 400-pound behemoth often paired with the BC-312 in Army applications.

Another big change that had taken place by 1946 was in receiving equipment. The home-made regenerative sets were largely a thing of the past and most hams had store-bought superheterodynes. These might be pre-war sets such as the Hallicrafters Sky Buddy, Sky champion or Super Defiant; the National HRO; and the Hammarlund HQ-120 or SP-110 Super Pro. New models, or revisions of old ones, were rolling off the production lines by the 1946 cutoff date of this contest. These included Hallicrafters' S-40 and SX-42; National's NC-46 and HRO-5A1; and Hammarlund's HQ-129-X and SP-400-X "Super Pro."

Store-bought transmitters were not as much in vogue as store-bought receivers, with most hams opting to save money to buy a receiver by building the transmitter. However, prewar and postwar models were beginning to appear in a variety of price and power brackets for those who wanted to invest in them.

1960

By 1960 the use of variable frequency oscillators (VFOs) on transmitters was becoming much more widespread, with most rigs at least having provision for switching between VFO and crystal input. Though transmitters of conventional design were still being built or purchased, single sideband (SSB) technology was beginning to take over for voice transmission. This would revolutionize the method of generating the signal in "phone" rigs, as well as the design of final amplifiers.

After being produced in a "phasing" or "filter" exciter, the modulated SSB signal was passed to a linear amplifier for final amplification. The "linear" was a design not hitherto widely used in amateur circles. Its characteristic of faithfully reproducing the waveforms fed into it was necessary because the input signal had already been modulated at the exciter level. Typically the first ham SSB stations used a commercial exciter that was purchased either assembled or in kit form. Linears tended to be home-built.

The new entry-level Technician and Novice licenses had also been instituted by 1960, and the latter would stimulate the appearance of a wide variety of low-power CW transmitters offered by manufacturers or described in construction projects. The Technician license granted all normal operating privileges in the 50- and 220-MHz bands; the Novice license allowed restricted operation on portions of the 80-, 40-, 15- and two-meter bands.

Only CW operation was allowed on 80, 40 and 15, but a.m. or f.m. could be transmitted on "two" in addition to CW The transmitters had to be crystal controlled with input to the final restricted to a 75-watt maximum. Hence the heightened interest in low-power rigs. Most had options for conversion to VFO operation after the operator had graduated to a higher license class.

Dominating the early market in commercial SSB exciters were the phasing units produced by Central Electronics – notably the Models 10-A, 10-B and 20-A. The former were rated at 10 watts P.E.P. (peak envelope power) and used plug-in coils; the latter was a 20-watt, bandswitching unit. The company also offered VFOs (converted from

The World Radio Lab "Globe Chief" (see text) was one of the many transmitters targeted for the Novice market. It was available in kit or wired form.

surplus command transmitters), SSB converters for existing receivers, linear amplifiers, and complete SSB exciter/transmitters.

For those with deep pockets, Collins Radio offered complete SSB stations, such as the "S" line receiver (75S-1), transmitter (32S1) and accessories. The large product line of the equally well-known E.F. Johnson Co. included potent SSB transmitters such as the "Valiant" and "pacemaker." Of course there were other manufacturers producing such equipment.

The Heath Company was one of the major players in the novice transmitter arena. One example was its 75-watt, crystal-controlled, bandswitching DX-40 with a.m. capability (a feature that could be used after license upgrading). E.F. Johnson's 50-watt "Adventurer" and WRL's 90-watt (75 watts for novice use) "Globe Chief," both with bandswitching and crystal-control, also targeted the novice market. Both had provision for adding an external VFO and an accessory screen modulator after upgrading.

There was also a large offering of inexpensive minimal rigs with just a few tubes and very low power. A good example, fondly remembered by many who were beginning hams during this era, was the Ameco AC-1. Sold in kit form, the little crystal controlled, 15-watt transmitter had just two tubes, including the rectifier.

Trying to name typical receivers from the multitude that had become available by 1960 is beyond the scope of this article. Suffice it to say the offerings included the descendants of most of the receivers mentioned in the 1946 section, most with SSB capability.

About the Contests

The Bruce Kelley 1929 QSO Party

This event is the original AWA operating event. It is a memorial to Bruce Kelley, W2ICE, one of the original founders of the Antique Wireless Association, first curator of the AWA Electronic Communication Museum, and Founding Editor of The OTB. A CW-only contest, it is held in a specified frequency window on the 80-meter band, usually in early December, and runs from Saturday through Sunday evenings on two consecutive weekends.

Transmitters embodying 1929 or earlier design must be used. Modern components are allowed as long as the design and tube(s) are true to the era. However, most participants enjoy giving their rigs a vintage look by using as many antique components as possible. Power is limited to 10 watts or less, though it may be increased to 20 watts during certain designated time windows.

The Hartley oscillator is as popular with current contestants as it was with old-time hams. Modern transceivers may be used for receiving. The '29 contest rules don't require the use of a vintage receiver, because operating on today's crowded ham bands with a vintage transmitter is challenge enough. However, some participants voluntarily take on this extra handicap.

Participants exchange basic information, which is entered on log sheets provided by the contest coordinator. After the contest, the logs are returned to the coordinator for checking. The object is to contact as many other participating AWA members as possible. An individual's score is simply his number of contacts. The very relaxed scoring criteria makes this more of an on-air get-together, or "QSO Party," than a competition.

The Other Contest Events

The other three events are scored a little more rigorously, with points weighted to take into consideration distance covered and power used. Non-vintage receivers and transmitters are allowed. Power categories are: up to 4.9 watts, 5-24.9 watts, over 100 watts. There are separate score multipliers for receivers and/or transmitters qualifying as vintage by the contest rules. These are multiband events, and the participant receives separate scores for contacts on each band – even if made with the same station.

30s Night is our newest contest and its rules are still evolving. Right now, it is a "Phone" only contest run for a 24-hour period in mid-March. To qualify as vintage, a transmitter or receiver must have been manufactured between January 1, 1930, and January 1, 1940 (or built from designs developed during that period). Operation is on specified frequency windows in the 80-, 40- and 20-meter bands.

The vintage receivers used in last year's contest were mostly commercial models, including a Hammarlund HQ-120, RCA AR-88, U.S. Army BC-312, and various models of the National SW-3, HRO and NC-100. The vintage transmitters included various home-brew designs from the ARRL Handbook, a Meissner Signal Shifter, and a National NTX30 transmitter with the companion NSM modulator.

The Linc Cundall Memorial OT Contest is a memorial to another of the original founders of the AWA. A CW-only contest, it is run over a Wednesday and Thursday, and the following Saturday and Sunday near the end of January. To qualify as vintage, a transmitter or receiver must have been manufactured before January 1, 1947, or built from designs of the same era.

Operation is on specified frequency windows in the 160-, 80-, 40- and 20-meter bands. These frequencies allow better country-wide and international communication then the Bruce Kelley contest, which is restricted to 80-meters because of the limitations of the 1929-era self-excited oscillators.

Last year's contest logs did not show the specific receiver used, but the vintage home-built transmitters used included a variety of '30s, '40s and '50s Handbook designs. There were even a few brave souls who managed to get on the air with '20s self-excited rigs.

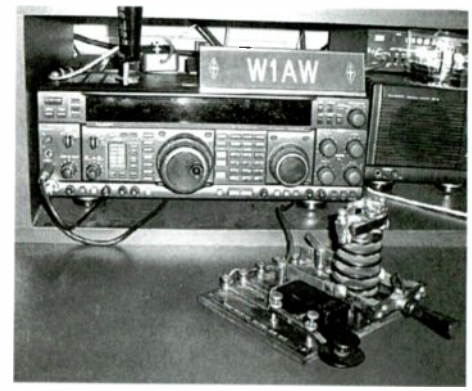
Among the vintage commercial transmitters reported were many World War II surplus Command Transmitters and a surplus Navy TCS, some Meissner Signal Shifters, a Hallicrafters HT-6, a Stancor 69,and a Utah UAT-1.

The Linc Cundall Memorial OT DX Contest is a carbon copy of the similarly named "OT Contest," except that is conducted on the 40- and 20-meter bands only and designed to play to the nostalgia of the younger hams. For this contest, a transmitter or receiver must have been manufactured before January 1, 1960, or built from designs of the same era to qualify as vintage. It is held in mid-April.

The vintage receiving and transmitting equipment reported in the most recent contest included a variety of '40s and '50s commercial equipment by Hallicrafters, Collins, Hammarlund, Millen, E.F. Johnson and Elmac. There were even a couple of Central Electronics SSB rigs (operated in CW mode of course), which are very suitable for the lower-power contest categories. Home-built gear was in the minority. The many Novice transmitters manufactured during the 1950s are also very adaptable to this contest.

ARRL Straight Key Night

It's not an AWA event, but any discussion of vintage operating activities really needs to include mention of the American Relay League's "Straight Key Night." Straight Key Night is open to all hams, not just ARRL members, and its premise is simple: disconnect your electronic keyer and hook up your J-38 or whatever manual key you are harboring in your shack. Then get on the air (any band) and chat.



Key from spark transmitter used by America Radio Relay League founder Hiram Percy Maxim. It was used with a modern Yaesu transceiver at ARRL headquarters during Straight Key Night 2004. Send-receive knife switch (not hooked up) is next to key. (Photo Courtesy ARRL)

The 2004 SKN began at 7:00 p.m. EST December 31, 2003, and ran through 7:00 p.m. EST January 1, 2004. Emphasis is on ragchewing rather than fast contest exchanges. Just have fun, then send in a list of stations worked and your vote for the best fist and the most interesting QSO you heard or worked. Downloadable entry forms will be posted on the ARRL website. Results are posted on line and in QST. For more information, visit http://www.arrl.org/contests/ and click on "Contest Rules and Forms."

Monitoring Times Hot 1000 HF Frequencies

Compiled by Larry Van Horn, N5FPW MT Assistant Editor
Mode is Upper Sideband (USB) unless otherwise noted

Part 2 - continued from April 2004

8170 Marine Simplex/Duplex (Shared) Worldwide
8173 Marine Simplex/Duplex (Shared) Worldwide
8176 Marine Simplex/Duplex (Shared) Worldwide
8179 Marine Simplex/Duplex (Shared) Worldwide
8182 Marine Simplex/Duplex (Shared) Worldwide
8185 Marine Simplex/Duplex (Shared) Worldwide
8188 Marine Simplex/Duplex (Shared) Worldwide
8190 UK Royal Air Force Architect Network Worldwide
8191 Marine Simplex/Duplex (Shared) Worldwide
8291 Marine Simplex/Duplex (Shared) Worldwide
8294 Marine Simplex Worldwide/US Transportation Command Marine Simplex <Channel 4>
8297 Marine Simplex Worldwide/US Transportation Command Marine Simplex <Channel 5>
8310 Brazilian Navy Network (USB/ALE)
8316 Royal New Zealand Navy Worldwide
8337 US Coast Guard Tactical
8495 US Air Force Reserve Network Nationwide
8689 US Navy Space Warfare Command Network Nationwide
8764 US Coast Guard Calling/Broadcast Notionwide Ships transmit on 8240
8779 Marine Calling Frequency Worldwide Ships transmit on 8255
8825 Aero North Atlantic (NAT-E) Major World Air Route Area
8828 Aero Pacific VOLMET
8831 Aero North Atlantic (NAT-F) Major World Air Route Area
8837 Aero LDOC Airline Company Discrete
8843 Aero Central East Pacific (CEP-1/2) Major World Air Route Area
8846 Aero Caribbean (CAR-B) Major World Air Route Area
8855 Aero South America (SAM-C/NE/SE) Major World Air Route Area
8861 Aero Africa (AFI-1)/South Atlantic (SAT-1) Major World Air Route Area
8864 Aero North Atlantic (NAT-B) Major World Air Route Area
8867 Aero South Pacific (SP-6/7) Major World Air Route Area
8879 Aero North Atlantic (NAT-C)/Indian Ocean (INO-1) Major World Air Route Area
8885 Aero LDOC Airline Company Discrete
8891 Aero North Atlantic (NAT-D) Major World Air Route Area
8894 Aero Africa (AFI-2) Major World Air Route Area
8897 Aero East Asia (EA-1) Major World Air Route Area
8903 Aero Africa (AFI-4)/Central West Pacific (CWP-1/2) Major World Air Route Area
8906 Aero North Atlantic (NAT-A) Major World Air Route Area
8912 Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan 2>
8915 Aero North Pacific (NP-3/4) Major World Air Route Area
8918 Aero Caribbean (CAR-A) Major World Air Route Area
8921 Aero LDOC Airline Company Discrete
8924 Aero LDOC Airline Company Discrete
8927 Aero LDOC Airline Company Discrete
8930 Aero LDOC Airline Company Discrete
8933 Aero LDOC Airline Company Discrete
8936 Aero LDOC Airline Company Discrete
8942 Aero East Asia (EA-2)/Southeast Asia (SEA-2) Major World Air Route Area
8951 Aero Middle East (MID-1/3) Major World Air Route Area
8957 Aero Europe VOLMET
8965 Aero Off Route US Air Force Worldwide (USB/ALE) – NIPR (Non-Secret Internet Protocol Router) Network/German Air Force Network
8968 Aero Off Route US Air Force Worldwide (USB/ALE) – SIPR (Secret Internet Protocol Router) Network
8971 Aero Off Route US Navy Worldwide – Tactical Support Center (TSC) Pacific/Atlantic, Fixed Wing Aircraft Safety of Flight/Dutch Navy P8B NAS Valkenburg/NATO AWACS Discrete DHN66 Geilemkirchen "Magic"
8972 French Air Force Circus Network <Racontar 1>
8974 Aero Off Route US Navy Worldwide – Irish Air Corps/Royal Australian Air Force/Royal New Zealand Air Force AOCS GPN 24 hours/Spanish Air Force
8977 Aero Off Route US Navy Worldwide – Tactical Support Center (TSC) Pacific Area/ARINC HFDL Reykjavik, Iceland/Italian Navy Ship-to-Shore/Japanese Military Forces
8980 Aero Off Route US Coast Guard Worldwide – US Navy Tactical Support Center (TSC) Pacific-Atlantic/ NATO AWACS Discrete DHN66 Geilemkirchen "Magic"
8983 Aero Off Route US Coast Guard Worldwide
8986 Aero Off Route US Air Force Worldwide
8989 Aero Off Route US Air Force Worldwide – Belgium Air Force Network <YG>/Canadian Military Aeronautical Communications System (MACS)
8992 Aero Off Route US Air Force Worldwide – HF Global Communications System (HF-GCS) <Primary>/DoD EAM Restoral Frequency/French Air Force Circus Network <Vinaigrette 3>/Portuguese Air Force/Swedish Air Force Network
8995 Aero Off Route US Navy Worldwide
8998 Aero Off Route US Navy Worldwide – Antarctica Operations
9001 Aero Off Route US Navy Worldwide – Spanish Air Force SAR Service Discrete/UK Royal Air Force Kinloss SAR Network
9004 Aero Off Route US Navy Worldwide Tactical Support Center (TSC) Atlantic
9007 Aero Off Route US Navy Worldwide – Canadian Military Aeronautical Communications System (MACS)/Portuguese Air Force
9010 Aero Off Route US Navy Worldwide (USB/ALE) – Belgium Air Force Network/Brazilian Air Force Network/Canadian Forces Military Discrete
9013 Aero Off Route US Air Force Worldwide
9016 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-175>
9019 Aero Off Route US Air Force Worldwide – Special Operations/E-8 JStars aircraft discrete
9022 Aero Off Route US Air Force Worldwide – AMC Command Post Ramstein AB "Metaphor"/Japanese Defense Forces Patrol Aircraft/RAF Strike Command Integrated Communications System (STCICS)/Spanish Air Force Network
9023 NORAD/Canadian Forces Tactical/Link 11 Voice Coordination Net
9025 Aero Off Route US Air Force Worldwide (USB/ALE) – Scope Command ALE Network/Royal Australian Air Force SAR Network/German Air Force Network/Mexican Army - Animal ALE Network
9026 US Air Force Special Operations Europe
9028 Aero Off Route US Navy Worldwide – Tactical communications noted here
9031 Aero Off Route US Navy Worldwide – Royal Australian Air Force AOCS Discrete/UK Royal Air Force Architect Network
9034 Aero Off Route Frequency US Navy/US Coast Guard Worldwide – RAF Strike Command Integrated Communications System (STCICS)
9037 Aero Off Route Frequency US Navy/US Coast Guard Worldwide
9043 NASA Space Shuttle Support Network Atlantic Ocean
9054 National Communications System (NCS) Nationwide
9057 US Air Force Airborne Command Post Network Worldwide <Z-180>
9070 National Communications System (NCS) Nationwide
9076 Transportation Department Emergency Net Nationwide
9106 US Government SHARES SCN ALE Network Nationwide (USB/ALE) <Channel 5>
9114 Federal Aviation Administration (FAA) Network Nationwide (USB/LSB/ALE)
9117 Brazilian Navy Network (USB/ALE)
9120 US Air Force Tactical Network Worldwide
9121 US Army National Guard Nationwide (USB/ALE)
9122 US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 8>
9141 US Army National Guard Nationwide (USB/ALE)
9161 US Air Force Special Operations Europe
9197 Federal Highway Administration Network Nationwide
9260 US Air Force Tactical Network Worldwide
9270 Agriculture Department Network Nationwide
9278 US Coast Guard 9th District Network (USB/ALE)
9380 US Navy/Coast Guard Hurricane Contingency Net
9435 US Customs and Border Protection Nationwide (LSB)
9462 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB)
9497 Drug Enforcement Administration Worldwide <Delta>
9791 Federal Highway Administration (FHWA) Network <F-04>
9809 US Air Force Airborne Command Post Network Worldwide <Z-185>
9914 Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
9973 National Telecommunications & Information Administration Network Nationwide
9999 US Army Network Nationwide
10000 Time/Frequency Standard Stations WWV/WWVH Ft. Collins, CO/Kauai, HI (AM)
10018 Aero Africa (AFI-3)/Middle East (MID-2) Major World Air Route Area
10024 Aero South America (SAM-NW/SW) Major World Air Route Area
10027 Aero LDOC Airline Company Discrete
10030 Aero LDOC Airline Company Discrete
10033 Aero LDOC Airline Company Discrete
10039 Aero North Central Asia (NCA-3) Major World Air Route Area
10042 Aero East Asia (EA-1) Major World Air Route Area
10045 Aero Flight Test Worldwide
10048 Aero North Pacific (NP-3/4) Major World Air Route Area
10051 Aero North Atlantic VOLMET
10057 Aero Africa VOLMET
10066 Aero Southeast Asia (SEA-1/3) Major World Air Route Area
10069 Aero LDOC Airline Company Discrete
10072 Aero LDOC Airline Company Discrete
10075 Aero LDOC Airline Company Discrete
10078 Aero LDOC Airline Company Discrete
10084 Aero Europe (EUR-A) Major World Air Route Area
10096 Aero South America (SAM-C/NE/SE)/North Central Asia (NCA-2) Major World Air Route Area
10165 US Army Network Nationwide
10172 NATO AWACS Discrete DHN66 Geilemkirchen "Magic"
10194 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB)
Canadian Forces Military Discrete Worldwide
10204 US Air Force Airborne Command Post Network Worldwide <Z-190>
10232 US Army National Guard Nationwide (USB/ALE)
10242 Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan 3>
10255 US Navy/Marine Corps MARS Common Nationwide
10305 US Air Force Hurricane Contingency Support Net Eastern Test Range
10315 NATO AWACS Discrete DHN66 Geilemkirchen "Magic" <Primary>
10320 Armed Forces Network (AFN) Hawaii Local Day
10373 US Coast Guard 9th District Network (USB/ALE)
10429 NATO AWACS Discrete DHN66 Geilemkirchen "Magic"
10493 Federal Emergency Management Agency (FEMA) NECN Nationwide (USB/LSB) <FEMA-2U/L>
10586 US Government SHARES SCN Network Nationwide (USB/ALE) <Channel XF>
10588 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB)
10608 US Coast Guard Tactical
10675 US Coast Guard Tactical
10711 US Navy SESEF discrete Mayport, FL/Norfolk, VA
10759 US Coast Guard Tactical
10780 NASA Space Shuttle Support Network Atlantic Ocean "Cape Radio"
10788 US Coast Guard Tactical
10796 US Army National Guard Nationwide (USB/ALE)
10815 US Army National Guard Nationwide (USB/ALE)
10819 DISA/JITC Network Nationwide
10883 US Marine Corps Tactical Network Worldwide
10891 Transportation Department Emergency Net Nationwide/Federal Highway Administration (FHWA) Network <F-05>
10899 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB/ALE)
10993 US Coast Guard Tactical
11007 Canadian Forces Halifax Discrete Worldwide
11010 Brazilian Navy Network (USB/ALE)
11028 Transportation Department Emergency Net Nationwide
11043 US Coast Guard 9th District Network (USB/ALE)
11075 DISA/JITC Network Nationwide
11076 Drug Enforcement Administration Worldwide <Echo>/Danish Air Force Network (USB/ALE)
11104 US Air Force Airborne Command Post Network Worldwide <Z-195>
11108 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB/ALE)
11110 US Air Force Western Missile Range "Plead/Aria Control"
11157 US Coast Guard Tactical
11171 US Air Force E-8 JStars aircraft discrete
11175 Aero Off Route US Air Force Worldwide – HF Global Communications System (HF-GCS) <Primary>
11178 Aero Off Route US Air Force Worldwide – Caribbean Anti-Narco Network
11181 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-200> SIPR (Secret Internet Protocol Router) Network/E-8 JStars aircraft discrete
11184 Aero Off Route US Navy Worldwide – RAF Strike Command Integrated Communications System (STCICS)
11187 Aero Off Route US Navy Worldwide – Strategic Comm Wing 1 discrete <CB>/Tactical Support Center (TSC) Pacific Area/ /Belgium Air Force <YH>
11189 US Navy Tactical Support Center (TSC) Patrol and Recon Wing One, Task Force 57 Diego Garcia
11190 Aero Off Route US Navy Worldwide – Canadian Forces Military Discrete
11193 Aero Off Route US Navy Worldwide
11196 Aero Off Route Frequency US Coast Guard Worldwide
11199 Aero Off Route Frequency US Coast Guard Worldwide (USB/ALE) – NIPR (Non-Secret Internet Protocol Router) Network
11202 Aero Off Route Frequency US Coast Guard Worldwide – Swedish Air Force
11205 Aero Off Route US Navy Worldwide – Tactical Support Center (TSC) Atlantic Area/Canadian Forces Military Discrete/UK Royal Air Force Architect Network
11208 Aero Off Route US Navy Worldwide – RAF Strike Command Integrated Communications System (STCICS)
11211 Aero Off Route US Navy Worldwide – Tactical Support Center (TSC) Pacific Area/Belgium Air Force/Spanish Air Force Network
11214 Aero Off Route US Air Force Worldwide – Canadian Military Aeronautical Communications System Discrete (MACS)
11217 Aero Off Route US Air Force Worldwide (USB/ALE) – US Government SHARES SCN ALE Network Nationwide <Channel 6>/Danish Air Force Network/German Air Force Network
11220 Aero Off Route US Air Force Worldwide – Mystic Star VIP/HF-GCS Discrete
11223 Aero Off Route US Air Force Worldwide – Canada/Alaska Shared
11226 Aero Off Route US Air Force Worldwide (USB/ALE) – Scope Command ALE Network
11229 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-210>
11232 Aero Off Route US Air Force Worldwide – Canadian Military Aeronautical Communications System (MACS)
11235 Aero Off Route US Navy Worldwide – German Navy/Spanish Air Force Network/Royal Australian Air Force/Royal New Zealand Air Force AOCS GPN Local Day/UK Royal Air Force Architect Network
11238 Aero Off Route US Air Force Worldwide
11241 Aero Off Route US Air Force Worldwide – RAF Strike Command Integrated Communications System (STCICS)
11244 Aero Off Route US Air Force Worldwide – DoD Command Post EAM Broadcast/Restoral Discrete/ Danish Air Force Network
11247 Aero Off Route US Navy Worldwide – UK Royal Air Force Architect Network/Royal Australian Air Force
11250 Aero Off Route US Air Force Worldwide – HF-GCS Discrete
11253 Aero Off Route US Navy Worldwide – UK Royal Air Force VOLMET
11256 Aero Off Route US Navy Worldwide – German Navy MATELO ARCN (USB/RTTY)
11259 Aero Off Route US Navy Worldwide – AW C&R Net
11262 Aero Off Route US Navy Worldwide – Spanish Air Force Network

11265 Aero Off Route US Navy Worldwide – Link 11 Voice Coordination Net/Canadian Military Aeronautical Communications System (MACS)/German Air Force Network
11268 Aero Off Route US Navy Worldwide – Belgium Air Force Network <YJ>/RAF Strike Command Integrated Communications System (STCICS)
11271 Aero Off Route US Air Force Worldwide – HF-GCS Discrete
11279 Aero North Atlantic (NAT-D) Major World Air Route Area
11282 Aero Central East Pacific (CEP-1/2) Major World Air Route Area
11288 Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
11291 Aero South Atlantic (SAT-2) Major World Air Route Area
11300 Aero Africa (AFI-3)/Middle East (MID-2) Major World Air Route Area
11309 Aero North Atlantic (NAT-E) Major World Air Route Area
11330 Aero Caribbean (CAR-B) Major World Air Route Area
11336 Aero North Atlantic (NAT-F) Major World Air Route Area
11342 Aero LDOC Airline Company Discrete
11345 Aero LDOC Airline Company Discrete
11351 Aero LDOC Airline Company Discrete
11354 Aero LDOC Airline Company Discrete
11360 Aero South America (SAM-NW/SW) Major World Air Route Area
11375 Aero Middle East (MID-1/3) Major World Air Route Area
11384 Aero Central West Pacific CWP-1/2 Major World Air Route Area
11387 Aero Southeast Asia VOLMET
11396 Aero Caribbean (CAR-A)/East Asia (EA-2)/Southeast Asia (SEA-2/3) Major World Air Route Area
11408 US Immigration and Customs Enforcement (ICE) Tactical Network Worldwide
11440 US Air Force Hurricane and Rescue Support Network Worldwide
11451 National Telecommunications Alliance Network Nationwide
11470 US Air Force Reserve Network Nationwide
11486 Brazilian Navy Network (USB/ALE)
11494 US Air Force Airborne Command Post Network Worldwide <Z-205>/Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan 4>
11611 US Air Force Special Operations Europe
11637 Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
11692 US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 9>
11816 US Air Force Reserve Network Nationwide
12057 US Army National Guard Nationwide (USB/ALE)
US Transportation Command Paint to Paint Network Nationwide
12070 US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 10>
US Air Force Airborne Command Post Network Worldwide <Z-211>
12076 Department of Veteran Affairs Emergency Network Nationwide
12087 US Army National Guard Nationwide (USB/ALE)
12112 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB/ALE)
12122 US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 11>
12165 MITRE Corporation Network Nationwide
12216 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB)
12290 Marine Global Maritime Distress/Safety System Worldwide
12353 Marine Simplex Worldwide US Transportation Command Marine Simplex <Channel 6>
12356 Marine Simplex Worldwide
12359 Marine Simplex Worldwide US Transportation Command Marine Simplex <Channel 7>
12362 Marine Simplex Worldwide
12365 Marine Simplex Worldwide US Transportation Command Marine Simplex <Channel 8>
12370 Brazilian Navy Network (USB/ALE)
12579 Armed Forces Network (AFN) Diego Garcia Local Day
12687 US Navy Space Warfare Command Network Nationwide
12689 Armed Forces Network (AFN) Key West, FL 24 Hours
13089 US Coast Guard Calling/Broadcast Nationwide Ships transmit on 12242
13116 Royal Australian Navy Worldwide <A5>
13137 Marine Calling Frequency Worldwide Ships transmit on 12290
13155 US Navy/DoD EAM Broadcast Discrete
13200 Aero Off Route US Air Force Worldwide – HF Global Communications System (HF-GCS) <Primary>
13203 Aero Off Route US Air Force Worldwide – German Air Force Transport Command Network
13204 US Air Force HF Command Post/Special Operations/E-8 JStars aircraft discrete
13206 Aero Off Route US Air Force Worldwide – Special Operations/Canadian Forces Military Discrete/Royal Australian Air Force/Royal New Zealand Air Force AOCS GPN
13209 Aero Off Route US Air Force Worldwide – Japanese Self Defense Forces Discrete
13212 Aero Off Route US Air Force Worldwide – Various Command Post
13215 Aero Off Route US Air Force Worldwide (USB/ALE) – Scope Command ALE Network/E-8 JStars aircraft discrete/Spanish Air Force Network
13218 Aero Off Route US Air Force Worldwide – 412TW/452FLTS Operations "Aria Ops"
13221 Aero Off Route US Coast Guard Worldwide
13224 Aero Off Route US Navy Worldwide (USB/ALE) – Brazilian Air Force/Navy Network/Swedish Air Force
13227 Aero Off Route US Navy Worldwide – Belgium Air Force
13230 Aero Off Route US Navy Worldwide
13233 Aero Off Route US Navy Worldwide – German Air Force Network
13236 Aero Off Route US Navy Worldwide – French Air Force Circus Network <Reconfort 3>
13239 Aero Off Route US Navy Worldwide
13242 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-215>/US Government SHARES SCN BBS Network Nationwide (USB/ALE) <Channel 10>/NIPR (Non-Secret Internet Protocol Router) Network
13245 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-220>/Spanish Air Force Network
13248 Aero Off Route US Air Force Worldwide
13251 Aero Off Route US Navy Worldwide
13254 Aero Off Route US Navy Worldwide – Diego Gorcia Control Tower Discrete
13257 Aero Off Route US Navy Worldwide – Canadian Military Aeronautical System (MACS)/German Navy/UK Royal Air Force Architect Network
13261 Aero Central East Pacific (CEP-1/2) Major World Air Route Area
13264 Aero Europe VOLMET
13270 Aero North Atlantic VOLMET
13273 Aero Africa (AFI-2)/Sauth Pacific (SP-6/7) Major World Air Route Area
13282 Aero Pacific VOLMET
13288 Aero Africa (AFI-3)/Middle East (MID-2)/Europe (EUR-A) Major World Air Route Area
13291 Aero North Atlantic (NAT-B/D/F) Major World Air Route Area
13294 Aero Africa (AFI-4)/North Pacific (NP-3/4) Major World Air Route Area
13297 Aero Caribbean (CAR-A)/South America (SAM-C/NE/SE) Major World Air Route Area
13300 Aero Central West Pacific (CWP-1/2) Major World Air Route Area
13303 Aero North Central Asia (NCA-3) Major World Air Route Area
13306 Aero North Atlantic (NAT-A/C)/Indian Ocean (INO-1) Major World Air Route Area
13309 Aero East Asia (EA-2)/Southeast Asia (SEA-2) Major World Air Route Area
13312 Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
13315 Aero South Atlantic (SAT-2)/North Central Asia (NCA-1) Major World Air Route Area
13318 Aero Southeast Asia (SEA-1/3) Major World Air Route Area
13324 Aero LDOC Airline Company Discrete
13327 Aero LDOC Airline Company Discrete
13330 Aero LDOC Airline Company Discrete
13333 Aero LDOC Airline Company Discrete
13336 Aero LDOC Airline Company Discrete
13339 Aero North Pacific (NP-3/4) Major World Air Route Area/ Aero LDOC Airline Company Discrete
13342 Aero LDOC Airline Company Discrete
13345 Aero LDOC Airline Company Discrete
13348 Aero LDOC Airline Company Discrete
13351 Aero LDOC Airline Company Discrete
13354 Aero North Atlantic (NAT-E) Major World Air Route Area
13357 Aero Africa (AFI-1)/South Atlantic (SAT-1) Major World Air Route Area
13362 Armed Forces Network (AFN) Guam Local Day
13413 US Coast Guard Tactical
13423 National Telecommunications & Information Administration Network Nationwide
13434 Transportation Department Emergency Net Nationw de Federal Highway Administration (FHWA) Network <F-42>
13446 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB)
13457 Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
13630 Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
13722 US Army/Director of Military Support Network Nationwide
13809 US Coast Guard Tactical
13855 Armed Forces Network (AFN) Iceland Local Day
13894 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB/ALE)
13907 Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan 5>
US Air Force Airborne Command Post Network Worldwide <Z-225>
13909 US Air Force E-8 JStars aircraft discrete
13927 US Air Force MARS Phone Patch Network <ACB Primary>
13950 US Coast Guard Tactical
13954 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Mike>
13956 Federal Emergency Management Agency (FEMA) NECN Nationwide (USB/LSB) <FEMA-4U/L>
13972 Brazilian Air Force/Navy Network (USB/ALE)
13977 US Air Force MARS Worldwide
13993 US Air Force MARS Transcontinental Network Nationwide
13996 US Army MARS Nationwide
14325 Amateur Radio Hurricane Watch Net Worldwide <Primary>
14350 US Army/Director of Military Support Network Nationwide
14360 AT&T Point to Point Network Nationwide
14364 Canadian Forces Military Discrete Worldwide
14385 US Navy/Marine Corps MARS Common Worldwide
14386 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Bravo>
14396 US Government SHARES SCN Voice Network Nationwide (USB/ALE) <Channel 2>
14402 US Army/Director of Military Support Network Nationwide
14446 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Echo>
14449 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Kilo>
14454 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Juliet>
14455 NASA Point to Point Network Nationwide
14460 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Charlie>
14463 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Delta>
14487 US Air Force MARS Worldwide
14567 Federal Emergency Management Agency (FEMA) NECN Nationwide (USB/LSB) <FEMA-3U/L>
14606 US Air Force MARS Phone Patch Network
14615 US Army Force Tactical Frequency Worldwide
14653 US Army National Guard Nationwide (USB/ALE)
14670 Time/Frequency Standard Station CHU Ottawa, ON Canada (AM)
14686 Drug Enforcement Administration Network Worldwide Local Day <Primary>
14690 Drug Enforcement Administration Worldwide <Golf>
14776 Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/LSB)
14780 Brazilian Navy Network (USB/ALE)
14885 Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/LSB/ALE)
14898 US Government SHARES SCN Voice Network Nationwide (USB/ALE) <Channel 2 Alternate>
14899 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB/ALE)
14902 Civil Air Patrol (CAP) Nationwide
14908 Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB/ALE)
15000 Time/Frequency Standard Stations WWV/WWVH Ft. Collins, CO/Kauai, HI (AM)
15010 Aero Off Route US Air Force Worldwide – Belgium Air Force Network <YM>
15013 Aero Off Route US Air Force Worldwide – RAF Strike Command Integrated Communications System (STCICS)
15016 Aero Off Route US Air Force Worldwide – HF Global Communications System (HF-GCS) <Primary>/ Spanish Air Force Network
15019 Aero Off Route US Navy Worldwide
15022 Aero Off Route US Navy Worldwide
15025 Aero Off Route US Navy Worldwide – USSOUTHCOM Flight Manitoring Facility. Key West, FL "Smasher"/ARINC HFDL Reykjavik, Icelond/ Swedish Air Force
15028 Aero Off Route US Navy Worldwide
15031 Aero Off Route US Air Force Worldwide – Canadian Military Aeronautical System (MACS)/UK Royal Air Force Architect Network
15034 Aero Off Route US Air Force Worldwide – Canadian Military Aeronautical System (MACS weather broadcast)
15037 Aero Off Route US Air Force Worldwide
15040 Aero Off Route US Air Force Worldwide
15043 Aero Off Route US Air Force Worldwide (USB/ALE) – Scope Command ALE Network/Danish Air Force Network
15046 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-230>
15049 Aero Off Route US Navy Worldwide – DoD EAM Broadcast Discrete
15052 Aero Off Route US Navy Worldwide
15055 Aero Off Route US Navy Worldwide
15058 Aero Off Route US Navy Worldwide
15061 Aero Off Route US Navy Worldwide
15064 Aero Off Route US Navy Worldwide
15067 Aero Off Route US Navy Worldwide
15070 Aero Off Route US Navy Worldwide
15073 Aero Off Route US Navy Worldwide – German Air Force Network/Spanish Air Force Network
15076 Aero Off Route US Navy Worldwide
15079 Aero Off Route US Navy Worldwide
15082 Aero Off Route US Coast Guard Worldwide
15085 Aero Off Route US Coast Guard Worldwide
15088 Aero Off Route US Coast Guard Worldwide
15091 Aero Off Route US Air Force Worldwide
15094 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-235>/US Government SHARES SCN ALE Network Nationwide (USB/ALE) <Channel 7>
15097 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-240>
15708 Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/LSB)
15851 Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
15867 Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan 6>
15962 US Air Force Airborne Command Post Network Worldwide <Z-250>
16077 US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 12>
16087 US Navy SESEF discrete Barbers Point, HI
16201 Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/LSB)
16326 US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 13>
16348 Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
16358 US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 14>
16382 US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE)
16420 Marine Global Maritime Distress/Sofety System Worldwide
16528 Marine Simplex Worldwide
16531 Marine Simplex Worldwide
16534 Marine Simplex Worldwide
16537 Marine Simplex Worldwide
16540 Marine Simplex Worldwide
16543 Marine Simplex Worldwide
16546 Marine Simplex Worldwide
17302 Marine Calling Frequency Worldwide Ships transmit on 16420
17314 US Coast Guard Calling/Broadcast Nationwide Ships transmit on 16432
17344 Royal Australian Navy Worldwide <A6>
17421 Transportation Department Emergency Net Nationwide
17487 US Government SHARES SCN ALE/STI Network Nationwide (USB/ALE) <Channel 8>
17519 Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/LSB)
17904 Aero Central Eastern Pacific (CEP-1/2)/Central Western Pa-

cific (CWP-1/2)/North Pacific (NP-3/4)/South Pacific (SP-6/7) Major World Air Route Area
17907 Aero Caribbean (CAR-A/B)/South America (SAM-C/NE/SE/SW/NW)/Eastern Asia (EA-2)/Southeast Asia (SEA-1/2/3) Major World Air Route Area
17916 Aero LDOC Airline Company Discrete
17919 Aero LDOC Airline Company Discrete
17922 Aero LDOC Airline Company Discrete
17928 Aero LDOC Airline Company Discrete
17931 Aero LDOC Airline Company Discrete
17934 Aero LDOC Airline Company Discrete
17937 Aero LDOC Airline Company Discrete
17940 Aero LDOC Airline Company Discrete
17946 Aero North Atlantic (NAT-A/B/C/D)/North Pacific (NP-3/4) Major World Air Route Area
17955 Aero Africa (AFI-1)/South Atlantic (SAT-1/2) Major World Air Route Area
17958 Aero North Central Africa (NCA-1/2/3)/East Asia (EA-1) Major World Air Route Area
17961 Aero Africa (AFI-2/3/4)/Middle East (MID-1/2/3)/Europe (EUR-A)/Indian Ocean (INO-1) Major World Air Route Area
17970 Aero Off Route US Navy Worldwide
17973 Aero Off Route US Air Force Worldwide (USB/ALE) – Airborne Command Post Network <Z-255>/NIPR (Non-Secret Internet Protocol Router) Network/German Air Force Network
17976 Aero Off Route US Air Force Worldwide (USB/ALE) – SIPR (Secret Internet Protocol Router) Network
17979 Aero Off Route US Navy Worldwide
17982 Aero Off Route US Navy Worldwide (USB/ALE) – Strategic Comm Wing 1 discrete <CC>/Brazilian Air Force Network
17985 Aero Off Route US Navy Worldwide
17988 Aero Off Route US Coast Guard Worldwide
17991 Aero Off Route US Coast Guard Worldwide – German Air Force Network
17994 Aero Off Route US Air Force Worldwide – Canadian Military Aeronautical System (MACS)/German Navy MATELO ARCN (USB/RTTY)
17997 Aero Off Route US Air Force Worldwide
18000 Aero Off Route US Air Force Worldwide – Canadian Forces Military Discrete/Spanish Air Force
18003 Aero Off Route US Air Force Worldwide (USB/ALE) – Scope Command ALE Network/Spanish Air Force Network
18006 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-260>/Belgium Air Force Network <YO>
18009 Aero Off Route US Air Force Worldwide – NATO AWACS Discrete DHN66 Geilemkirchen "Magic"
18012 Aero Off Route US Navy Worldwide – Canadian Military Aeronautical System (MACS)/French Air Force Circus Network <Veritee 3>/German Air Force Network
18015 Aero Off Route US Navy Worldwide
18018 Aero Off Route US Navy Worldwide – UK Royal Air Force Architect Network/Spanish Air Force Network
18021 Aero Off Route US Air Force Worldwide – Belgium Air Force Network <YP>
18024 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-265>
18027 Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-270>/Canadian Forces-NORAD Discrete
18030 Aero Off Route US Air Force Worldwide
18032 US Air Force E-8 JStars aircraft discrete
18046 US Air Force Airborne Command Post Network Worldwide <Z-275>
18171 Justice Department Tactical Network Nationwice (USB/ALE)
18387 US Air Force Airborne Command Post Net Worldwide <Z-280>
18594 Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan 7>
18617 US Air Force MARS Phone Patch Network
18666 Justice Department/Drug Enforcement Administration Network Worldwide (USB/ALE) Local Day Primary <Papa>
18825 Marine Simplex Worldwide
18828 Marine Simplex Worldwide
18831 Marine Simplex Worldwide
18834 Marine Simplex Worldwide
18837 Marine Simplex Worldwide
18840 Marine Simplex Worldwide
18843 Marine Simplex Worldwide
19024 US Air Force E-8 JStars aircraft discrete
19131 Justice Department Tactical Network Nationwide
19665 US Air Force Airborne Command Post Network Worldwide <Z-290>
19770 Marine Calling Frequency Worldwide Ships transmit on 18795
19969 Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/LSB)
20000 Time/Frequency Standard Stations WWV Ft. Collins, CO (AM)
20050 Belgium Air Force Network <YQ>
20390 NASA Space Shuttle Support Network Atlantic Ocean
20407 US Air Force Airborne Command Post Network Worldwide <(Z-305>
20631 US Air Force ALE Network Worldwide (USB/ALE) NIPR (Non-Secret Internet Protocol Router) Network
20659 US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 15>
20890 Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan 8>
20963 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Golf>
20971 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Foxtrot>
20977 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Lima>
20992 US Air Force MARS Phone Patch Network <ACZ>
21866 Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/LSB)
21925 Aero North Pacific (NP-3/4) Major World Air Route Area
21940 Aero LDOC Airline Company Discrete
21943 Aero LDOC Airline Company Discrete
21946 Aero LDOC Airline Company Discrete
21949 Aero LDOC Airline Company Discrete
21952 Aero LDOC Airline Company Discrete
21955 Aero LDOC Airline Company Discrete
21958 Aero LDOC Airline Company Discrete
21961 Aero LDOC Airline Company Discrete
21964 Aero LDOC Airline Company Discrete
21967 Aero LDOC Airline Company Discrete
21970 Aero LDOC Airline Company Discrete
21973 Aero LDOC Airline Company Discrete
21976 Aero LDOC Airline Company Discrete
21979 Aero LDOC Airline Company Discrete
21982 Aero LDOC Airline Company Discrete
21985 Aero LDOC Airline Company Discrete
21988 Aero LDOC Airline Company Discrete
21994 Aero LDOC Airline Company Discrete
21997 Aero LDOC Airline Company Discrete
22159 Marine Simplex Worldwide
22162 Marine Simplex Worldwide
22165 Marine Simplex Worldwide
22168 Marine Simplex Worldwide
22171 Marine Simplex Worldwide
22174 Marine Simplex Worldwide
22177 Marine Simplex Worldwide
22708 Royal Australian Navy Worldwide <A7>
22756 Marine Calling Frequency Worldwide Ships transmit on 22060
22983 Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/LSB)
23214 Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan 9>
23250 Canadian Military Aeronautical System (MACS) Worldwide
23271 Canadian Forces Military Discrete Worldwide
23332 Belgium Air Force Network <YS>
23337 US Air Force Scope Command Network Worldwide (USB/ALE)
23402 Drug Enforcement Administration Worldwide <Romeo>
23872 US Air Force Airborne Command Post Network Worldwide <Z-315>
24526 Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/LSB)
24550 Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
25100 Marine Simplex Worldwide
25103 Marine Simplex Worldwide
25106 Marine Simplex Worldwide
25112 Marine Simplex Worldwide
25115 Marine Simplex Worldwide
25118 Marine Simplex Worldwide
25350 Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan 10>
26617 Civil Air Patrol (CAP) Nationwide
26620 Civil Air Patrol (CAP) Search and Rescue Nationwide
26859 US Air Force Airborne Command Post Network Worldwide <Z-335>
27559 US Air Force Hurricane and Rescue Support Network Worldwide
27870 US Air Force Scope Command Network Worldwide (USB/ALE) SIPR (Secret Internet Protocol Router) Network
29715 Canadian Forces Affiliate Radio System (CFARS) Worldwide <Hotel>

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Putting a Big Signal on the Ham Bands Cheap

Most beginners in amateur radio notice one thing right away: big signals get attention. Ether-vaporizing 20 over 9 signals from big time operators with deep pockets always get to work the DX stations first. But, what can an average beginner with a no-frills, 100 watt transceiver and a limited budget do to get a little advantage over the rest of the operators in the same boat?

❖ Improving Your On-Air Signal

There are several ways to put a bigger signal on the ham bands with relatively little cost. The first place to look is your microphone. Many stock, held-held microphones which are sold with the transceivers are not optimized for on-air performance. You've heard them yourself on the bands: mushy sounding, muffled audio that makes it sound like the operator is talking through a pillow.

Microphone guru Bob Heil, K9EID, has been demonstrating improved audio at hamfests and on-air for years. Now his products, the famous Heil microphone line, are so popular that they are offered with some HF transceivers. He makes several dozen microphones all built around the concept of tailoring your audio for on-air activities. Using his HMM Dual Element microphone, for example, you can get more high pitched audio for DX hunting or more pleasing, full-bodied audio for local rag-chewing just by flipping a switch. This mike typically sells for $80. You can learn more from his web site: **http://www.heilsound.com.**

If you don't like the price tag on after-market mikes, you can try making one yourself. An article in *QST* magazine* shows how you can do-it-yourself and enjoy great audio at a fraction the price of the store-bought variety. Using parts you can easily find, you should be able to put this mike on the air for under $10. I did this years ago and have received dozens of unsolicited, favorable comments from hams around the world. Needless to say, I never use the stock mike which came with the transceiver.

Another method is to use any of the popular audio equalizers which allow you to tweak the audio with an outboard box designed to give your audio more "punch," more "highs," or more "fidelity." Julius Jones, W2IHY, makes what he calls a Dual Band Audio Equalizer and Noise Gate which is designed to optimize your on-air presence. This product typically sells for $165. Read more about the equalizer and other audio tips at: **http://www.W2IHY.com.**

❖ It's All in the Antenna

It doesn't matter how fancy your transceiver is or what a great microphone you're using if you don't have a good antenna. Sometimes you are forced to make do with land use restrictions, grouchy neighbors, or spouses who don't share your penchant for the hobby. In these cases you just have to do the best you can. Stealth antennas, attic antennas, and disguise antennas all have to be used just to get on the air. But if your only restriction is a monetary one, consider one inexpensive option which will give you a big on-air signal.

The multi-element beam antenna is the most cost effective way to put out a big signal because the basic beam is relatively cheap and, unlike, linear amplifiers, requires no additional power to increase your signal. The most popular of these is the three-element tri-bander: it uses three aluminum elements (reflector, driven and director elements), spaced at specific distances apart along the "boom," which supports all three so that they're lined-up in a horizontal plane. On the High Frequency (HF) ham bands, beam antennas are horizontally polarized, but on the VHF and UHF bands they are vertically polarized.

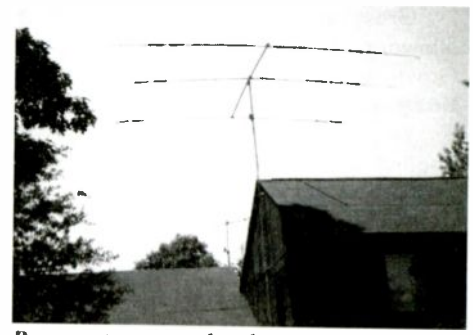
Basically, it works like this: power from the transmitter is delivered to the middle, or "driven" element. The other elements, resonating the energy, act to reflect and direct the signal forward. This concentrated signal goes out in the direction in which the antenna is pointed. It's possible to place additional reflectors and directors for increased gain, but at HF frequencies that much aluminum gets to be heavy and expensive. One of the advantages to using a beam is that it is engineered to be used across the width of all three bands without the aid of a tuner or antenna matching device.

❖ Drawback to the Beam

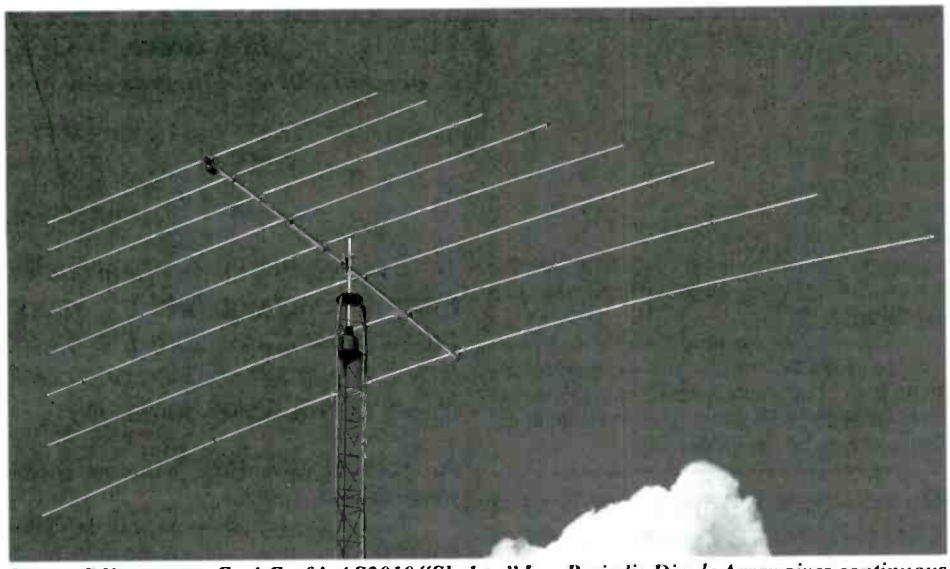
There are a couple of drawbacks to a beam antenna. First, is a lack of versatility. Most are designed specifically for a particular set of frequencies in the ham bands. This is why they're not great for SWLing. The above-mentioned tri-bander, for example, works great, but only for the narrow ham bands on 10, 15 and 20 meters. If you want to work the WARC bands of 12 and 17 meters you'll need a different beam or, for about twice as much, you can use a log-periodic dipole array (LPDA) to tune 13.5 to 32 MHz continuously.

The second problem is that beams are impractical for the lower frequency HF bands 160 through 30 meters. The size of the elements for these bands would be huge, making the antennas the size of most houses and extremely heavy. Even so, I should note that some avid hams have built three-element antennas for these bands.

The biggest drawback to the three-element tri-bander has to do with putting them into service. Typically, a tower is used to support the antenna and there's usually a rotator to turn it. These two items alone cost far more than the original cost of the beam antenna itself. For instance, a free-standing, crank-up tower can cost anywhere from $1,000 for a 33-ft tower to over $16,000 for a 106-ft tower. That doesn't include the massive amounts of concrete, steel re-enforcing bar, and hired backhoe to dig the foundation for your antenna. Oh, and if you planned to



Beam antenna on the cheap. This CushCraft A3S three element tri-bander lets me work the world with a big enough signal to enjoy even the down side of the sun spot cycle. (photo by author)



Dream DX antenna: CushCraft's AS2010 "SkyLog" Log Periodic Dipole Array gives continuous performance on 13.5 to 32 MHz including all WARC bands. (Courtesy: CushCraft)

turn the antenna, rotators for multi-element beams start at over $500.

❖ Bringing Down the Costs

OK, now let's back up a bit. We can get rid of the tower and use a simple mast made up of two, three, or four 10-ft steel TV masts (depending on how tall the peak of your roof is) which you can buy at Radio Shack. You'll need exterior wall supports to hold the mast to the wall of the house on the gable end. Put a patio block at the base to support the combined weight of the mast and antenna. In my case, I used three sections, because the peak of the second floor of the house is about 25 feet above the ground and that puts the antenna about 5 or 6 feet above the peak.

I got rid of the rotator by choosing to turn the antenna by hand. I made the wall supports just loose enough to allow the mast to rotate within them. The bottom wall support is used to clamp tight to the mast to prevent it rotating once I've turned it in the direction I want to transmit. Now, admittedly, it can be a pain in the neck to have to go outside in the rain, snow, cold, wind, or dark to rotate the antenna. However, I've found that, since my main interest is working stations in Latin America and the Caribbean, I can usually set the antenna to due south and forget it. Occasionally, when propagation warrants, I'll turn the beam to the east to work Europe and Africa.

How does this seemingly rickety installation hold up? Under 11 months worth of wind, rain, ice and one tropical storm, it's still up and going strong.

❖ So, How Does It Work?

All signal strength measurements are subjective. But, the standard 1 through 9 Readability – Strength system works for comparisons. For example, a 5 x 5 (readability 5 out of a possible 9 and strength a 5 out of a possible 9) signal when the atmospheric noise is a 5 will be barely readable. But, that same signal on a totally quiet band is "arm chair copy." Furthermore, the presence of interfering signals (QRM), or fading (QSB) will also be a factor. I've had conversations (QSOs) with hams 2,000 miles away where the signal strength was an S1 but was perfectly readable. Other times I've had QSOs where the signal was S9, but interfering stations made copy impossible.

To determine how well the beam performs I use an antenna selector switch so that I can check the signal strength of the beam against the all-band dipole I also use. I've found that the difference between using the beam and the wire is huge. European stations which are being received as an S3 on the wire suddenly become S6 when switched to the beam pointed toward Europe. That much increase in signal strength means the difference between being heard in a "pile-up" (dozens of competing hams trying to work the same station).

After having the beam in place for nearly a year I've worked hundreds of DX contacts and dozens of countries I've never been able to work with just the wire antenna. The combination of the good microphone and the beam antenna has resulted in numerous DX contacts reporting my signal as S9+10 or 15 db over. The retail price of a CushCraft A3S beam is $450. The cost of 3 ten foot masts and the wall mounts is about $50. That makes the entire antenna installation about $500. That's less than the cost of a decent rotator or the cheapest 500 watt linear amplifier. It's a bargain.

❖ Erring on the Side of Caution

The hardest part about putting this antenna up is actually getting it to the top of the mast. Even though it's a relatively small beam, the boom is 14 feet long and the longest element is 28 feet. It weights 35 pounds. That makes for a large and cumbersome thing to be carrying up a ladder. You have to have a lot of room to maneuver and you'll need help on the ground to steady the ladder. I felt like a member of the Flying Walendas as I walked slowly up the steep slope of the roof carrying this enormous antenna and walking along the peak to the edge of the roof where the top of the mast was waiting. Luck was with me, as there was no wind when I slipped the center support over the top and held it with one arm while tightening the nuts on the two U-bolts which hold it to the mast. I didn't look down.

If you're going to try this, here are some additional tips: Don't do this on a windy day. Don't do it if there's any moisture on the roof. Never do any antenna installation anywhere near electric service wires. It's very helpful if you have a safety harness which can be attached to something very substantial on the house. In retrospect, I have to add, if you've got the money, hire a "cherry picker" truck to do the job.

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* D. Brede, "A $5 Headset Mike," January, 1993 *QST*. This information is also in the *ARRL Handbook* under Station Setup and Accessory Projects 22.29 and on-line at **http://www.arrl.org** available in PDF format to ARRL members.

Getting Started

Ask Bob

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Q. *I've enclosed an ad for a so-called "Xium" antenna; it has an 18-inch dish, no electronics, and is advertised to outperform larger antennas for shortwave, TV, AM broadcasting, and even CB. Is this possible? (Kevin Northrop, Great Meadows, NJ 07838)*

A. There have been various versions of these do-everything antennas, and they all fail miserably. A small antenna without any gain elements that is supposed to outperform larger, properly-designed, gain antennas is impossible.

The very presence of an 18-inch dish should raise eyebrows; that size dish is designed to work in the 12,000 MHz range, so on the frequencies this antenna is advertised to work on, this teensy dish does *nothing* to improve reception. Not only that, but the antenna is advertised as being non-directional, so why would it have a beam-focusing dish reflector?

So far, comments on Internet sites are vastly negative for this antenna. You'd be far better off with a good, multi-purpose VHF/UHF antenna like the Scantenna for only $49.95 including 50-ft. of coax (see our web page at **http://www.grove-ent.com/ANT7.html**).

Q. *I've noticed that new electric power meters in my neighborhood have liquid crystal displays (LCD). Aren't LCDs vulnerable to sub-freezing tempratures? Mark Burns, Terre Haute, IN)*

A. They certainly are, and that's why I'd bet these little meters have heaters! After all, where could an electric heater more easily get its power than from the power line?

Q. *Why is it that often, when I try to print out a page of information from the Internet, I get a long, empty page with just some numbers at the bottom that I don't really want, thus wasting paper? (Mark Burns, Terre Haute, IN)*

A. Basically, what is happening here is that web pages are typically "templated" with certain codes that are likely to be used, including page numbers, end of page notations, and the like. There are also extraneous, meaningless bits of code that look like information and cause the printer to provide room for them.

The simplest way to get the shortest printout is to copy the page to your word processor, paste it as "Unformatted Text," drag the mouse over the page, highlighting what you want to delete, and then hit the PRINT key!

Q. *Are there always either 3 or 5 MHz separations between repeater and mobile frequencies in the 450-512 MHz UHF band? Is this also true in unlicensed private mobile services in the 900 MHz range? (Kenneth Pearson, Freehold, NJ)*

A. I've never seen any variance in the 3 and 5 MHz base/mobile channel separations in the UHF range; it's the way the FCC Rules and Regulations list them. Any variance would make it doubly difficult to license new stations because there might be interference potential on one of the unusually-paired frequencies, but not the other. If a service is unlicensed, however, there is no standard requirement for base and mobile splits.

Q. *Do you know where I can purchase a commercial grade tape measure that is graduated in inches and frequency or wavelength? (Jon Asdourian, Senior Forensic Examiner)*

A. I don't think you'll find one. There are too many variables. The speed of an electromagnetic signal is standardized for the vacuum of space, and the velocity of propagation of a wave is dependent upon the medium through which it is transmitting. If you wanted to measure a half-wavelength of coaxial cable, the value would depend upon not only the frequency, but the velocity factor of the dielectric (insulation).

Q. *I am considering purchasing a communications receiver, but I am concerned about the internal lithium backup battery losing its functional settings when it has to be eventually replaced. (Tom Carroll, email)*

A. Don't be. Using due care, simply attach another battery or other DC source of the same required voltage and polarity across the contacts before removing and replacing the aged battery. That way you won't lose a thing.

Q. *If the earth's interior heat comes from radioactivity, and the moon presumably came from the earth, why is the moon so dead and cold? (Mark Burns, Terre Haute, IN)*

A. No doubt about it, Mark, you come up with some interesting questions!

The latest theory, advanced since the 1970s, is that the earth's interior heat comes from radioactive potassium mixed with the molten iron in the earth's core. When a giant meteorite collided with the earth, the dense iron and radioactive potassium were already at the earth's core, so the lighter, iron- and potassium-depleted surface material was ejected to form our moon.

Q. *While perusing some old Grove catalogs, I noticed two discontinued products and wondered why you don't make them anymore: CVR-1 Scanverter to allow any scanner to be able to listen to shortwave, and PRE-4 scanner preamplifier. (Kenneth Pearson, Freehold, NY)*

A. There are several reasons why these products are no longer available. First and foremost, because we closed our manufacturing division after it continued to lose money year after year. The PRE-4, however, was replaced by a vastly-improved PRE-5, but it, too, was too expensive to make in small numbers.

Unlike many other companies, we are located in a small, rural community with no major cities within 100 miles in any direction, so our talent pool for engineering is virtually non-existent. Many readers will recall our ill-fated attempts several years ago to manufacture a high-end, affordable, wide-frequency-coverage receiver; it began as the SR-1000 and was to continue as the SW-100.

After going through four engineers, an engineering firm, and half a million dollars, we gave up. We are still trying to liquidate all the parts we had purchased to make the first 500 receivers.

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

Getting Started

Bright Ideas

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33 Interested in emergency or disaster preparedness? Here is an interesting website to visit: **http://www.bcprofessional.com.** Don't miss the bargains in the "Gear" page. The free book downloads are excellent products. And I did say, free!

34 As the owner of a new Yaesu VX-2R, I followed my usual habit of carefully storing all the original packing materials, photocopying the manual, and doing the modification for extended receive and transmit. I let the battery charge up while reading my photocopy of the manual, highlighting the important sentences.

When I ordered the VX-2R, I noticed they sold a cheatsheet for $4.95, so I ordered one. I was disappointed. It was a simply a regurgitation of the Set Menu options, almost word for word out of the manual. There was nothing on how to set up the vfo, repeater shift, PL tone, and write the vfo to a memory channel. Nor was there anything on how to scan in vfo, or memory mode. So, as always, I made up my own. Here it is!

Yaesu VX-2R			
Band	#	Range	TX
BC	1	0.5-1.8	NO
SW	2	1.8-30	NO
50 HAM	3	30-59	NO
FM r.	4	59-108	NO
AIR	5	108-137	Yes
2 Meter	6	137-174	Yes
VHF TV	7	174-222	Yes
UHF Air	8	222-420	N/Y
440 Ham	9	420-470	Yes
UHF TV	A	470-800	Y/N
800-900	b	803-999	NO
TV Audio 2-50		Memory Bank 20	
Tap ♮ key for battery status			

******cut or fold here**********

FW then H/L for menu options
Tap PTT to save selections
To select operating frequency
Press Band, and then Dial, tap FW and tune in 1 MHz steps
For T SQL, tap FW, then MD
For PL tone, SET menu # 42
Write to Memory, Hold FW, it blinks, displays CH# dial for MR# hit FW again to write to Memory
To Scan in VFO press Band to select range, hold Band again
To Scan in MR, hold Band, then FW, **and Band again. To select** MR Bank # ,turn dial, Band again
To Scan 1-20 banks 100 CH# each For WX, FW then%, then Band
To LOCK, FW then Band for 1 sec.

The N/Y, and Y/N in the transmit column means only a portion of the band is capable of transmitting. I know it is a little cryptic, but it is enough to jog my memory.

I folded it back-to-back and laminated it. Since I own dozens of radios and have a failing memory, I need little reminders on how each one works. Usually I carry one with the radio, or even taped to the back. You can make your own cheatsheet. Plus it forces you to learn all the basic functions. If you can explain it, you can do it!

35 If you're a ham, you probably picked up a copy of the new *2004 ARRL Repeater Directory*. On pages 27-29, they list all the cryptic abbreviations for special features, and unique information about individual repeaters. I retyped the list, and formatted it, business card size, folded back-to-back. Tip: Use portrait orientation, rather than horizontal.

I used the copy feature to fit several on one page. I cut them out, laminated each one, and use them for bookmarks and quick reference. I used the tables feature in my word processor, but you could also use the label function. Naturally, I made a few extras for friends.

Need to buy a directory? Try your local ham radio shop or **http://www.arrl.org/catalog/**

Bookmark for the ARRL
Repeater Directory
Footnotes repeater status
o=open to all
c=closed (private)
_itz=Long Term Zero
RB=remote base
a=Autopatch
(CA)=closed autopatch
e=emergency power
l=linked
r=races
s=ares
t=PL tone xxx.x
x=wide area coverage
z=direct access to PD
cut or fold here **
A few simplex frequencies
National calling channels
29.600
52.525, 52.02, 52.04, 52.540
146.520 146.40—146.580
also 147.420--147.570
223 500 and 223.40-223.520
446.000
902.100
1294-1295

36 I bought the Energizer brand four pack of Photo Lithium batteries for my digital camera. I find that my digital camera, the HP 310, completely drains these expensive batteries if left in the camera. So I always remove the batteries and return them to their plastic holder. These come in a "reclosable" clamshell-like plastic housing. I stripped away the paper and was left with this clamshell plastic container. I had a couple of these reclosable packages left from earlier efforts. I find that they work for storing regular AA batteries when I need to toss some spare batteries in my pocket for radios or my "grab and go" bag, and other transporting scenarios. Works well in your pocket, or otherwise the batteries could short out. Bless the radio manufacturers that use AA batteries!

37 Do you use a lot of AA alkaline batteries? Try **http://www.ccrane.com.** They sell AA in box quantities of 24, or 48. Tests usually reveal that generics do as well as brand names. Crane has other interesting products such as a solar panel for $14.95. Or a top notch AA recharger for $40.

38 Since I transitioned to the big easy chair for listening, I set up an oak folding table. Note the KGB coffee mug. I don't usually use mugs for coffee, but rather to hold pens, specialized rubber ducks, and telescoping antennas. I ordered it from **http://secure.sovietski.com/.** I searched the internet and found another site that seemed to be a good compromise between price and quality: Personalized mugs are available at **http://www.themugfactory.us/pages/1/index.htm** See photo.

39 Memorial Day weekend is the traditional start of the summer season. The park rangers, EMS, lifeguards, and boat patrol frequencies will come alive. So give a listen, and get your radio programmed accordingly. Next month my entire column will get us ready for the wildfire season.

40 If you missed it, *Monitoring Times* **subscribers** have some *new* free benefits (see page 3). By subscribing, you save serious money. Enough to buy a new radio? Hmmmmm.

Monitoring Times strives to be the very best publication for accurate, and timely information about the broad hobby of radio monitoring. If you have a question, news item, or, frequency list, please submit them to *editor@monitoringtimes.com* and she'll direct it to the appropriate columnist.

In the March issue, I raised the issue of using small, four point typeface. Well I received dozens and dozens of better solutions. If you go to the dropdown menu for font size, you can erase the size in the top box, and type in any old size you wish. Thanks to all who took their time to respond. I am busy working on bright ideas for next month!

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Get a Charge Out of Scanning

One thing that most users of portable scanners can agree on is that their batteries have shortcomings. Run-of-the-mill alkalines are expensive; nickel-cadmium (NiCd) batteries have a "memory effect" that leads to reduced capacity; and even the newer nickel-metal-hydride (NiMH) batteries take a long time to recharge. Worst of all, none of these batteries ever seem last as long as you'd like.

❖ Scanner Batteries

Hi,

Not sure what battery life people expect from the Pro-96 but I get 10 to 12 hours out of 2000 mAh batteries. I don't get any better out of the Uniden 235 or 245. The best is the Rayovac 2000mAh 15-minute charge batteries. You need a $29.95 charger for them but they charge regular NiMH and Nicads, too.

The Pro-96 has a much longer battery life than the Uniden if you use the 2000 mAh Ray-O-Vac 15-minute recharge system. They call them IC-3, they have an IC in the battery and last about 10 hours in the PRO-96 before you need to recharge them and they only take 15 minutes to give you another 10 hours.

- Les in Michigan

For many months now the Rayovac Corporation, based in Madison, Wisconsin, has been marketing a new rechargeable battery technology called IC-3 (In-Cell Charging Control). Each IC-3 battery has built-in charging control that monitors voltage and temperature during the recharge process, allowing the charger to deliver maximum current while avoiding potentially explosive pressure build-up. Safe delivery of a large charging current allows an IC-3 battery to be fully recharged in 15 minutes.

Rayovac is advertising that their battery is expected to last for about 1,000 recharge cycles, so even if you recharge twice a week they should be good for 10 years. The ads also claim that the IC-3 batteries have four times the capacity of regular alkalines.

Yuasa-Delta Technology in Taiwan manufactures these custom Nickel-Metal Hydride (NiMH) batteries for Rayovac.

A Rayovac 15-minute charger retails for about $30 and includes two AA-size batteries, although it can recharge four of them at time. Some charger packages include a mail-in offer for a car cord, allowing you to recharge batteries in your vehicle while away from home. A pack of four IC-3 AA-size batteries sells for about $13. IC-3 batteries can also be charged in other NiMH rechargers, but will take the normal amount of time (some number of hours) to fully recharge.

Since the PRO-96 uses four AA-size batteries, an investment of about $43 will keep it running for the better part of the day with only a brief recharge time.

If that's too much to spend, a less expensive solution is the Energizer rechargeable battery system. Their four-battery recharger costs about $10 and four AA-size batteries are another $10. The downside is that the recharging cycle can take as long as 14 hours. The Energizer batteries in my local store were slightly higher capacity (2100 mAh) than the Rayovac (2000 mAh), implying they may last a bit longer between recharges.

So, if you'd like to get away from using short-lived and environmentally unfriendly alkaline batteries in your portable scanner, consider one of these rechargeable battery brands. You may be pleasantly surprised to find that your scanner runs quite a bit longer than you're used to.

❖ Maine

Dear Dan,

I just moved to Maine from Cohasset, Massachusetts, just in time to have all shortwave reception wiped out by a crazy sun. Things are coming back to normal on HF but in the meantime, I got out my Radio Shack PRO-46 to see what was doing on VHF. Quite a bit as I have found. Not too many stations but they are most active.

47.320	Maine State Highway (snowplows which seem to be out at the first flake.) Quite active and the call I heard was WPZ-749.
122.800	Belfast Airport (state owned) Unicom.
125.300	Bangor Airport approach/departure control at Belfast. Both use the ID of "Belfast Control."
154.650, 155.055	Maine State Police. Very active, mostly on I-95.
156.030	Waldo County Emergency Dispatch - extremely active.
154.905	Belfast Municipal Repeater - heard a few times.
45.480	Belfast City Fire, local operations
153.130	Belfast City Ambulance, local operations
154.295	Maine State Fire
154.310	Maine statewide Mutual Aid Fire Channel
155.805	Belfast City Police, local operations

I have seen the following units active, but so far I haven't heard them on the radio.

There are two tanker terminals at Searsport at the head of Penobscot Bay.156.450 and 156.500 are both used by the Penobscot Bay Pilots and the Maineport Towboats, both based at Belfast. Can get quite busy.

157.100	Coast Guard marine broadcasts from Southwest Harbor at 1135 and 2335 UTC.
162.400	NOAA, Ellsworth - KEC-93
483.600	Unknown delivery service. Houses are poorly marked hereabouts and the drivers are often frustrated finding some address.

I have other frequencies and services listed for this area but I haven't confirmed any of them yet.

- 73, Bob in Belfast, Maine

I was not able to find a listing for 483.600 MHz in Maine. The FCC on-line database at http://gullfoss2.fcc.gov/cgi-bin/ws.exe/genmen/index.hts shows public safety use of the frequency in California and, coincidentally, for the City of Cohasset, Massachusetts. Perhaps that's an old listing?

In any case, I did find three frequencies for the Waldo County Sheriff on low band: 39.62 and 39.74 MHz are being transmitted out of a facility at 19 Congress Street in Belfast and 42.14 MHz from the top of Aborn Hill in Knox. In the VHF band they use 155.520 MHz from Belfast and 156.030 MHz from Knox.

Perhaps some of our other Maine readers have additional frequencies to contribute?

◆ Tippecanoe County, Indiana

Indiana's Tippecanoe County, 60 miles northwest of the state capitol of Indianapolis, has received a $7 million grant from the Department of Homeland Defense and will use about $200,000 of it to upgrade old public safety radios. The county has a little over 150,000 residents in its 500 square miles and is home to Purdue University in West Lafayette.

The county operates a Motorola trunked radio system for county and municipal agencies. The system was originally installed as a Type IIi (hybrid) and has been upgraded to a mixed analog/digital system. Some of the old police radios are apparently no longer compatible with the system and must be replaced.

Assigned frequencies for the system are 855.2125, 855.7375, 856.7375, 857.7375, 858.7375, 859.7375, 860.7375, 866.0500, 867.3000 and 868.1500 MHz.

I have received information for the following talkgroups, although some of the low-numbered talkgroups may have moved when the system was upgraded. Updates from folks actually monitoring this system are welcome!

Dec	Hex	Description
368	017	County Sheriff Dispatch
400	019	County Sheriff Car-to-Car
432	01B	County Sheriff Special Operations
464	01D	County Sheriff SWAT
560	023	Indiana State Police District 14 (Simulcast)
688	02B	County Fireground 1 (North)
720	02D	County Fireground 2 (North)
752	02F	County Fireground 3 (North)
784	031	County Fireground 4 (South)
816	033	County Fireground 5 (South)
848	035	County Fireground 5 (South)
1008	03F	Lafayette Police Dispatch
1104	045	Lafayette Police Car-to-Car
1264	04F	County Fire Dispatch
1648	067	West Lafayette Police Dispatch
1744	06D	West Lafayette Police Tactical
1968	076	West Lafayette Fire Dispatch
2000	07D	West Lafayette Fireground (North)
2016	07E	West Lafayette Fireground (South)
30416	76D	Lafayette Fire Dispatch (Primary)
30448	76F	Lafayette Fire Dispatch (Secondary)
30480	771	Lafayette Fire Channel 2
30480	771	Lafayette Fire Channel 3

The Indiana State Police are reported to still use low band frequencies of 42.26 and 42.42 MHz.

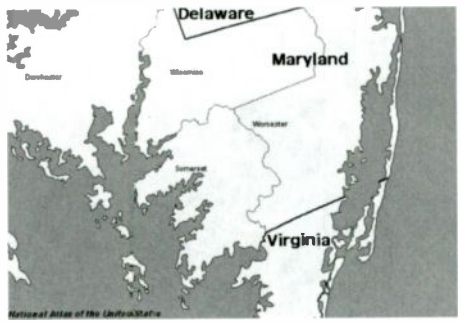
The City of Lafayette is still licensed for 155.37, 155.55 and 155.61 MHz. At one time the Lafayette Police Department could be heard on 155.61, but I'm not sure if they still use it after joining the county trunked system.

Indiana University uses 155.745 MHz at the terminal building of Purdue Airport.

The airport tower itself can be heard on 119.6 MHz, ground control on 121.9 and ATIS (Automated Terminal Information Service) on 127.75 MHz.

◆ Somerset County, Maryland

Somerset County, Maryland, 80 miles east of Washington, D.C., on Maryland's Eastern Shore, will be spending well over $3 million on a new 800 MHz public safety radio system. If all goes according to plan, an aggressive build-out schedule will have the system up and operating before the end of the year. To help meet this goal the county will use an existing State Police tower in Princess Anne and build a new tower in Marion Station.



The primary goal is to get the police and fire departments using the same network so they can talk directly with each other, rather than having to relay messages through a dispatcher. A secondary goal is to improve interoperability with neighboring counties that already have 800 MHz systems, although the adjacent Maryland counties of Wicomico and Worcester currently use different technologies. The new Somerset system is expected to have a combination of analog and digital voice traffic.

The Maryland State Police maintain a barracks in the county seat of Princess Anne. From their location on Route 13 they're licensed for operation on 47.32 and 47.4 MHz. They're also licensed for 39.24, 39.6, 39.78, 39.1 and 39.62 MHz from the Green Hill tower in Westover.

Somerset County Fire is still operating low band, 46.18 and 46.24 MHz. The County Sheriff operates in VHF on 154.650 as well as 155.550 and 155.970 MHz.

Wicomico County to the north operates a Motorola Type II system on the following eight frequencies: 856.7125, 856.9625, 856.9875, 857.9875, 858.2375, 858.9875, 859.2375 and 860.2375 MHz.

Dec	Hex	Description
1616	065	County Fire Dispatch
1648	067	County Fireground 1
1680	069	County Fireground 2
1776	06F	Salisbury Fire
1872	075	County Emergency Medical Services
1968	07B	County Sheriff Dispatch
2000	07D	County Sheriff Tactical 1
2032	07F	County Sheriff Tactical 2

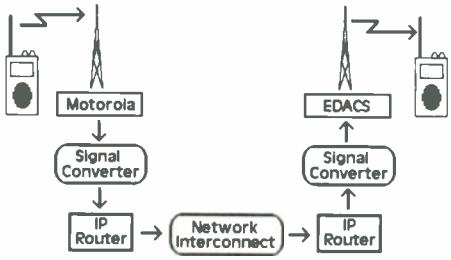
Worcester County to the east is home to Ocean City, a busy resort town on the Atlantic Ocean. The county operates an EDACS system on the following frequencies. As with all EDACS frequencies, be sure to enter them in Logical Channel Number (LCN) order:

LCN	Frequency
01	855.9625
02	856.4625
03	857.4625
04	857.7125
05	858.4625
06	858.7125
07	859.4625
08	859.7125
09	860.4625
10	860.7125

Dec	AFS	Description
274	02-022	Ocean City Police Dispatch
275	02-023	Ocean City Police
289	02-041	Ocean City Fire Dispatch
290	02-042	Ocean City Fire Operations
292	02-044	Ocean City Emergency Medical Services
785	06-021	County Sheriff Dispatch
786	06-022	County Sheriff
945	07-061	County Fire Dispatch
946	07-062	County Fire 1 (North)
947	07-063	County Fire 2 (Central)
948	07-064	County Fire 3 (South)
953	07-071	County Fire and Police Operations

◆ Delmarva

Somerset, Wicomico and Worcester Counties in Maryland are part of an area called *Delmarva*, a contraction of *Delaware-Maryland-Virginia*. Worcester County recently awarded M/A-COM a $5.6 million contract to connect federal, state and local agencies across the nine counties that make up Maryland's Eastern Shore on the Delmarva peninsula. M/A-COM intends to use their new NetworkFirst technology to



Example of Network Interconnection

link different radio systems from each county together.

The basic idea behind NetworkFirst is to take the voice traffic from each radio system and convert it into a standard digital format. That digitized voice can then be transferred from one radio system to another and eventually converted back into voice signals. Since each radio system will be accepting and delivering voice traffic in their native format, no changes are necessary to radios that are already out in the field. NetworkFirst performs the conversion work between the standard digital format and the proprietary signals of each system. In addition, digitized voice can be carried over Internet Protocol (IP) equipment like any other data. This allows standard computer networking equipment like routers and gateways to be used to interconnect the different counties.

❖ Detroit, Michigan

Dear Dan,

The City of Detroit has petitioned the Federal Communications Commission (FCC) for a temporary trunked system location atop the Penobscot Building, to serve as a transition site while they switch over to a new radio system. It is currently a pending level 1 with the FCC.

Petition documents indicate that Detroit's Police, Fire and Emergency Medical Services Departments are planning to join the State of Michigan radio system. Michigan State Police use APCO-25 and can be monitored on the PRO-96.

The Penobscot Building is the second-tallest building in Detroit and is located in the center of downtown.

The internet site "South East Michigan Scanner Page" (http://www.bouwkamp.net/miscanner/detroit.htm) states that "the data channels are on-line and functioning and there has been test transmissions on all the voice channels."

According to the Radio Info Systems web site (http://www.radioinfosystems.com/updates.htm), the frequencies requested are: 851.3375, 853.3625, 855.3625, 855.4125, 855.2375, 867.0750, 867.0875, 867.6000, 868.5375, 868.6250 and 868.7250.

- Thanks, Ira in Michigan

Based on information in the FCC's Universal Licensing System (ULS), the Special Temporary Authorization (STA) was granted on December 17, 2003, and will expire in June of this year. STAs are typically requested when someone wants to use certain frequencies for something unusual or experimental, and are often interesting to monitor. In this case it looks like Detroit wants to operate both their old and their new trunking system at the same time, and still have a few frequencies left over for testing.

I located two call signs in the FCC database that are connected to this STA. Call sign WPZA945 authorizes the use three frequencies: 867.0750, 868.2375 and 868.7250 MHz, which are part of the Public Safety National Plan 821-824/866-869 MHz, Trunked Radio Service (the shorthand for this service is "YF"). A second call sign, WPZA947, authorizes the use of four additional frequencies: 851.3375, 853.3625, 855.3625 and 855.4125 MHz. This call sign is in a different "frequency pool," namely the Public Safety/Special Emergency 806-821/851-866 MHz, Trunked Radio Service (shorthand is "YP"). The STA specifically grants the use of these seven frequencies for six months to the Michigan State Police, who filed the request on behalf of the City of Detroit.

The frequency 855.2375 MHz is actually assigned to call sign WNAJ346, a regular license registered to Wayne County. This is an old Motorola Type IIi (hybrid) county system that is being phased out. There are five other frequencies reported for this system: 853.3125, 854.2375, 854.3125, 855.2875 and 855.3125 MHz. Users are being switched over to a new countywide system, but while it's still operating you can use the following fleetmap and talkgroup information:

Fleetmap	
Block-0	S-12
Block-1	S-12
Block-2	S-4
Block-3	S-0
Block-4	S-0
Block-5	S-8
Block-6	S-0
Block-7	S-9

Fleet 200 (for example, 200-1 or 200-10) and Fleet 500 are assigned to the Sheriff's Department. Fleet 701 is Emergency Management and Fleet 000 is the Road Commission.

The other four frequencies Ira lists, 867.0875, 867.6000, 868.5375 and 868.6250 MHz, are part of call sign WPSJ369, a regular license registered to the City of Detroit. This is a relatively new APCO-25 digital system being tested out of Detroit. This system will eventually allow Detroit to interoperate with nearby systems including Downriver and Wayne County. Frequencies assigned under this call sign are: **866.7000, 867.0750, 867.0875, 867.1125, 867.1625, 867.2125, 867.2250, 867.2875, 867.3375, 867.6000, 867.6125, 867.7125, 867.8125, 867.8375, 868.1625, 868.2125, 868.2375, 868.2500, 868.5000, 868.5375, 868.6250, 868.6625, 868.6875, 868.7125 and 868.7250 MHz.**

❖ Dayton HamVention

If the calendar says May then it must be time for the annual trek to Dayton, Ohio, for the HamVention. Three days of radios, computers, and bargain hunting will take place at the Hara Arena starting Friday, May 14, and finishing up late on Sunday, May 16. I'm usually hunting for old calculators and computers, but with 500 indoor vendor spaces and more than 2,500 outdoor tailgate slots you're sure to find something of interest. Dayton is also the place where big name equipment vendors announce and demonstrate new products. Educational sessions and forums run all weekend, covering the gamut from kit building and lightning protection to satellites and shortwave listening. For more information and details, check the official website at http://www.hamvention.org.

That's all for this month. More information is available on my website, including detailed APCO-25 information and links to state radio projects. You can send your questions, comments and frequency lists to me at *danveeneman@monitoringtimes.com* Until next time, happy scanning!

Skywarn booth at 2003 Hamvention by Keith LaBorde, K4KAL

Scanning Canada

John David Corby, VA3KOT
johncorby@monitoringtimes.com

Respond Emergency Communications

It was a very cold, dark evening in February when I drove to Mississauga, Ontario, to meet with some people I had discovered by chance while doing a frequency search on the Web. The organization is listed in the government frequency database as "Respond Emergency Communications – Search and Rescue." I called and made an appointment with the group's leader, Ray Haines. Ray had told me that the group meets every Friday evening at a road intersection in the City of Mississauga, so I loaded the group's frequencies into my scanner and set off to meet with them.

Respond Emergency Communications has been around since 1979. In 2000, the group's long service was recognized by the City of Mississauga with a civic award presented by the City's long-serving, octogenarian mayor Hazel McCallion.

Respond started as a CB group, but now the members use commercially licensed radios on three frequencies: 169.95 MHz, 172.47 MHz and 172.98 MHz. The 169.95 MHz channel ("channel 1") is the group's main communications frequency. It is a simplex channel shared with several other licensees in the same area, but Respond uses a tone to separate their use of the channel from, among others, the local ice supplier.

My scanner did not break squelch on the drive down from my home north of the city. I wondered whether I had copied the frequencies correctly. Then, as I pulled onto the exit ramp off the highway, I heard a couple of brief exchanges on "channel 1."

❖ Responding to the Mississauga Train Derailment Disaster

The civic award from the City of Mississauga cites Respond's support during the Mississauga train derailment in the group's founding year. On November 10th, 1979, just before midnight, a 106 car, Canadian Pacific freight train loaded with a deadly cocktail of caustic soda, propane, chlorine, styrene and toluene rolled into the heart of the city. Train 54 from Windsor, Ontario was bound for Agincourt, near Toronto – it never reached its destination.

A combination of old style bearings and poor maintenance caused overheating of the train's wheel axles. As the train reached the heavily populated neighborhood where Respond now holds its gatherings, the wheel axles started to disintegrate. A few minutes after midnight the train derailed and the first explosion of one of the propane cars took place. More explosions followed and the CP Rail radio channels lit up with traffic in the middle of the night.

Assisted by Respond, over 200,000 people out of a total 1979 population of 284,000 were evacuated, creating a virtual ghost town. This was one of the largest deployments of emergency services ever seen in Canada. A release of eighty tons of deadly chlorine gas was swept into the air by the fire, but fortunately dispersed harmlessly over Lake Ontario. The disaster lasted ten days.

❖ The "Fella From the Scanning Magazine"

I pulled off the highway and started making my way down a city street headed for the scheduled rendezvous. I had prepared a list of questions and was already listening to Respond's radio exchanges on my scanner in the hope of gaining a little further insight before our meeting. As I reached the intersection where I had been told to join them, I saw no trace of any group gathering. I reached for my cellphone and called Ray Haines for directions; he told me to head for a parking lot behind a commercial building a city block away.

Making a turn off the main street into a small commercial sub-division, I finally sighted a small group of cars and minivans that looked like security vehicles. They were gathered in a dark, secluded lot behind a large building. As I parked up, a couple of shadowy figures dressed in dark clothes, faces obscured by balaclavas, stepped out of one of the cars and walked over toward me. As I stepped out of my vehicle one of them, in a very pleasant voice, said to me, "You must be the fella from the scanning magazine." The sinister looking character turned out to be Respond group member and fellow ham Adrian, VA3AGF, who invited me to join him inside his nice, warm minivan to answer my questions.

❖ Relocate to Tango Hotel

Adrian told me all about the radios the group uses and how they allocate their channels. As we were speaking, Ray Haines arrived and suggested we move on to "Tango Hotel." Readers who understand phonetics and are familiar with Canada's largest chain of donut stores will know where we went next.

The atmosphere inside "TH" was much warmer and brighter than the cold, dark parking lot where we first met. I was given more details about Respond's radio systems. They use a variety of handheld and mobile rigs. Handhelds generally operate at 5 watts and mobiles at 25 watts. One Motorola commercial handheld transceiver that I was shown had been modified to scan the local emergency services trunked frequencies.

Respond takes its work very seriously. New members are screened and remain on probation until the group feels they are ready. Members commit to be available for a specified minimum amount of time each month and are trained in first aid. Respond vehicles carry amber flashing lights on the roof to identify themselves while in action. Working in conjunction with local police, they close highways during accident situations, assist in parades and join searches for missing children.

As we finished up our coffee, I asked Respond leader Ray Haines what message he would like to send to *MT* readers. "We need more members – and angels" he replied. Respond is a volunteer group, and by "angels" Ray meant financial sponsors. You can find out more about this dedicated and committed group on their website at **http://www.respondemergency.com**. If you can help them with sponsorship or by joining them you will be contributing to a very worthwhile cause.

Next month: Exploring the low end of the VHF band across Canada. Until then, 73.

The Respond group at "Tango Hotel"

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

US Maritime Safety Information

MSI stands for Maritime Safety Information. It consists of urgent navigational and weather warnings, weather forecasts, distress alerts, and special notices. The timely dissemination of MSI is a major goal of the Global Maritime Distress and Safety System (GMDSS).

This is a broad topic, and full coverage of all the world's MSI systems is a book, not a column. Here in the United States, though, we've implemented all three of the systems specified by GMDSS. These are the satellite-based SafetyNet, the medium-frequency Navtex, and the scheduled broadcasts on high frequency (HF). The latter two of these are done by the US Coast Guard.

While several countries now have multiple Navtex frequencies, here it's still just 518 kilohertz (kHz). We've talked about Navtex quite a bit, because it's easy to decode. Hobby-class devices and computer programs pick up the content just fine. The mode is SITOR-B (Simplex Telex Over Radio, mode B). AMTOR (Amateur Teleprinting Over Radio) is identical for our purposes, and it works the same. Either is fine for listening, though one does lose all of the special bells and whistles provided by the full-featured printing terminals used afloat.

HF MSI is also in SITOR-B, and AMTOR again works fine. Here on dry land, HF coverage is often better than Navtex, which can be spotty at certain times of day. This is due both to differences in the two propagation modes, and to the choice of station locations, which use sites freed up by the phaseout of Morse telegraphy. For example, none of the Navtex stations ever get very far above the noise in Los Angeles, but the HF is usually perfect copy.

❖ MSI Products

Since the information is aimed at US interests worldwide, it tends to compress a lot of useful global information into a relatively short broadcast. Basically, weather bulletins come from weather offices (US Department of Commerce), navigation data from hydrographic (charting) offices (US Department of Defense), and special warnings from a number of intelligence and enforcement agencies.

A typical broadcast will start out with the weather. If there is a hurricane warning or similar, this will be urgency ("pan pan") traffic. There are also often advisories regarding other relevant features such as gales and heavy seas.

The subsequent terse navigational warnings come as NAVAREAs and HYDROs (for hydrographic). NAVAREAs cover the portions of the Atlantic and Pacific that are assigned to US responsibility by the World-Wide Navigational Warning Service. This international effort divides the planet's ocean surface into 16 such areas, which are usually given Roman numerals. The Atlantic Ocean is NAVAREA IV, stretching from the East and Gulf coasts out to 35 degrees west latitude. The Pacific is NAVAREA XII, from the West coast out to the Date Line, which jogs along and around 180 east/west.

Outside the NAVAREAs, the HYDROLANT (HYDROgraphic AtLANTic) covers everything eastward. The HYDROPAC (HYDROgraphic PACific) does the same with everything westward, including the Indian Ocean.

These warnings can get pretty interesting, especially if you're looking for things that might generate utility radio traffic. They relay distress notices, and warn ships away from upcoming military exercises or missile firings. There are also usually a lot of wide-berth requests for special activity involving cable-laying or survey vessels.

Rarely, a warning is given a subtype of MARAD (Maritime Administration Advisory). These deal with more general threats to vessels, particularly US interests, from hostile actions, foreign government policies, piracy/robbery, or terrorism. One of the few MARAD currently still in effect warns of an unspecified threat to US ships in or near the waters of Sudan, Yemen, Somalia, Indonesia, and the Strait of Malacca.

Rarest of all are Special Warnings. These are basically war, revolution, or other extremely hostile situations. The most recent one that is still valid was put out for the Eastern Mediterranean and Middle East a year ago last March. It warns of coalition military operations relating to the Iraq invasion, noting that, "The timely and accurate identification of all vessels and aircraft in these areas are critical to avoid the inadvertent use of force."

Good advice, however ungrammatical.

MSI is also available online, as part of the United States Notice To Mariners, at **http://pollux.nss.nima.mil/index/.**

Have fun with this stuff.

US MSI Schedule

Times are UTC (Coordinated Universal Time)

518 kHz Navtex
First letters are transmitter identifiers

C	Pt. Reyes CA	0000	NMC
A	Miami FL	0000	NMA
E	Savannah GA	0040	keyed by NMN
O	Honolulu HI	0040	NMO
Q	Cambria CA	0045	NMQ
F	Cape Cod MA	0045	NMF
V	Guam	0100	NRV
N	Chesapeake VA	0130	NMN
W	Astoria OR	0130	NMW
R	San Juan PR	0200	NMR
G	New Orleans LA	0300	NMG
J	Kodiak AK	0300	NOJ
X	Kodiak AK	0340	NOJ

HF assigned frequencies (kHz)

Most USB radios read 1.7 - 2 kHz lower

NMN, VA, keying NMF, Boston

0140	6314	8416.5	12579
1630-	8416.5	12579	16806.5

NMC, Pt. Reyes, CA

0000	8416.5	16806.5
1800	8416.5	16806.5

NMC keying NMO, Honolulu, HI

0130	8416.5	12579	22376
0730	8416.5	12579	
1330	8416.5	12579	
2030	8416.5	12579	22376

NMC keying NRV, Guam

0230	12579	16806.5	22376
0500	12579	16806.5	22376
0900	12579	16806.5	22376
1500	12579	16806.5	22376
1900	12579	16806.5	22376
2315	12579	16806.5	22376

Utility World

Utility Logs

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

ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
ARQ	Automatic Repeat Request teleprinting system
ARQ-E3	French ARQ teleprinting system
CAMSLANT	Communication Area Master Station, Atlantic
CAMSPAC	Communication Area Master Station, Pacific
Coq-8	Coquelet-8, French teleprinting system
CW	Morse code telegraphy ("Continuous Wave")
DEA	US Drug Enforcement Administration
DSC	Digital Selective Calling
E3	UK MI6/SIS numbers, Cyprus
E10a	Israeli female phonetic numbers, null message
EAM	Emergency Action Message
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
HFDL	High-Frequency Data Link
HF-GCS	High-Frequency Global Communications System
M22	Israeli Navy 4XZ, still considered "numbers"
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
MWARA	Major World Air Route Area
MX	Russian solitary single-letter beacons/markers
MXC	Russian cluster single-letter beacons
NAWS	Group call: Notice to Allied War Ships
NATO	North Atlantic Treaty Organization
PACTOR	Packet Teleprinting Over Radio
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission (Distinguished Visitors)
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
V2	Cuban female 5-numbers, begins "Atencion!"

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

183.8 Unid-Possible French Forces, idling in ARQ-E3, at 1530. (Day Watson-UK)

2182.0 US Coast Guard Group Charleston, with Notice To Mariners regarding emergency beacon activation from fishing vessel *Blessing* off SC, at 1545. (Mark Cleary-SC)

2187.5 GNLB-British vessel, making a DSC safety test with Shetland Coast Guard, at 2056. (Watson-UK)

2663.0 IPC-Crotone Radio, Italy, navigation warnings at 2057. (Patrice Privat-France)

2670.0 San Juan-US Coast Guard, PR, maritime weather at 0310. (Rick Baker-OH)

2680.0 4XZ-Israel Navy, Haifa (M22), CW marker, also on 4241, at 1305. (Ken Maltz-Israel)

3167.5 "U-6-G"-US Navy, Link-11 net with "6-Y-N," at 2157. (Cleary-SC)

3349.0 NNN0HNB-US Navy/Marine Corps MARS, in the South Carolina G1B Traffic Net at 0105. (Cleary-SC)

4091.2 "L"-Russian single-letter CW beacon (MX), St. Petersburg, at 1253. (Ary Boender-Netherlands)

4094.54 "W"-Pirate cluster beacon, CW dits plus single letter ID, at 0100. (Pete Rowe-CA)

4096.6 Unid-Pirate cluster beacon, CW long dashes, at 0100. (Rowe-CA)

4461.0 KPA2-Israeli intelligence (E10a), also on 4646, at 1312. (Maltz-Israel)

4521.7 L2C-Argentine Navy, Buenos Aires, SITOR-B navigation warnings in Spanish, also 7777.1 and 8416.5, at 0030. (Bob Hall-RSA)

4604.0 Red Robin 8-Michigan Civil Air Patrol, checking in Red Robin 194 and White Peak 3229, New York, at 0206. (Ron Perron-MD)

4630.0 White Peak 3201-New York Civil Air Patrol, checking in at 0111. (Perron-MD)

4924.5 CECOM-US National Guard, NJ, working HQ3NGB, VA, at 1603. (Perron-MD)

5002.0 4XZ-Israel Navy, Haifa (M22), CW marker, also on 5167, at 1316. (Maltz-Israel)

5088.5 USAIS1012-US Army Intelligence & Security Command, VA, calling USACE1010, US Army Corps Of Engineers, in ALE, also 6767.5, 6985, 7510, and 7448.5, at 1456. (Perron-MD)

5097.0 CFH-Canadian Forces, Halifax, NS, NAWS marker in RTTY at 0240. (Glenn Blum-TX)

5226.0 Unid-Two fishermen discussing effects of full moon, at 0119. (Perron-MD)

5257.5 FDG-French Air Force, Bordeaux, RTTY "voyez le brick" test loop at 1730. (Watson-UK)

5616.0 Reach 5248-US Air Force C-141C, passing position at 0840. (Privat-France)

5658.0 KLM 072-Flight calling Kabul, Afghanistan, also Singapore 446 calling Kabul, no joy for either at 2200. (Privat-France)

5670.0 Chennai-Chennai Radio, India, working Singapore 328 at 1756. (Privat-France)

5680.0 US Coast Guard Group Charleston, testing direction finding gear with Cutter *Gallatin*, at 1533. (Cleary-SC)

5690.0 Coast Guard 1502-US Coast Guard aircraft in patch via CAMSLANT to Lantarea Command, regarding distressed fishing vessel *Blessing*, at 0238. (Cleary-SC)

5696.0 CAMSLANT-US Coast Guard, working Coast Guard 6545, at 1322. (Baker-OH) CAMSLANT, telling Air Station Clearwater that they are on Boston, New Orleans, and Miami transmitters, at 1946. (Cleary-SC)

5708.0 Reach 9460-US Air Force Air Mobility Command, patch via Andrews to Rota Meteo, Spain, at 0357. (Cleary-SC)

5732.0 28C-US drug interdiction aircraft, setting radio guard with Panther (DEA, Bahamas), at 0017. (Cleary-SC)

5877.0 F2Z224-Virginia National Guard, sounding in ALE at 1401. (Perron-MD)

6501.0 CAMSLANT-US Coast Guard, VA, working cutter *Juniper*, at 1320. (Cleary-SC)

6697.0 Ruby Red-US military, with a 28-character EAM, also on 11244, at 1721 and 1725. (Jeff Haverlah-TX)

6721.0 NW1-Nightwatch 1, US military National Airborne Operations Center, passing several lines of ALE operator chatter in the AMD field, at 0151. *[Automated Message of the Day. Nice catch! -Hugh]* NW1 calling JNRSPR (Secure Internet Protocol Routing Network entry point, Puerto Rico), in ALE at 0223. (Blum-TX)

6754.0 Trenton Military-Canadian Forces VOLMET, at 0324. (Baker-OH)

6761.0 Steel 33-PA Air National Guard KC-135, calling Reach 0186, no joy at 0004. (Cleary-SC)

6767.5 USAIS1012-US Army, calling USAMD1010 in ALE, also 3285, 5088.5, 6985, and 7510, at 1542. (Perron-MD)

6922.0 5FI-Moroccan Police, calling 4HG in ALE, at 0755. 3TA calling 0ZZ, also on 7635, 7730, and 9285, at 0917. (Watson-UK)

6959.0 Lincolnshire Poacher-UK female "numbers" voice (E3), repeating each 5-figure group, at 2245. (Cleary-SC)

6969.0 NNN0MRQ-US Navy/Marine Corps MARS multimode bulletin-board "switch," CA, interactively passing messages in PACTOR-I to various stations at 0003. NNN0DXB, message list in PACTOR at 0235. NNN0DXA, message list at 2349. (Hugh Stegman-CA)

7039.0 "C"-Russian single-letter CW beacon (MXC), Moscow, also 8495, 10872, 16332, and 20048, at 1253. (Boender-Netherlands)

7508.0 ZSJ-South African Navy, Silvermine, with a FAX Antarctic ice chart, at 0810. (Hall-RSA)

7527.0 Juliet 01-US Coast Guard aircraft, setting guard with CAMSPAC at 2319. (Cleary-SC)

7777.0 RM12-Mexican Army Region 12 command, calling JADE in ALE, at 0253. (Perron-MD) RAYO-Mexican Army, calling CELTA in ALE, at 0338 and 0341. (Blum-TX)

7805.0 BARRAZA-Peruvian police, calling CHOCOPE in ALE, also 7980 and 8050, at 0657. (Perron-MD)

7945.7 RFVICOS-French Navy, Cosru Port de Galets, Arq-E3 traffic in French at 2043. (Hall-RSA)

8047.0 HQ3NGB-US National Guard, VA, calling ISXNGB in ALE, at 1443. (Perron-MD)
8097.0 Unid-Cuban "Atencion" AM numbers, 5-figure groups at 0545. (Perron-MD)
8337.6 Shark 11-US Coast Guard, working Falcon 20, Caribbean Dutch Navy P-3, at 2200. (Cleary-SC)
8413.0 555-Georgian guard, unknown location, calling 01 in ALE at 0010. 360, calling 555 at 0414, 0423, and 1818. (Watson-UK)
8414.5 S6OW-Vessel *K Silver*, DSC distress call for explosion and fire at 2155. (Watson-UK)
8416.9 IAR-Roma Radio, Italy, with CW marker at 1855. (Jeff Seale-KY)
8418.4 NOJ-US Coast Guard, Kodiak, Alaska, CW identifier at 0305. (Seale-KY)
8432.0 PEMEX-Mexican oil company, Spanish and English SITOR messages to "all ships PEMEX Fleet," at 0053. (Perron-MD)
8500.0 VTP13/14-Indian Navy, Mumbai, 4-letter groups in RTTY at 1530. (Hall-RSA)
8734.0 P3ZK3-Cypriot bulk carrier *Baron*, phone patch via Olympia Radio at 0131. (Perron-MD)
8763.9 CAMSLANT-US Coast Guard, weather broadcast at 2340. (Seale-KY)
8819.0 Tashkent VOLMET, aviation weather in Russian, at 2121. (Privat-France)
8912.0 61A-US drug interdiction, calling Panther 400 (DEA, Bahamas), but raised Service Center (US Customs Service), at 1930. (Cleary-SC)
8930.0 RSO-Probably NATO, working CS004 in ALE, at 0802. (Privat-France)
8971.0 Cardfile 71E-US Navy P-3, unexploded ordnance report for Fiddle (US Navy, FL), at 2015. (Cleary-SC) Goldenhawk-US Navy, ME, calling "E-1-Q," at 2130. Wolf 02 calling Freefall at 2242. (Allan Stern-FL)
8983.0 Coast Guard 1502-US Coast Guard, aiding a helicopter and rescue swimmer at the *Blessing*, ultimately sent a commercial tow, at 1808. CAMSLANT, going to 8240 for sailing training ship *Eagle*, at 2046. (Cleary-SC)
8992.0 Trident 804-US Navy, patch via Puerto Rico HF-GCS for Spare Group traffic with "H-2-R," at 2248. (Cleary-SC)
9007.0 Canforce 4493-Canadian Forces, getting weather from Trenton Military, at 2214. (Cleary-SC)
9025.0 T15-Mexican Army, possible zone command, calling TORNADO in ALE, at 0348. (Perron-MD) E30001-US Air Force, ALE-initiated phone patch made by passing the number in the AMD field, at 1637. COYOTE-Mexican Army, calling CICLON ("Cyclone") in ALE, at 1845. CY7, calling TORRE ("Tower"), ALE at 2341. (Blum-TX)
9060.0 RM14-Mexican Army, Region 14 command, calling JADE in ALE, at 0902. (Perron-MD)
10182.0 111-Spanish police, calling TZSJ in ALE, also 8151, at 1616. (Privat-France)
10242.0 Service Center-US Customs Service, in a training patch with "03," at 0100. (Perron-MD)
10945.0 3TA-Moroccan Police, unknown location, working 0ZZ in ALE, at 0901. (Watson-UK) CFH-Canadian Forces, Halifax, RTTY NAWS marker at 0937. (Perron-MD)
10996.0 FDI22-French Air Force, Narbonne, CW marker at 0014. (Perron-MD)
11155.0 RESERVA1-Venezuelan Army, working CUFAN1 in ALE-initiated secure voice, at 2337. (Perron-MD)
11175.0 Stout 42-US Air Force Reserve tanker, patch to Lager Control via Hickam, at 0244. (Baker-OH) Navy 676-US Navy, radio checks with Offutt at 2033. (Haverlah-TX)
11232.0 Sentry 51-US Air Force, patch via Trenton Military to Darkstar 3, at 2146. (Cleary-SC)
11244.0 Ben Hogan-US military, with 28-character EAM, simulcast 6697 and 11244, at 1933. (Haverlah-TX)
11300.0 Tripoli Control-MWARA, Libya, oceanic air traffic control with EGY 1508, Egyptian Air Force C-130, at 1250. (Privat-France)
11309.0 Air France 620, in North Atlantic MWARA at 2124. (Seale-KY)
11345.0 BPA 1502-Blue Panorama flight enroute to Milan, working Stockholm at 0900. (Privat-France)
11396.0 Ujung-Ujung Pandang MWARA, Indonesia, working unheard aircraft at 1451. (Privat-France)
12666.2 RFFMEA-Naviter France Sud, RTTY loop to "Batiments," (ships) at 1800. (Hall-RSA) RFFMEA, same loop at 1940. (Perron-MD)
13153.5 3AC-Monaco Radio, PACTOR-II traffic list at 1148. (Watson-UK)
13155.0 Important-US military, 28-character EAM, simulcasting on 8992 and 11244, and same time as Offutt on HF-GCS, at 1912. (Haverlah-TX)
13927.0 SAM 6757-US Air Force Distinguished Visitor flight, patch via AFN2AC (Air Force MARS, Miami), to ServAir in Santo Domingo, Dominican Republic (borders on Haiti), attempted to secure fuel, but ended up going to Curacao, at 1542. (Cleary-SC)
14812.0 BRA-Slovakian MFA, Bratislava, sounding in ALE at 1445. (Perron-MD)
14926.7 Unid-French Forces, Dakar, Senegal, ARQ-E3 idler at 1115. (Watson-UK)
14996.0 RWM-Russian standard time station, Moscow, with CW beeps at 1215. (Watson-UK)
15016.0 McClellan-US Air Force HF-GCS, 28-character EAM at 1825. (Haverlah-TX)
15025.0 N324UP-United Parcel Service flight UP6727, periodically updating position in HFDL to ground station 03 (Reykjavik, Iceland), starting at 1628. (Watson-UK)
15043.0 ADW-US Air Force, Andrews AFB, MD, passing what looked like a phone number to an unknown station in ALE, at 1955. (Watson-UK)
16038.7 Unid-Egyptian MFA, Cairo, working Khartoum, Sudan, in SITOR-A at 1523. (Watson-UK)
16077.0 SAMHF1-US Army Corps Of Engineers, AL, sounding in ALE at 1519. (Perron-MD)
16278.7 Unid-Algerian MFA, Algiers, passing Coq-8 traffic to Khartoum and Cairo, at 1511. (Watson-UK)
16338.5 7RQ20-Algerian MFA, El Djaza 'ir (Algiers), with Coq-8 traffic at 1330. (Maltz-Israel)
16710.5 UIYC-Vessel *Kapitan Maslovets*, working UIW, Kaliningrad, Russia, in SITOR-A, then 3rd-shift Cyrillic traffic, at 1034. (Watson-UK)
16804.5 P3KL6-Vessel *Blue Fortune*, DSC safety test with US Coast Guard CAMSLANT, VA, at 1450. (Watson-UK)
16938.0 VTG 8-Indian Navy, Mumbai, CW operator having trouble with his semiautomatic key, too many dits, at 1325. (Maltz-Israel)
16951.5 6WW-French Navy, Dakar, Senegal, testing in RTTY, then working "FG," at 1541. (Watson-UK)
16986.0 CTP-Portuguese Navy, Lisbon, RTTY NAWS marker at 1424. (Watson-UK)
17069.6 JJC-Tokyo Radio, Japan, very weak Kyodo news FAX at 1050. (Watson-UK)
17460.0 RDL-Russian Navy, Moscow, with coded traffic in frequency-shift Morse telegraphy, at 1647. (Watson-UK)
17510.2 Unid-Probably Danish Navy, with a FAX ice chart at 1350. (Perron-MD)
17967.0 LH8440-Lufthansa flight with HFDL position for Bahrain, at 1127. (Watson-UK)
17976.0 ADWSPR-US Air Force secure data network gateway, Andrews AFB, sounding in ALE at 1151. PLASPR, sounding at 1206. HAWSPR and CROSPR, Ascension Island and Croughton, UK, sounding at 1225. JNRSPR, PR, sounding at 1233. ICZSPR, Sigonella, Italy, sounding at 1258. IKFSPR, Keflavik, Iceland, sounding at 1303. JDGSPR, Diego Garcia, sounding at 1303. (Watson-UK)
18003.0 510315-US Air Force tanker, calling HAW (Ascension), in ALE at 0832. (Privat-France)
18181.4 Unid-Algerian MFA, Algiers, with Coq-8 traffic in French to Accra, Ghana, at 1420. (Watson-UK)
18183.4 7RQ20-Algerian MFA, Algiers, Coq-8 traffic in French to Yaounde, Accra, and Dakar, at 0755. (Hall-RSA) Unid-Algerian Embassy, Niamey, with Coq-8 traffic in French to Algiers, at 1430. (Watson-UK)
18351.7 Unid-Egyptian diplomatic, with Arabic operator chatter in SITOR-A, at 1753. (Watson-UK)
18757.0 RFGW-French MFA, Paris, with 5-letter code groups in FEC at 1300. (Hall-RSA)
19048.7 Unid-French Forces, Paris, idling in ARQ-E3 at 1215. (Watson-UK)
19216.7 Unid-French Forces, Ft. De France, Martinique, idling in ARQ-E3 at 1544. (Watson-UK)
20047.9 "S"-Russian single-letter CW beacon (MXC), Arkhangelsk, at 1253. (Boender-Netherlands)

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Domino, Missionaries & Moroccan ALE

This month we start with news of a new HF digital mode making its way into the amateur (ham) radio bands. As many of today's popular modes have started life on the ham bands, it's worth covering these new developments in case they appear elsewhere.

◆ Domino

Designed and written by New Zealander Con Wassilieff (amateur radio callsign ZL2AFP), Domino has been specifically designed with ease of use and the HF digital beginner in mind. The mode is ideal for keyboard-to-keyboard chat and has limited file transfer capabilities. The system compensates for quite wide variations of frequency and drift – up to 200Hz and 200Hz/minute respectively.

Domino offers three distinct MFSK (multi-frequency shift keyed) modes:

Mode	Baud	BW	Tones	Speed
domino8	7.8125	158Hz	16	31WPM
domino11	11.025	223Hz	16	44WPM
domino16	15.625	316Hz	16	62WPM

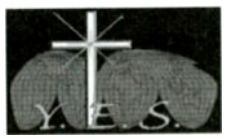
The system implements a number of new techniques in amateur radio systems, including interleaving on tones and incremental error correction coding. The net result is a mode that is very robust in the face of atmospheric and ionospheric disturbances and very quick tuning synchronization.

Like most modes these days, Domino is implemented in Windows software and requires only a modest PC and soundcard with which to operate. The source code has been placed in the public domain for others to experiment with.

◆ Mystery Network Cracked

I was interested to read a message posted on WUN that seemed to suggest a breakthrough in a network that we had first mentioned here almost two years ago. Centered on the frequency of 8016.1kHz, one can hear the incessant selcalling activity between a number of stations including CUWA, YAJA and JANK. At the time, we speculated in this column that the network was in the Amazonian basin area of Brazil based on a preliminary fit of some place names.

German monitor Kristian K seems to have finally come up with an answer to this network. As a web search of some of the PacTOR selcals confirms, this network appears to be deep in the jungles of the far southern parts of Venezuela and supports a number of missionary operations in that part of the world.



Over 1.2 million people live in this region of Venezuela, including the remote indigenous tribes of Yanamamo, the Ye'Kuana, the Piaroa, and the Sanoma. The missionary organization YES (Yielded Evangelical Servants), most likely supported by transport and supply flights from MAF (Mission Aviation Fellowship), has groups of its volunteers in the following places (indicated by their PacTOR IDs):

COSH	Cosheloweteli
COYO	Unidentified
CUWA	Cuwa
JAL	Jalulusi-Teli
JANK	Unidentified
MMG	Unidentified
VEN	Caracas?
YAJA	Yajanamateli

Another location, Puerto Ayacucho, is also listed, but no selcals appear to fit this station and many of these locations are far too small to be found on any commonly available maps. To date, there have been no reports of actual traffic between these stations, only the constant selcals and responses. YES has other operations in Haiti, Mexico, Dominican Republic and Trinidad, although none of these have yet been found on HF.

It is also interesting to note that another mystery PacTOR network on 7987.75 kHz with selcals like JMX, BRR and YANOMA also fit a number of missionary locations.

◆ Mission Aviation Fellowship

Another interesting faith-based volunteer organization, MAF supports many humanitarian and missionary operations throughout the world, including Africa (Mali, Lesotho, Zimbabwe, etc), Indonesia, Russian, Ecuador, Haiti and Venezuela.

In addition to ferrying people and supplies using its fleet of small aircraft, MAF also sets up and operates communication networks to serve very remote parts of the world through its MAFLink system. MAFLink operates satellite phone, GSM mobile phone and HF Email services using both PacTOR and Codan technology.

MAF Link
Overcoming Barriers

The MAF site lists HF Email networks in operation from the following countries and hub locations: Haiti (Port Au Prince), Mail (Bamako), Zambia (Musenga), West Papua (Wamena), Ecuador (Shell), Congo (Kinshasa, Lubumbashi, Tshikaji) and Central African Republic (Yaloke). At least one of these networks, operating from Haiti and using the selcal PAPIPO, has been spotted on 5427.8 and 5857.8kHz.

Perhaps the Codan networks stick to the proprietary selcal system rather than the standard MIL-188-141A ALE? Otherwise I feel confident that a number of these other networks would have been identified by now. Let me know if you happen to bump into them in your travels through the HF dial.

◆ Moroccan Police ALE Network

WUN has also been busy with plenty of reports of a Moroccan Police (Gendarmes) ALE network which operates on the frequencies of 5500, 6922, 7635, 8942, 9285 and 10900 kHz (USB), callsigns are of the form letter-number-letter or number-letter-letter. IDs heard include A0P, A6S, A8Y, E8F, H1O, K6T, K8F, L9X, P4N and many others.

For some time the location of this network was given away only by the USB chatter triggered by the ALE, the MIL-188-110A 39 tone modem traffic being encrypted. Lately, however, location-based IDs have also begin to be used: CASAALE, MEKNESALE, KENITRAALE, and MARRAKEFIX.

That's all for now. Enjoy your summer listening and keep the emails and letters flowing.

Resources

Domino:
http://www.qsl.net/zl1bpu/MFSK/domino
YES:
http://www.yeservants.org
MAF:
http://www.maf.org

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

XERMX Gives Up On Shortwave

IMER, the government's Mexican Radio Institute, has decided to close down XERMX, Radio México Internacional on shortwave, due to the high cost of replacing transmitters, three of the five [?] being in poor condition, and since SW is outmoded: look at the BBC which ceased SW to the US recently. However, IMER will be investing more in Internet broadcasting, making all of its stations available in about six months.

This was announced to staff members at a meeting in February by Rocío Micher, head of IMER radio stations and confirmed by the director of XERMX, Dolores Béistegui, in a story by Christian Obregón, in *Diario Milenio*, March 4 via Héctor García Bojorge, DF, in *Conexión Digital*.

The closedown was "imminent" but still heard as of March 19 with usual very poor signal on 9705 around 1500 and before closing at 0600. The schedule grid thru March 2004 at **http://www.imer.gob.mx/cartas/rmi.pdf** shows nothing but Spanish including *Fox Contigo*, a weekly hour with the president, Sat 1800. *DX 21*, Tue and Fri at 2130-2200. Nothing recognizable as a mailbag, as more and more music filled the hours.

ALBANIA R. Tirana A04 English: Eu 1845-1900 7210 9520; 2130-2200 7130 9520; NAm: 0145-0200 & 0230-0300 6115 7160 (Drita Cico, ARTV via Alokesh Gupta, New Delhi, India, *DX LISTENING DIGEST*)

AUSTRALIA HCJB A04 English: Pac 50 kW 120° 0800-1100 11750; SAs 75 kW 307° 0100-0300 15560; 1230-1330 & 1415-1730 15405 (via Swopan Chakroborty, Kolkata, India, *DXLD*)

BELGIUM [non] RVi A04 English to NAm via Bonaire: 2200-2230 350° & 0400-0430 11635 320° (via Alokesh Gupta, New Delhi, India, *DXLD*)

BHUTAN BBS increased airtime on 6035 and moved English an hour later to 1500, clashing in Feb with BBC Urdu (Alok Dasgupta, *DX Asia*)

BOLIVIA New station heard Feb 21 on 4763.3, Radio Televisión Chicha, from Tocla, in Nor-Chicha province, Potosí Department, nominal 4760, 2240 to 2400*. Next day announced schedule as 1030-1700, 2100-2400 (Arnaldo Slaen & Marcelo Cornachioni, Choscomus, Argentina, Cumbre *DX*) However, missing the following day (Slaen, DSWCI *DX Window*)

4722.82, R. Pio Doce, 0950-1000, Aymara news-like program, soft "Pio Doce" song by male chorus followed by nice ID by W. Nothing heard on usual 5952.47 (Dave Valko, Dunlo PA, *Cumbredx*) 4722.7, Radio Uncía [?] and 5952.4 both running Emisora Pio XII programming at 1000-1020 (Robert Wilkner, Florida, *DXLD*)

BULGARIA R. Bulgaria A04 English: WEu 0630-0700 11600 13600; 1130-1200 11700 15700; 1730-1800 9500 11500; 2100-2200 5800 7500; NAm 2300-2400 & 0200-0300 9700 11700, all 500 kW from Plovdiv (*Observer*)

CANADA To pay for new Portuguese programming [not on A04 shortwave schedule], RCI decided (pending an agreement with a radio station in Ukraine) to cut daily Ukrainian, reduce production to a weekly broadcast, eliminate any news. Our Ukrainian colleagues are in shock. Management decided to eliminate entirely any RCI-produced programming to the Americas. One of the two popular Chinese programs, the highly listened to evening broadcast, is cut (RCI Action Committee) But Ukrainian got a reprieve at least until fall (Bill Westenhaver, *CKUT International Radio Report*)

Misuse, misappropriation, and mismanagement has been a staple at RCI since the current regime was put into place, and nobody is saying anything about it. A $15.2 million budget for RCI is stated, clear and distinctly wherever one looks. Now, all of a sudden, how does an $11 million figure suddenly surface? RCI has become nothing more than a cash cow for Radio-Canada/CBC. How many times had CBC tried to make RCI disappear, but couldn't succeed? Now it was back again, with stable funding and falling once again under the wing of the CBC. The CBC said, if we have to take care of RCI, then we are going to get as much back out of that $15.2 million as we possibly can. Many of the in-house resources of RCI were pulled from them, and replaced with services to be supplied by the parent firm, at a cost of course.

Although the $15.2 million budget was tagged for RCI, their dependency on Radio-Canada to supply administrative, technical and other services meant that Radio-Canada was now able to claw back huge chunks of RCI's funds into the Radio-Canada/CBC coffers. The future, looks very, very bleak (Sheldon Harvey via RCI Action Committee)

CHINA CRI A04 via new site in extreme western China, Kashi-Kashgar includes English: 1400-1557 9560 100 kW 174°; 1900-2057 7140 500 kW 269°; 2000-2157 7190 500 kW 308° (Observer, Bulgaria) Since two powers are involved, and if Alliss antennas cannot radiate both 500 and 100 kW, then it seems a second site has been constructed with more conventional antennas. As both are listed as KAS they may not be too far apart and located in that province? (Olle Alm, Sweden, *BC-DX*)

[non] CRI's relays from Cuba are being coördinated by the HFCC, even though RHC's own transmissions are not (Jeff White, FL, *DXLD*)

COSTA RICA We invite friends and supporters of RFPI to tune in using Quicktime player, soon joined by MP4; follow links at ***http://www.rfpi.org*** and check the schedule grid. Listen to what multibillionaire Maurice Strong doesn't want you to hear (RFPI) Capacity of 6000 simultaneous listeners (James Latham via James Bean, *DXLD*)

CROATIA [non] HRT, Croatian Radio, A04, via DTK 100 kW Jülich, overlapping transmissions: 2200-0300 9925 230°; 2300-0259 9925 300°; 0100-0459 9925 325°; 0400-0659 12110 230°; 0600-1000 12110 270° (DTK via Alokesh Gupta, *DXLD*) Mostly in Croatian, also English and Spanish segments, times not specified

CZECH REPUBLIC R. Prague A04 27-min English to NAm: 2230 7345 9415; 0000 7345 9440; 0100 6200 7345; 0300 7345 9870 (via Swopan Chakroborty, *DXLD*)

ECUADOR HCJB A04 English, only: 1100-1330 12005 50 kW to N&SAm both on 128/352° beams; 15115 changed to Spanish at 1300-1500, 100 kW 323° (via Volker Willschrey, Dr. Hansjoerg Biener, *BC-DX*)

La Voz del Napo, Tena, 3279.55, enjoyable classical music 0700-0723 with good fidelity. It is almost impossible to hear even the shortest snatch of Bizet, Vivaldi, from North America at this hour. I'm glad to know that people of Ecuador are not as unimaginative and limited in their perspective on the arts (Steve Waldee, CA, *DXLD*)

Radio María, Catholic network programming at 0745 on reactivated 4869.93 (Paul Ormandy, ZL4PW, *DXLD*) Actually La Voz del Upano, back after some years, sometimes \\ Napo 3279.54 on same network (Björn Malm, Ecuador, *SWB América Latina*) Upano ID and programming 1100-1130 (Bob Wilkner, Flórida, *DXLD*) Also 4869.95 with religious programming \\ 3280 after 0300 (Adán González, Catia La Mar, VENEZUELA, *DXLD*) Very strong but distorted at 0900 (Steve Waldee, CA, *DXLD*)

[and non] *VOCES DE AMÉRICA LATINA* - Amigos DXistas! You are welcome to visit **http://www.malm-ecuador.com** and listen to "Latest Recordings", compressed to less than 200 kb (most cases) so you will have no problem listening or downloading the files (Björn Malm, Ecuador, *DXLD*) More and more clips, not only hot SW DX from SAm, but also many MW stations in Ecuador and neighboring countries.

EGYPT R. Cairo A04 English: 1215-1330 17670 SAs; 1630-1830 9855 C&SAf; 2030-2200 15375 WAf; 2115-2245 9990 Eu; 2300-0030 11725 ENAm; 0200-0330 11855 NAm; also Arabic 0030-0430 7115 ENAm (via Alokesh Gupta, New Delhi, India, *DXLD*) Oh oh, 11855 clashes with WYFR to CAm! And 7115 is in our hamband! (gh)

ETHIOPIA [non] R. Mustaqbal, under SOMALIA [non] last month, EDC says is actually intended for the Somali speaking population in southern Ethiopia (Mauno Ritola, Finland, *DXLD*) For Somali refugees in Ethiopia, organized by EDC - Education Development Center, Inc (USA), started on 19 January 2004 and due to end with the school year in Ethiopia in July 2004. Programs produced in Ethiopia; see **http://ies.edc.org/projects/ethiopia.htm** Contact: Abdoulkader Houssein, Ahoussein@edc.org (project assistant). (Bernd Trutenau, Lithuania, *DXLD*) A04: 0630-0700 Mon/Tue/Thu on 15370 MEY 250 kW 210°; 1200-1230 Mon/Tue/Thu on 15370 MEY 250 kW 032° (Observer, Bulgaria) 210° from South Africa does not compute; probably still UAE site for the 0630 broadcast as in previous season; or bath on 032° (gh)

TDP's A04 clandestines to Ethopia include, all on 12120: Radio Voice of Oramo Liberation Mon & Thu 1700-1730 in Oromo; Raadiyoo Sagalee Oromiyaa Mon 1730-1800 in Oromo; Dejen Radio Sat 1700-1800 in

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

Tigrigna; Voice of Ethiopian Medhin Sun 1830-1930 in Amharic (**http://www.airtime.be/schedule.html** via Bernd Trutenau) Site is Samara, Russia (Wolfgang Büschel)

There are two separate stations with almost identical names bocked by the Oromo Liberation Front: 1. Radio Voice af Oromo Liberation Front (Oromo: Radiyoo Segalee Qabsoo Bilisummaa Oromoo - RSQBO) **http://www.oromia.org/rsqbo/rsqbo.htm** - Programs in Oromo; brokered by TDP (which calls this station incorrectly "Radio Voice af Oromo Liberatian") - Email address: rsqbo@yahoo.com

2. Voice of Oromo Liberation (Oromo: Sagalee Bilisummaa Oromoo - SBO) **http://www.oromoliberationfront.org/sbo.html** - Programs in Oromo and Amharic; brokered by DTK - Email address: sbo13366@aol.com

A full archive of audio files for both stations is available on the respective websites (Bernd Trutenau, Lithuania, DXLD)

FRANCE [non] Some RFI relays in English for A04 via South Africa, Ascension: 0600-0630 11665 ASC 250 kW 027°; 1200-1228 17815 ASC 250 kW 027°; 1600-1658 9730 MEY 100 kW 005°; 1600-1658 15160 MEY 250 kW 328° (Observer, Bulgaria)

GUATEMALA On 4698.77, R. Amistad Tentative, reactivated? Weak talk by man in Spanish at 1100 Mar 13 (Hans Johnson, FL, *Cumbredx*) Very possible the volunteers from Chattanooga, TN, were able to replace the HV plate transformer in the power supply and get the little transmitter up and running again. They took with them a salvaged transformer from a small microwave oven which is about the right voltage and current to power the transmitter at about 250 watts (Larry Baysinger, via Hans Johnson, *ibid.*)

INDIA AIR was already testing in Feb and Mar in preparotion for new domestic all-news service on SW to start in Apr: 0025-0430, 0700-1330, 1430-1740 on 7195 Mumbai, 7270 Chennai, 7360 Delhi, 7420 Guwahati. Complete SW schedule af AIR in kHz order: **http://geocities.com/bcdxnet/sw/frequency.htm**

Complete SW schedule by station:
http://geocities.com/bcdxnet/sw/location.htm
External Services by time:
http://geocities.com/bcdxnet/es/time.htm
External Services by language:
http://geocities.com/bcdxnet/es/language.htm
(Jose Jacob, *dx_india*)

INDONESIA unID on 4750 at 1540-1600*, perhaps RRI Makassar, ex-4753v of many years, nearly continuous "electronica" dance music (Guy Atkins, WA, *hard-core-dx*) 4749.98, no ID noted but 1340 mentioned Makassar (John Wilkins, CO, *Cumbre DX*)

IRAN At HFCC Duboi, reps of IRIB confirmed that due to budget problems they discontinued English and French SW to NAm, although still available via Internet. Spanish to LAm continues on SW (Jeff White, *NASB newsletter*) A04 shows VIRI still with English at 0030, extended to three hours, but for South America! If 9905 proves clear frequency, unlike some previous NAm channels, we should be able to hear it there anyway (gh)

IRIB A04 English, all 500 kW from Kalmalabad or Sirjan sites: 1030-1130 15600 17660; 1530-1630 9635 11650; 1930-2030 11750; 0030-0330 9905 (via Swopan Chakroborty, India, *DXLD*)

[non] New clandestine: Radio Pedar to Iran (Father Radio) in Persian (Farsi) on 9740 M-F 1830-1930 UT. Uses Merlin Transmitters from UK. From Studio of Channel One TV, in California. Phone 818-226-6200 (P. Mohazzabi, *DXLD*) VG in Bulgaria; A04 changed to 1730-1830 on 17660 via 300 kW Woofferton, 128° (*Observer*) Contact Info: 6203 B. Variel Avenue, Woodland Hills, CA 91367, USA. Website: **http://www.channelonetv.com** Email: info@channelonetv.com or feedback@channelonetv.com (Bernd Trutenau, Lithuania, *DXLD*)

ITALY [and non] IRRS-Shortwave / NEXUS-IBA, Milan, tentative A04: Sat & Sun 0800-1200 13840 20 kW; Sat-Thu 1900-2030 5775 20 kW; Fri 1900-2030 5775 100 kW. Live audio at **http://mp3.nexus.org** And see **http://www.nexus.org/NEXUS-IBA/Schedules** (Alfredo E. Cotroneo, CEO, via Alokesh Gupta)

JAPAN Some of Radio Japan's beautiful QSL cards are visible via **http://web.tiscali.it/ondecorte/rj.html** (Nino Morabello, Italy, *Japan Premium*)

KURDISTAN [non] Denge Mezopotamya, 11530, is on the Web at **http://www.denge-mezopotamya.com** and carries its programming in RealAudio. The damain expires on 18 May 2004 (Tom Sundstrom, Net Notes, NASWA *Journal*) Denge Mezopotamya/Voice of Mezopotamia programs produced in studios of Kurdish media company Roj NV neor Aalst in Belgium (address: Fobriekstraat 5, B-9470 Denderleeuw); Kurdish satellite channel Medya-TV is produced at same location (Bernd Trutenau, Lithuania, *DXLD*)

LAOS 7145, Loo National R., Vientiane, 1330-1359*, Feb 19, English program, moderate signal, weak modulation; irregular, because of frequent transmitter problems. Listed 25 kW, but I hear the Lao National R. in Luang Prabang on 60 mb (supposed on 4660) much better, despite only listed 1 kW! (Rolond Schulze, Philippines, DSWCI *DX Window*)

NETHERLANDS RN A04 English: NAm 1100-1200 11675; 1900-2100 (Sat/Sun) 15315, 17735 and 17660; 0000-0200 9845; 0400-0500 6165 and 9590. Af 1800-1900 6020, 9895 and 11655; 1900-2100 7120, 9895, 11655 and 17810; As/FE/Pac 1000-1100 9785, 12065, 13710 and 13820; 1400-1500 9890, 11835 ond 12075 (*Media Network* blog)

This entails further reductions: the 1400 broadcast from two hours to one; it had been well heard even in NAm on 12080 ond 15595 from Madagoscar in B-03; finally got the message that 5965 vio Sackville at 1200 doesn't cut it. 11675 via Bonaire at 1100 should have much broader coverage of ENAm, maybe even CNAm and WNAm for those awake (gh)

[and non] Dutch InfoRadio announced it intended to broadcost daily summaries of regional news in Dutch during April-October 2004 on SW via Germany and WRMI. InfoRadio had announced similar plans for summer 2003, but these were not started. In December 2003 InfoRadio asked the Dutch Broadcasting Regulatory Authority (Agentschap Telecom) to license a small SW transmitter for operation on Dutch soil (Bernd Trutenau, Lithuania, *Cumbredx*)

NEW ZEALAND RNZI A04, 28 Mar-30 Oct 2004, daily, 0° to All Pacific u.o.s.: 1851-1950 9885 NE Pacific, Fiji, Somoa, Cook Islands 35°; 1951-2050 11725; 2051-0458 15720; 0459-0705 9615; 0706-1059 9885; 1100-1259 9885 NW Pacific, Bougainville, Timor, Asia 325°; 1300-1850 6095 (RNZI via Alokesh Gupta, New Delhi, India) Usually makes changes in May, and onward before October (gh)

PAPUA NEW GUINEA NBC 4890, often heard, but one morning at 0917 was absolutely shocked by the perfect clarity, from a correspondent over the phone, while the studio announcer was muffled and absolutely indistinct, bad miking (Steve Waldee, CA, *DXLD*)

Wantok Radio Light is a new tropical band SW station scheduled to start about May 2004, mainly relaying existing FM station of same name in Port Moresby. During January, HCJB engineering staff helped relocate studios to a high rise office tower in downtown Port Moresby. Life Radio Ministries (P O Box 2020, Griffin, GA 30224) aperate Wontok Radio Light in partnership with others including HCJB and have licences to operate 30 FM repeoters across PNG. SW facilities supposed to be built during April/May 2004; discussions ongoing with the bureaucracy about the SW frequency (David Ricquish, *NZ DX Times*)

PARAGUAY R. Nacional got some new tubes to relaunch its SW transmitter by early March. The site had been abandoned, the tower about to fall down, the transmission lines deteriorated; maintenance had been done only once in 30 years. Thanks to aid from Taiwan the facility was rehabilitated (*ABC Color* via Levi P. Iversen, Paraguay, *Conexión Digital*) Back on the air on 9736.9v mostly with fútbol, until 0038* (Jim Clar, NY) 9736.88, then off the air for a week, back on 9736.83, later than usual until 0451* (Adán González, Venezuela) Irregular, not every night; fútbol 2218, 0100-0256* music and IDs, 9736.85 (Brian Alexander, Mechanicsburg, PA) 9736.8, at 0924-0948, very good signal with mild QRM chatter from 9735 DW and 9740 BBC (Scott Barbour, NH, all *DXLD*)

PERÚ Longtime unID on 4960.55v at 1000 (Björn Malm, Ecuador) Listening to your recording, sounds like Radio La Hora (gh) That's it, heard in mornings only, but also on normal frequency 4855.87 at 0130. Then both 4856.15 and // 4960.55 heard at 1051, from Cusco.

Radio Naylamp, Lambayeque on 5115.80 with very good audio and also very frequency stable; had been a drifter with lousy audio.

Radio Altura, Cerro de Pasco at 2000 on 5014.38, moved from 5009.70v (Björn Malm, Quito, Ecuador, *SWB, DXLD*) 5014.4, R. Altura, Chaupimarca; 1106 Peruvian folklore show, 1125 ID "Somos Altura!" (Hiroyuki Watanabe, Japan, *Radio Nuevo Mundo*)

ROMANIA RRI closed five language services at the end of March: Hungarian, Bulgarian, Greek, Turkish and Portuguese (Eugenio Hac y Martin, RRI Spanish Service, via Rubén Guillermo Margenet, Argentina, *Play-DX*)

RUSSIA 7320.0, R. Rossii, Magadon. It is about dinner-time in mid-February at this frigid port on the Sea of Okhotsk at 60 degrees latitude, but luckily the winds are calm, so temperature of -11°C (+12°F) probably does not cut through the warm Russian furs like a knife. The radio listeners to the Magadan service are hearing between 0745 and 0750 some soulful, emotional, sentimental vocal music – probably about love – followed by Svetlanov's famous recording of the Scherzo by Mussorgsky, apparently the theme music leading into what to this American's ear sounds like a weather and news report; on the hour sharply at 0800 come the resonantly evocative strains of the Coronation Scene from *Boris Godunov* and thus the Radio Rossii interval music leads us into another hour of programming, this time more news, presumably, read by a female in an austere, clipped, and frighteningly-authoritative manner (one almost imagines the brown woolen suit, hera's medal, and furrow of hoir between the eyebrows of a formidable female commissor-type from the old Soviet Union, now redeployed as a radio democrat.) (Steve Waldee, San José CA, *DXLD*)

SINGAPORE RSI A04 English: 1100-1400 on 6150, 6080 (Jan Nieuwenhuis, Holland, *BC-DX*)

SOMALIA Mogadishu FM station Radio Shabeelle is being relayed on 6961, from Feb 24, later adjusted to 6960 (Chris Greenway, Nairobi, Kenya) 6961.0, Tentative, 2015-2100*, talks in what could be Somali, African pop songs, 2058 a song which mostly sounded like a Muslim call to prayer. Heavily disturbed and only audible in LSB mode (Anker Petersen, Denmark) Site partly in English, with audio: **http://www.shabele.com** (Dave Kernick, UK, all *DXLD*) At 0400-0600 and 1000-2100.

The office of Radio Shobele, headed by Abdi Malik Yusuf Mahmuud, is on the third floor of Globol Building, on the second road of Bakaraha Market, in downtown Mogadishu. In Merca the station can be found next to COSV Building on a hill top overlooking the port of Merca. The Radio has held a debate show for the warring clan elders as a means of cooling down the ongoing hostilities among rival militias. Shabele Media Network presented disarmament and demobilization programs covering the horror and ruthlessness of 13 years of civil war, a drama called Qoomamo (regret for wrong-doing), every night at 1800 UT (via Mika Mäkeläinen, *dxing.info*) E-mail verification from Chairman of Shabele Media Network maalik@shabele.com (Jari Savoloinen, Finland, *World Of Radio*) Tentative on 6960 from *0357 (Steve Lare, MI, *DXLD*)

SUDAN Radio Peace, 4750 at 0345 31 Dec was unidentified, but heard

again in early March from 0315, African vernaculars, English ID at 0318, 0348 and 0418*, "We are broadcasting on four-seven-five-zero kilohertz in the sixty metre band. This is Radio Peace. Thank you for listening", no clue as to location (Tony Rogers, UK, *8DXC-UK*) Checking 4750 almost daily UT afternoons/evenings after Qinghai BS from China signed off at 1600; at 1612, slowly rising, program in English by female voice, 1618 switched to African vernacular (Jari Savolainen, Kuusankoski, Finland, *DXLD*)

Info about this at **http://www.persecutionproject.org/resources/radios/radios.htm** – "Last year Persecution Project in partnership with Educational Media Corp's Global Endeavor Ministry helped establish RADIO PEACE - Sudan's première Christian radio station. Today Radio Peace is providing daily broadcasts of the Gospel of Jesus Christ including music, news, evangelistic and discipleship programming in seven indigenous languages. Until recently radical Islamist propaganda dominated the Sudanese air waves. Now, with the establishment of Radio Peace, the Light of the Gospel is penetrating all parts of Sudan."

And more at **http://www.missionvisionnetwork.org** as of Nov 2003: "After 14 months of planning and four trips to Southern Sudan by EMC President and Manager Pete Stover, "Radio Peace," a regional shortwave station, is now covering the southern third of the country with Christian programming four hours per day in six languages, 1 kW. Pray for the programming broadcast by "Radio Peace" to bring hope to the persecuted Christians and the truth of the gospel to the persecutors." (via Andy Sennitt, *HCDX*)

But where in Southern Sudan? The propagation studies on the persecution site are centred on a place called Waw, at approx. 8° North, 28° East. Says this "Nuba radio" first went on air 22 June 2003 (gh) 4750v, Radio Peace, tune-in 0237 in English, 0246 clear ID, music bumper and vernacular, poor but readable until after 0300, gradually deteriorated and fade out after 0400 (Jeffrey S. Heller, Naperville, IL, *Cumbre DX*) Evening transmission is at 1600-1747 (Chris Greenway, Nairobi, Kenya, *8DXC-UK*)

[non] Sudan Radio Service A04 Mon-Fri via 300 kW Woofferton UK, 128°: 0300-0500 11665, 1500-1700 17630, new 1700-1900 17660 (*Observer*, Bulgaria)

SWEDEN [and non] R. Sweden A04 English to NAm: Sackville relays 6010 at 0130 240°, 0230 at 268°; mornings, direct from Sweden, 1230 and 1330 on 15240, both 305°; for other easterly targets at 1230: also 13580, 15735; 1330 15735 (via Swopan Chakroborty, *DXLD*)

SWITZERLAND SRI's Ulrich Wegmüller explained at the closing plenary session of HFCC in Dubai that his station will be ending its shortwave broadcasts at the end of October 2004. As a result, SRI's only remaining transmitter in Switzerland (in Sottens) will be idle, and its owner Swisscom is willing to sell it whole or as spare parts, an ABB 500-kilowatt, type SK55 C3-P, operating from 5.9 to 26.1 MHz with a PSM modulator and Dynamic Carrier Control (DCC), built in 1989 (Jeff White, *NAS8 Newsletter*)

TAIWAN Voice of Han, alrleady on some MW frequencies, launched a Mainland service on SW 9745, from Kuanyin, 40 km west of Taipei with two small curtain antennas, 2255-1705 (Miller Liu, Taiwan, *dxing.info*) Audible here in March when 9745 clear of China and Sawa, such as 1845-1930, confirmed by comparing to website streaming (Alan Pennington, *8DXC-UK*)

TURKEY VOT A04 English: 1230-1320 15225 15405; 1830-1920 9785; 2030-2120 7170; 2200-2250 9830 NAm; 0300-0350 6140 NAm, 7270 (*Observer*, Bulgaria)

UKRAINE RUI Tentative A04 English: 2100 WEu on 7420, Kharkiv 290°; 0000 & 0300 NAm 7545, Mikolaiv 314°, changing to 9810 in summer, 5910 in autumn; 1100 WEu 15415, Kharkiv 277° (via Swopan Chakroborty and Alokesh Gupta, India, *DXLD*)

U K Alistair Cooke, 95, retired from weekly *Letters from America* on the BBC in February, upon advice from his doctor, after a 58-year run; he has heart problems. BBC Radio 4 planned to run best-of LFAs for some three months more; not clear if BBCWS would do the same. Many of them are archived in text and audio on the BBC website. Many of the earlier ones he re-recorded much later for the archives which had not been maintained from the beginning. Cooke wanted to do a farewell letter, but BBC announced his retirement before this could be recorded (numerous press reports) The BBCWS will never be the same without him. Oops, it's already not the same (gh)

U S A 2004 is shaping up to be a bad year for the Voice of America. Its English language transmitter hours would be reduced by roughly 1/3 at the end of March, making it potentially tougher to hear VOA even in areas where its English is a priority. Among the cancelled broadcasts, the last remaining two-hour English release to the Americas, 0000-0200 Tue-Sat; also some services targeting Africa and Asia.

Editorial commentary: Those who control US government-sponsored international broadcasting seem to be enamored with ill-conceived services (Radio Martí, Radio Sawa) that suck resources out of the best-recognized brand name left in international broadcasting (Richard Cuff, Easy Listening, NASWA *Journal*)

AFGE Local 1812, representing many workers at VOA, reports on its website that 11 positions were to be eliminated in the VOA English service, airtime reduced to 14 hours a day. There is no monetary need to cut VOA English language radio broadcasts, as the overall budget has increased slightly in the last few years. AFGE Local 1812 has learned that the IBB Budget Office has submitted a plan to the BBG to turn the VOA's English Service into full feed service thereby eliminating almost all jobs.

Some members of the Broadcasting Board of Governors have embarked on a plan to steadily diminish and eventually eliminate the Voice of America. Everything points to that fact, including changing the logo, freezing new hires, cutting five-hours of English-language programming with the possibility of more drastic cuts on the way, not giving credit to VOA writers for material used on the new satellite broadcasts, etc.

Only six months after the Union and the Agency settled a Free Speech grievance, the Agency is investigating VOA employees for what appears to be a free speech issue. The Agency has hired a contractor, Alfred J. Finch, for the sole purpose of finding out who spoke with an Egyptian reporter. An article appeared in an Egyptian Newspaper, *El-Osboa*, that Radio Sawa and Al-Hurrah poobahs apparently found offensive. It is believed that these officials feel that someone in the Agency, and they seem to be concentrating on ex-VOA Arabic Service employees, may have spoken with the author of the article. These employees have been subjected to interrogations that certainly seem to border on harassment.

According to a recent survey, most of the listeners to VOA English radio broadcasts listen on shortwave. The countries of the world where VOA English is most popular are China, India, the Philippines, Nigeria, Zimbabwe, Sierra Leone, Kuwait, and Russia. By region, in order, English radio broadcasts are most popular in Africa, East Asia, the Middle East, and South Asia. So what transmissions do you think the BBG was planning to eliminate? Shortwave of course. And the areas of the world these shortwave broadcasts target — Africa, East Asia, South Asia, and the Middle East (**http://www.afge1812.org**)

WRMI has added mp3 audio files to its website at **http://www.wrmi.net/pages/714011/index.htm** -- samples of some outside programs, and complete *Voice of the NAS8, Viva Miami* shows (gh)

WWRB's newest transmitter, Global-5 is ready to go on the air! We need a 3 MHz frequency. WWRB is asking for SWL input in the selection of our 3 MHz frequency. We do not want to QRM some overseas station people like to hear. Please send recommendations to WWRB via our web site **http://www.wwrb.org**

WWRB took three days off for safety reasons in order to reconfigure its 45 degree azimuth rhombic antenna for a much lower takeoff angle on 12172, 8° to put a better signal into Europe, North Africa and Middle East as required by a new client, instead of previous 46° for closer coverage. To accomplish this, the rhombic's radiating elements (cables) had to be raised to approximately 160 feet above ground level from 67 feet. This change is not difficult as WWRB antennas are suspended by towers as high as 190 feet above ground level; it is time consuming but not difficult (Dave Frantz, WWRB, *DXLD*)

[non] United Methodist Church (Radio Africa), A04 via 100 kW Julich, daily: 0400-0559 13810 160°; 0600-0800 15435 190°; 1700-1859 13820 or 15715 145°; 1700-1859 15715 or 17550 160° (DTK via Alokesh Gupta, *DXLD*) French and English

KIMF, Piñón, NM, the new missionary station which has registered a schedule for years without coming on the air, A04: 2200-1800 5835, 1600-2300 11885, both 50 kW, 135°; note the two-hour overlap allowing leeway in switchover time.

Though WWBS, Macon, GA, has been off the air since early 2003 when its owner died, it is still scheduled for A04 Sat & Sun only 2300-0100 on 11910, 50 kW, 30°.

WMLK, Bethel, PA, the old 50 kW still on 9465, 53° at 0300-0900, and except Sat 1600-2200; the new transmitter may be used on 15265 at 1600-2200, 250 kW 57°; 9955 at 0300-0900 125 kW 53°. The latter will have to be coördinated with WRMI which also may use it 0000-1000 (from complete FCC A04 via Jim Moats)

I once received a panic call from a SW DXer in AZ who was sure we had a serious harmonic problem on WLW at 700 kHz. He was actually hearing our 60 watt FM IFB/que transmitter on 26.45 MHz. We regularly got DX reports on it from all over the world. New Zealand and Italy were some of the more memorable ones. I have seen some transmitters with bad harmonic problems. But usually never above the 50 db down range. Which at 5 kW would be the equivalent of 50 MilliWatts and that is some pretty low power. But hams use that power level to communicate hundreds of miles if the conditions are right. I reactivated the 26 MHz system in about 1989 or 90 to get us an IFB system in an unusually crowded VHF and UHF spectrum. It worked pretty well for a lot of years but newer technology has passed a lot of it by. We even tipped off WFLA (a sister station) in Florida what we were doing and they put up a system for IFB for their traffic operations. Problem is the equipment is so hard to find that is FCC type accepted. The IFB gear in the vehicles that is used for a lot of TV queing is less than 1 watt and mobile. However, there are some high powered high profile systems still alive out there. I know it sure does drive the illegal out of band CB people crazy (Paul Jellison, CO, Clear Channel, NRC-AM)

ZIMBABWE Besides 3306, ZBC reactivated 4828, heard at 1900 (Jari Savolainen, Kuusankoski, Finland, *DXLD*) Two separate ZBC services are being relayed on SW. In the local evening 3306 with Radio Zimbabwe and on 4828 with National FM. They may link up later for a single overnight service. This revived SW activity may be the result of assistance to the ZBC from Iran, the start of which was reported last year (Chris Greenway, Kenya, *DXLD*) And Mugabe is beefing up his external broadcasting to counter negative publicity (gh) Immediately before *every* hour and half-hour, all four ZBC radio stations play a song in praise of the government's land reform program, which ends with the slogan "Our land is our prosperity." You don't have to listen to the ZBC for very long to become familiar with it! (Chris Greenway, Kenya, *DXLD*) Until the Next, Best of DX and 73 de Glenn!

Global Forum

Broadcast Logs

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0011 UTC on 4828
ZIMBABWE: ZBC. English comments between African tunes. Fading signal and intermittent bubble signal interference. (Chuck Bolland, Clewiston, FL/HCDX) 3306, 0328-0422. Tribal music hosted by male's presumed Shona language, taking listeners' phone calls to English time checks and miscellaneous chatter. Station identification at 0400, followed by news of fair signal quality. (Rich D'Angelo, PA/NASWA Flash Sheet)

0031 UTC on 4960
DOMINICAN REP. Radio Cima. Spanish. Latin American music including campo and pops. Station ID for SIO 2+32. **Radio Cristal** 5009.8, 2241-2316+ "Radio Cristal Onda Corta" at 2316. (Harold Frodge, Midland, MI)

0230 UTC on 3291.26
GUYANA: Voice of. Item about youth violence in Georgetown. Pop to jazz tunes and *Night Ride* pop music show. Fair-good signal quality. (Sam Wright, Biloxi, MS) 3291.1, 0121-0133+. (Frodge, MI) 3291.1, 0355+. (Arnaldo Slaen, Buenos Aires, Argentinc) 3291, 0250-0332. (D'Angelo, PA/NASWA)

0405 UTC on 5500
ETHIOPIA: Voice of the Tigray Revolution. Tigrinya/Afar. Male/female commentary to indigenous Ethiopian music. (Paul Johnson, Galesburg, IL) **Radio Ethiopia** 7165.41, 1442-1500* Arabic // 9560.4. (John Wilkins, Wheatridge, CO, Cumbre DX, DXLD) 9561.5, 1635-1655 // 7165.4 both with strong adjacent interferences noted.. (Carlos Goncalves,Portugal/DX Window)

0433 UTC 4990
SURINAME: Radio Apintie. Dutch/English. U.S. pop ballads and ad/music promos past 0500. Excellent, though lacking an ID. (Scott Barbour, Intervale, NH) 4990, 0339 Clear station slogans. (JerryBerg, MA/DX Window)

0457 UTC on 4052.47
GUATEMALA: Radio Verdad. Spanish/English. Religious ballads to multilingual announcements at 0502. Fair with static burst. (Barbour, NH) 4052, 0405-0600* including ID and choral national anthem. (D'Angelo, PA/NASWA) **Radio Maya** 3324.8, 1127 with vernacular items. (Jerry Lineback, KS/NASWA) Guatemalans logged at DXpedition: **Radio Maya Barillias** 3324.8, 0134; **Radio Verdad** 4052.5, 0147-0204+; **Radio Buenas Nuevas** 4799.8, 0028. (Frodge, MI) Tent. **Radio Cultural** 3300, 1046-1053. (Barbour, NH)

0527 UTC on 7125
MOLDOVA: Voice of Russia. ID to poetic readings and music. "Voice of Russia World Service" ID to *News in Brief* segment. **VGR** 6155, 0358-0400; 7300, 2132-2137+ (Frodge, MI)

0609 UTC on 4915
GHANA: Radio Ghana. Closing items of African news to 0610, followed by national news. Station ID amid co-channel interference. (Brian Bagwell, St. Louis, MO, Frodge, MI)

0620 UTC on 5025
BENIN: Radio Parakou. French. Reggae to Afro pops. "Radio Parakou" identification at 0630, repeated at 0645 over pop tune. Fair signal quality, slight fades. (Tom Banks, Dallas, TX; Bagwell, MO)

0639 UTC on 7460
WESTERN SAHARA: Radio Nacional Saharagui. Arabic text to indigenous music. (Mackenzie, CA). 7460, 2244. (Johnson, IL)

0650 UTC on 3279.6
ECUADOR: La Voz del Napo. Spanish. Weak signal with listeners' phone-in and local time-check. (Banks, TX) Ecuadorians audible: **Radio Federacion** 4960, 1102-1107. **HCJB** 6045, 1220-1229; (Frodge, MI) **HCJB** 3220, 1130; **Radio Oriental** 4781.3. (Lineback, KS/NASWA)

0958 UTC on 4940
VENEZUELA: Radio Amazonas. Spanish. "Canned" ID at 1005 between musical selections. Announcer with remote coverage. Weak but clear audio. (Barbour, NH)

1154 UTC on 6185
CHINA: Huayi BC Company. Mandarin/English. Announcers' lite talk over music ballads to English ID. Fair signal, with no sign of co-channel Radio Educacion, Mexico who apparently signed off a bit early. China's **Voice of Jinling** 5860, 1155-1218. Mandarin service and ID as, "Jinling zhi Sheng." (Barbour, NH) 6285 **Tibet PBS** (tentative) 2235-2240+. (Frodge, MI)

1307 UTC on 6070
CANADA: CFRX. News-Talk 1010 "CFRB" identification. SIO 4+44. (Frodge, MI) 6070, 1500. (Fraser, ME)

1331 UTC on 6925 USB
PIRATES: Border Radio. Good ole' boy comedy skits to station identification sign-off 1341:24*. **Ragnar Radio** 6925 USB, *1346-1414+. C&W music to QSL address: ragnarradio@yahoo.com. "This is Ragnar Radio, broadcasting freedom from the Great Lakes." SIO 353+. **Voice of Capt. Ron** 6925 USB, 2332-2337. Hard rock music to QSL address: captainron6955@hotmail.com (Frodge, MI) **Sunshine Radio** 6925, 2255.Email reports to: Grasscutterradio@yahoo.com. **Undercover Radio** 6925, 0142; **James Bond Radio** 6925, 2350. (Johnson, IL; Frodge, MI)

1404 UTC on 5995
AUSTRALIA: Radio. Station ID and news // 9590 fair-good quality. (David Ross, Hamilton, Ontario, Canada) 21725, 0333 // 13630; via Shepparton 15415, 15515 via Shepparton; Aussie's **Voice Int'l** (MacKenzie, CA) **ABC Alice Springs** 2310, 1110-1135 // **ABC Tennant Creek** 2325 very poor.(Gayle Van Horn, NC)

1502 UTC on 17870
CLANDESTINE: (Uganda) Radio Rhino Int'l. Commentary on UN involvement in Uganda's problems, to *Star Trek* music intervals and 1557 sign-off. (Johnson, IL) **Voice of Komala**, 3928.05, *0328-0335. Opera overture to Kurdish ID; **Voice of the Strugglers of Iranian Kurdistan**, Al-Sulaymaniyah, Northern Iraq, 4250..0, *0255-0350. (Anker Petersen, Denmark/DX Window)

1730 UTC on 15495
UNITED KINGDOM: UN Radio relay. Sign-on to *UN Today* with segments on children's rights during wartime, Burundi and Tanzanian refugees, Iraq and cloning. Extended sign-off info with schedule and web address at 1244, // 17810 via Ascension Islands. (Barbour, NH)

1803 UTC on 9780.35
YEMEN: Radio Yemen. Tentative English text of poor quality and signal fading. Pop style music with one mention of "Yemeni". (Frodge, MI)

1935 UTC on 11655
MADAGASCAR: Radio Netherlands relay. *Europe Unzipped* program. (Fraser, ME). 12080, 1424+ // 15595 with program preview. (Ross, CAN) **RTV Malagasy** 5010, 0320-0335. French text including clear identification at 0330. (Van Horn, NC)

2030 UTC on 9630
SEYCHELLES: BBC relay. Station ID to *Newshour* segment. Fair quality. (Ross, CAN)

2046 UTC on 5046.87
TOGO: Radio Togolaise. French. Afro pops, brief talks, ID with mentions of "Togo." Clear but weak, slowly improving by tuneout. (Barbour, NH).

2050 UTC on 4976
UGANDA: Radio Uganda. Vernaculars/English. Closing bits of Afro pop tune. Announcer's presumed news or regional news wrap-up routine. English station identification to national anthem. (Van Horn, NC) 5026, 2115-2235; 5026, 0415-0440 (Berg, MA; D'Angelo, PA/DX Window)

2212 UTC on 7125
GUINEA: RTV Guineene. French report on politics, followed by newscast. SINPO 33433. Noted two hours earlier (2030) during DXpedition in Ondina Beach in Salvador de Bahia. (Slaen, ARG). Caught during DXpedition 7125, 2136-2142+, mention of Conakry, best in USB; 2207-2215+; RTVG identification at 2215. (Frodge, MI)

2222 UTC on 4760
LIBERIA: ELWA. Local announcements and calendar of events, followed by hymnal music. SIO 2+42+. (Frodge, MI) 2215 religious ballads to ID and national anthem 2231*. (Barbour, NH)

2249 UTC on 7345
CZECH REP. Radio Prague. Report on Nazi archives still hidden in Bohemia and Monravia. (Fraser, ME).

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

The QSL Report

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The K1BV DX Awards Directory, by Ted Melinosky, is the number one source for collectors interested in unique awards for contacts, and certainly the largest book of its kind in the world. Collectors will find sections on awards from the 128 DXCC Countries, hundreds of club awards, effective QSLing techniques, use of QSL Bureaus, and using contests for your award hunting purposes. Shortwave listeners will find a list of those countries available that honor their submissions, and are identified as SWL OK.

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For more information about hundred of awards available, online subscription, or the printed edition, for US and overseas rates, please refer to; http://www.dxawards.com or write to: Ted Melinosky K1BV, 12 Wells Woods Road, Columbia, CT USA 06237-1525.


K1BV at the operating position !

The DX Award Directory is an exceptional source for the beginner and advanced collector of awards, for the amateur or shortwave hobbyist. Wouldn't your shack look terrific with a wall of colorful awards?

AMATEUR RADIO

Gambia, C5Z, 15/20 meters SSB. Full data color photo card. Received in 11 days for an SASE to: QSL Manager, K6VNX Arlen T. Turriff, 8819 East Callita St., San Gabriel, CA 91775. DXCC Country # 167. (Larry Van Horn N5FPW, NC)

San Andres Island (NA-033) 5J0X, 40/10 meters SSB. Full data color card. Received in 10 days for an SASE to QSL Manager N1WON, Cory B. Mc Donald, P.O. Box 1854, Melrose, FL 32666-1854. (Van Horn, NC))

USA,Offutt AFB, NE-KOAIR, 7244 kHz LSB. Special event for Veteran's Day 2003. Full data B-29 card signed by Dick, WOHXL. Received in 62 days for an SWL report and SASE. QSL address: Strategic Air Command Memorial, Amateur Radio Club, P.O. Box 1292, Bellevue, NE 68005. (William R. Wilkins, Springfield, MO)

USA, California, Museum Ship Tug Angeles Gate, 20 meters SSB. Full data color photo card. Received in 163 days for a SASE to: United Radio Amateur Club, Berth 84 Foot of 6th Street, San Pedro, CA 90731. (Van Horn, NC)

HUNGARY

Radio Budapest, 9835 kHz. Full data QSL card unsigned, plus schedule. Received in 43 days for an English report and two US dollars. Station address: English Language Service, Brody Sandor utca 5-7, H-1800 Budapest, Hungary. (Joe Squashic, Wake Forest, NC)

MEDIUM WAVE

Australia, 4WK 963 kHz AM Warwick, Queensland. Verification letter signed by Ted Rogers-General Manager, plus station info sheet, stickers and program cassette. Received in 40 days for an AM report. Station address: 4WK, Corner of James and Hume Streets, P.O. Box 403, Toowoomba QLD 4350, Australia. Queensland QSL # 222. MW QSL # 2,877. (Patrick Martin, Seaside, OR)

WBGX, 1570 kHz AM. Friendly handwritten verification on station letterhead, signed by Michael Gallagher-President. Received in ten days for a taped report. Station address: 5956 S. Michigan Ave., Chicago, IL 60637. (Martin, OR)

Canada, CHWO 740 kHz AM. Oversized QSL card signed by Brian Willowdale-QSL Manager. "Goodie Package" including bookmarks, CHWO historical data sheet, program schedule, brochures and ODXA membership invitation sheet. Received in 20 days for an email report to: am740@rogers.com. QSL address: P.O. Box 161, Willowdale Postal Station. A, Toronto, Ontario M2N 5S8 Canada. (Patrick Griffith NONNK, Westminister, CO)

KCSJ, 590 kHz AM. Partial data letter signed by Lee Roberts-Program Director, plus business card. Received in ten days for an AM report. Station address: 106 West 24th St., Pueblo, CO 81003. (Griffith, CO)

KNWX, 1210 kHz AM. Verification form letter signed by Jon W. Price. Received in six days for an AM report. Station address: 1820 Eastlake Ave., East Seattle, WA 98102-3711. (Martin, OR)

RUSSIA

TDP Radio, 7560 kHz. Partial data QSL card (Card # 362) signed by Ludo Maes. Received in 84 days for an English report. Station address: P.O. Box 1, 2310 Rijkevorsel, Belgium. (Martin Schoech, Eisenach, Germany/Cumbre DX)

TAIWAN

Radio Taiwan Int'l, 15265 kHz. Full data card unsigned. Received in 20 days for an email report to; cbs @cbs.org.tw Station address: 55 Pei'an Road, Taipei 104, Taiwan, Rep. Of China. (or)P.O. Box 24-38, Taipei, Taiwan, Rep. Of China. Website: http://www.cbs.org.tw. (Nino Marabello, Treviso, Italy/HCDX)

THAILAND

Radio Thailand, 13695 kHz. Full data QSL card unsigned, plus broadcast schedule. Received in 53 days for an English report and two US dollars. Station address: 236 Vibhavadi Rangsit Highway, Din Daeng Huaykhwang, Bankok 10400, Thailand. (Squashic, NC)

UKRAINE

Radio Ukraine Intl, 5905 kHz. Full data unsigned QSL card. Received in 53 days for an English report and two US dollars. Station address: English Language Service, Kreshchatik str., 26, 252001 Kyiv, Ukraine. (Squashic, NC)

UZBEKISTAN

Radio Tashkent, 6025 kHz. Date-only verification letter from the Correspondence Section. Received in 26 days for an English report and two US dollars. Station address: Khorazm Street 49, Tashkent 700047, Uzbekistan. Website: http://ino.uzpak.uz. (Scott Barbor, Intervale, NH) 7215, 49 days. (Rodolph Grimm, Sao Bernardo, Sao Paulo, Brazil/Cumbre DX)

MAY HOLIDAY QSLING

Marshall Islands Constitution Day, 1 May
Poland Constitution Day, 3 May
Guernsey Liberation Day, 9 May
Micronesia, Federated States of Constitution Day, 10 May
Israel Independence Day, 14 May
Paraguay Independence Day, 14 May
Cameroon Republic Day, 20 May
Cuba Independence Day (from US administration 1902), 20 May
Yemen Unification Day, 22 May
Bermuda Day, 24 May
Eritrea Independence Day, 24 May
Argentina Revolution Day, 25 May
Jordan Independence Day, 25 May
Georgia Independence Day (from Soviet Russia), 26 May
Anguilla Day, 30 May

John Figliozzi
johnfigliozzi@monitoringtimes.com

DX, SWL, MEDIA & IT PROGRAMS

It's time for our semi-annual review of programs on our favorite radio-related topics on our favorite medium. Capsule descriptions are provided and, for most stations, refer to the *Shortwave Guide* pages for frequency information and an explanation of the one letter day abbreviations. Times are approximate and both times and frequencies are subject to change.

Allan Weiner Worldwide - a phone-in with WBCQ's station manager where the topic du jour is usually shortwave.
On WBCQ - **A** 0000 (7415), 1700 (17495usb).

Ask WWCR - focuses on listener questions and station operations. (Updated fortnightly.)
On ***WWCR*** - **F** 0945 (9475), 2030 (15825); **A** 0845 (5070), 2345 (3210); **S** 1015 (15825), 1730 (12160); **W** 1715 (15825). (Also available on-demand <http://www.wwcr.com>)

The Buzz - Richard Aedy reports about the biggest changes facing our already technologically sophisticated world.
On *R. Australia* - **H** 2330, **F** 2030, **A** 0730, **S** 0605. (Also on-demand <http://www.abc.net.au/rn/science/buzz>)

CIDX Report - Sheldon Harvey reviews recent developments in international broadcasting.
On ***R. Canada Int.*** - **S** 2007; **M** 0107, 0207; **T** 2035; **W** 0135, 0235 (fortnightly within *The Mailbag* program). (Also available on-demand <http://www.rcinet.ca>.) *[Ed. Note: Schedule may be drastically altered by changes announced but, as of print deadline, yet unspecified.]*

DX Corner* - How the DXing hobby looks from central Europe, devoted on alternate weeks to international broadcast and amateur radio activities.
On ***R. Budapest*** - **A** 1920, 2120; **S** 0120, 0250. (Also available on-demand <http://real1.radio.hu/nemzeti.htm> or <http://www.wrn.org/listeners/stations/station.php?StationID=9>)

DX Corner* - A friendly program from the Voice of Turkey for radio enthusiasts.
On ***Voice of Turkey***, fortnightly - **A** 1245, 1845, 2045, 2215; **S** 0315.

[*Not the same program, although sharing the same title.]

DXers' Corner - All India Radio's entry in this genre featuring reports from Indian hobbyists.
On ***All India Radio***, fortnightly - **M** 1840, 2130; **T** 2340

DX Mailbag: - Essentially a letters program.
On ***R. Romania Intl.*** - **A** 1345, 2345; **S** 0245, 0445.

DX Partyline - Allen Graham hosts and produces this program designed for new and seasoned DXers and SWLers. It provides a place for the clubs to impart information about their events and projects and reads reports from listeners around the world about what is being heard on the bands in their respective regions.
On ***HCJB Australia*** - **A** 0830, 1430.
On ***HCJB Ecuador*** - **A** 1230. (Also on-demand <http://www.hcjb.org/dxploudio.php>)
On *WWCR* - **S** 0200 (5070), **T** 0930 (9475), **H** 2000 (15825)

DXers' Special - Presumably a program supported by Latin American hobbyists with information from a station that is heard only sporadically in North America, unfortunately
On ***RAE Argentina*** - **W** 1945; **H** 0345.

DXers Unlimited - Arnie Coro emphasizes amateur radio and technical topics in a friendly, accessible program.
On ***R. Habana Cuba*** (in two weekly editions) -
First edition - **A** 2105, 2332; **S** 0135, 0335, 0535.
Second edition - **T** 2105, 2332; **W** 0135, 0335, 0535.

DXing with Cumbre - Marie Lamb hosts a relaxed program that, whenever possible, likes to emphasize new and exotic DX catches. There are regular segments devoted to pirate radio and the Electronic DX Press (EDXP), also.
On ***WHRI Indiana*** - **A** 0500 (5745 & 7315), 0730 (5745 & 7315), 1230 (15105), 1500 (13760), 1930 (9495); **S** 0030 (7315), 0630 (5745), 1530 (15105), 2030 (5745); **M** 0330 (7315).
On ***KWHR Hawaii*** - **A** 0600 (17780); **S** 0430 (17780), 1200 (11565), 1600 (9930).
On ***WHRA Maine*** - **F** 2200 (1650); **S** 0830 (7580); **M** 0330 (7580).
(Available on demand http://www.cumbredx.org/)

Go Digital - Tracey Logan looks at developments in digital technology.
On ***BBCWS*** *Americas stream* - **T** 1506, 2106; **W** 0106. (There is also a live webcast each M 1500 at <http://www.bbcnews.com>, click on "technology".)

Mailbox - Myra Oh reads letters and news of interest, Paul Ormandy reports on the latest South Pacific DX news and RNZI frequency manager Adrian Sainsbury answers and explains technical questions and issues.
On ***R. New Zealand Intl.*** (Airs fortnightly alternating with **RNZI Talk**, which features info about RNZI) - **M** 0830, 1130, 1330, 1530; **T** 0330. (Available on-demand <http://www.rnzi.com>.)

Media Report - From Radio National (ABC-Australia), a unique program looking at the motivations behind the mass media and those who seek to influence it, both in Australia and abroad.
On ***R. Australia*** - **H** 0130, 1030, 1530. (Available on-demand <http://www.abc.net.au/rn>.)

Mediawatch - From National Radio (NZ), a weekly look at how print, radio, television and the Internet deliver the news at home and abroad. *(Ed. Note: Expected to return.)*
On ***R. New Zealand Int.*** - **S** 1012. Also on-demand <http://www.mediawatch.co.nz>.

Off the Hook - A hacker's view of emerging technologies.
On ***WBCQ*** - W 2300 (7415).

Radio Bulgaria Calling - Like RRI's program, primarily a letters and reception report program.
On ***R. Bulgaria*** - **F** 1740, 2140, 2340; **A** 0240, 0640, 1140. (Also available on-demand, but only on the day of broadcast <http://www.nationalradio.bg/real.htm>)

Radio Waves - A short commentary or observation on some aspect of the radio hobby.
On ***R. Exterior de Espana*** - **A** 2140; **S** 0040.

Radio World - Frans Vossen with timely information and commentary on the international radio scene.
On ***R. Vlaanderen Intl.*** - **S** 0700, 1130, 1730, 1930, 2200; **M** 0400. (Also available on-demand <http://www.rvi.be/rvi_master/uk/radio_world/index.html>.)

The Real Amateur Radio Show - Interactive discussion about amateur radio topics.
On ***WBCQ Maine*** - **A** 2300 (7415).

The Whole World on the Radio Dial - A relatively new program.
On ***R. Ukraine Int.*** - **A** 2118; **S** 0018, 0318, 1118.

Voice of the NASB - A special DRM program produced jointly by U.S. private international broadcasters, also broadcast in analog shortwave as follows:
On ***WRMI*** - **S** 0230 (7385), 2130 (15725)

Wavescan - Adventist World Radio's excellent program for DXers and SWLs around the world, produced by longtime DXer Adrian Peterson.
On ***Adventist World R., Austria*** - **S** 0200, 0730, 1730, 2130.
On ***Adventist World R.***, South Africa - **S** 2030.
On ***Adventist World R.,*** UAE - **S** 1200, 1530, 1630.
On ***KSDA Guam*** - **S** 1000, 1330, 1600, 1630, 1730, 2130.
On ***WRMI Florida*** - **S** 2100 (15725), M 0230 (7385). [Schedule changes frequently; consult <http://www.wrmi.net> and click on "Programming" for updates.]
(Also available on-demand <http://english.awr.org/wavescan>)

World of Radio - Glenn Hauser's comprehensive activities report on the HF broadcast bands, including frequencies, personalities, station and program information.
On ***WBCQ Maine*** - **W** 2200 (7415/17495usb); **A** 2030 (17495usb), 2330 (9330usb); **S** 2230 (9330usb); **M** 0415 (7415).
On ***WWCR Tennessee*** - **H** 2030 (15825); **A** 1030 (5070), 2030 (12160); **S** 0230 (5070), 0630 (3210); **W** 0930 (9475).
(Also available on-demand <http://www.worldofradio.com>)

Worldwide Friendship - A friendly program of listener correspondence, reports and information about the shortwave listening hobby.
On ***R. Korea Intl.*** - **A** 0810, 1140, 1310, 1610, 1910, 2210, **S** 0210. (Also available on-demand <http://rki.kbs.co.kr/>.)

In addition, a long-time favorite continues to provide timely information in print form with some multimedia content via the Internet: **Media Network** from *Radio Netherlands*, edited by Andy Sennitt <http://www.rnw.nl/media>. *RNMN* also provides listeners, upon request, with regular newsletters via e-mail.

Special thanks to Glenn Hauser, Marie Lamb, John Norfolk, Harold Sellers and DX Observer whose valuable work has been included in this month's column.

Until June, good listening!

How to Use the Shortwave Guide

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

① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

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

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

Find the station you want to hear.

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

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

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

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

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

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

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

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

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

Choose a program or station you want to hear.

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

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

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

MT Monitoring Team

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John Figliozzi, Program Manager, johnfigliozzi@monitoringtimes.com
Mark Fine, VA, markfine@monitoringtimes.com

Program Highlights

John Figliozzi

NEWS & NOTES

BBC HIGH- & LOW-LIGHT -

The **BBC** continues to roll out fine programs and puzzling decisions. ***Global Perspective*** is a unique partnership of broadcasters across the world. Ghana's **Joy FM** joins **BBC World Service**, **CBC**, **RNZ**, **ABC** (Australia), **RN**, **RTV Hong Kong** and **Soundprint** (USA) for a fourth annual collaboration, this year focusing on global health services. The eight part series, which began on April 20, airs on the Americas stream on W 1406, H 0006, S 1306 and 2106.

Meanwhile, at the end of March the **BBC** cancelled ***East Asia Today***, a unique and popular program, with almost no warning. Listeners were furious, with *Write On* mentioning that not one letter it received supported the move. **BBC** claims it was necessary for cost cutting and priority reordering and blah, blah, blah. (Where have we heard all this before?)

VOA CUTS MORE -

As a result, there is no longer any **VOA News Now** for the Americas or Europe and daily broadcasts in English are down to as little as 17.5 hours a day with further plans to reduce that to 14 hours a day by October. Meanwhile more money gets poured down the other BBG ratholes. Is there a conflict of interest within the commercial broadcasting cabal on the BBG? Are they using public funds to create precursor services paving the way for their own commercial broadcasting services down the road?

Listen to **Sawa** or **Farda** and tell me they don't sound like merely Arabic and Farsi versions of commercial radio here.

SPORTS ARE BACK -

- on **R. Australia** and **RNZI** Friday and Saturday nights (our time) with Australian rules football and rugby. (See our *SWG* listings.)...

R. Romania Int. announced a comprehensive revamp, but so far I don't hear much difference. We'll give it some time...

RCI also has had a revamp, dropping ***Canada Today*** to the US and replacing it with a repeat of ***The World at Six***...

HCJB's ***Morning in the Mountains*** is back, but for only a quarter hour M-F 1200.

0000 UTC - 8PM E / 7PM C / 5PM P

0000	0007		Sierra Leone, SLBS 3316do		
0000	0015	vl	Cambodia, National Radio Of	11940as	
0000	0027		Czech Rep, Radio Prague Intl	7245na	9440na
0000	0030		Japan, Radio 13650as	17810as	
0000	0030		Thailand, Radio 9680do		
0000	0030		UK, BBC World Service	3915as	11945as
			17615as		
0000	0030		USA, Voice of America	7215va	9890va
			11760va 15185va	15290va	17740va
			17820va		
0000	0045		India, All India Radio	9705as	9950as
			11620as 11645as	13605as	
0000	0057		Canada, Radio Canada Intl	9640as	15205as
0000	0059	DRM	UK, BBC World Service	6015na	
0000	0100		Anguilla, Caribbean Beacon	6090am	
0000	0100		Australia, ABC NT Alice Springs	2310irr	4835do
0000	0100		Australia, ABC NT Katherine	5025do	
0000	0100		Australia, ABC NT Tennant Creek	4910do	
0000	0100		Australia, Radio 9660pa	12080va	13630pa
			15240pa 15415as	17750as	17775va
			17795va 21725as		
0000	0100		Canada, CBC Northern Service	9625do	
0000	0100		Canada, CFRX Toronto ON	6070da	
0000	0100		Canada, CFVP Calgary AB	6030da	
0000	0100		Canada, CKZN St John's NF	6160do	
0000	0100		Canada, CKZU Vancouver BC	6160do	
0000	0100		Costa Rica, University Network	5030am	6150am
			7375am 9725sa	11870am	13750na
0000	0100	1st o	Finland, Scandinavian Weekend Radio		5990eu
			11690eu		
0000	0100		Germany, Deutsche Welle	7290as	9880as
0000	0100		Guyana, Voice of 3291do	5950do	
0000	0100		Japan, Radio 6145na		
0000	0100		Malaysia, RTM Radio 4	7295do	
0000	0100		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
0000	0100		Netherlands, Radio 9845na		
0000	0100		New Zealand, Radio NZ Intl	15720pa	
0000	0100		Sierra Leone, Radio UNAMSIL	6139af	
0000	0100		Singapore, Mediacorp Radio	6150do	
0000	0100	vl	Solomon Islands, SIBC	5020do	9545do
0000	0100		Spain, Radio Exterior Espana	15385na	
0000	0100		UK, BBC World Service	5970as	5975ca
			6195as 9410as 9740as	9825sa	11955as
			12095as 15280as	15310as	15360as
			17790as		
0000	0100		Ukraine, Radio Ukraine Intl	7545na	
0000	0100		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb
			12133usb 12579usb	13362usb	13855usb
0000	0100		USA, KAIJ Dallas TX 13815va		
0000	0100		USA, KTBN Salt Lake City UT	7505na	
0000	0100		USA, KWHR Naalehu HI	17510as	
0000	0100	twhfa	USA, Voice of America	5995am	6130am
			7405am 9455am	9775am	11695am
			13790am		
0000	0100		USA, WBCQ Kennebunk ME	7415na	9330na
0000	0100	mtwhfa	USA, WBCQ Kennebunk ME	5105na	
0000	0100		USA, WBOH Newport NC	5920am	
0000	0100		USA, WEWN Birmingham AL	5825na	7425na
0000	0100		USA, WHRA Greenbush ME	7580va	
0000	0100		USA, WHRI Noblesville IN	5745va	7315am
0000	0100		USA, WINB Red Lion PA	9320am	
0000	0100		USA, WJIE Louisville KY	7490am	11515va
			13595am		
0000	0100		USA, WRMI Miami FL	9955am	
0000	0100		USA, WTJC Newport NC	9370na	
0000	0100		USA, WWCR Nashville TN	3210na	5070na
			5935na 7465na		
0000	0100		USA, WWRB Manchester TN	5050na	5085na
			6890na		
0000	0100		USA, WYFR Okeechobee FL	6065na	9505na
			15130sa		
0000	0100	vl	Vanuatu, Radio 3945al	7260do	
0000	0100		Zambia, Radio Christian Voice	4965af	
0015	0030	twhfa	Austria, Radio Austria Intl	13730sa	
0015	0100	va/mtwhf	Germany, Bible Voice Broadcasting		7210as
0030	0100		Germany, Pan American BC	9740va	
0030	0100		Iran, Voice of the Islamic Rep	9905sa	
0030	0100		Lithuania, Radio Vilnius	6120al	7325na
0030	0100		Sri Lanka, SLBC 6005as	9770as	15745as
0030	0100		Thailand, Radio 13695na		
0030	0100		UK, BBC World Service	9580as	
0045	0100	twhfa	Austria, Radio Austria Intl	13730sa	
0055	0100		Italy, RAI Intl 9675na	11800na	

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

0100	0115		Italy, RAI Intl 9675na	11800na	
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na
0100	0127		Slovakia, Radio Slovakia Intl	5930na	7230ca
			9440sa		
0100	0130	s	Germany, Universal Life	9485as	
0100	0130	mtwhfa	Serbia & Montenegro, Intl Radio	7115na	
0100	0130	twhfa	USA, Voice of America	5995am	6130am
			7405am 9455am	9775am	13790am
0100	0130		Uzbekiston, Radio Tashkent Intl	5975as	6165as
			7160as		
0100	0130		Vietnam, Voice of 6175na		
0100	0156		China, China Radio Intl	6140va	9580na
			9790na		
0100	0156		North Korea, Voice of	3560as	6195as
			7140am 9345as	11735am	
0100	0156		Romania, Radio Romania Intl	9690na	11940na
			15430na 17760na		
0100	0159		Canada, Radio Canada Intl	9755am	11990am
			13710am		
0100	0159	DRM	China, China Radio Intl	6140na	
0100	0200		Anguilla, Caribbean Beacon	6090am	
0100	0200		Australia, ABC NT Katherine	5025do	
0100	0200		Australia, ABC NT Tennant Creek	4910do	
0100	0200		Australia, HCJB 15560pa		
0100	0200		Australia, Radio 9660pa	12080va	13630po
			15240pa 15415as	17750as	17775va
			17795va 21725as		
0100	0200		Canada, CBC Northern Service	9625da	
0100	0200		Canada, CFRX Toronto ON	6070do	
0100	0200		Canada, CFVP Calgary AB	6030do	
0100	0200		Canada, CKZN St John's NF	6160da	
0100	0200		Canada, CKZU Vancouver BC	6160do	
0100	0200		Costa Rica, University Network	5030am	6150am
			7375am 9725so	11870am	13750na
0100	0200		Cuba, Radio Havana	6000na	9820na
0100	0200	1st o	Finland, Scandinavian Weekend Radio		5990eu
			11690eu		
0100	0200		Guyana, Voice of 3291do	5950do	
0100	0200		Iran, Voice of the Islamic Rep	9905sa	
0100	0200		Japan, Radio 6025va	11860as	15325as
			17560va 17685pa	17810as	17835am
			17835sa 17845as		
0100	0200		Malaysia, RTM Radio 4	7295do	
0100	0200		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
0100	0200		Netherlands, Radio 9845na		
0100	0200	DRM	Netherlands, Radio 15525na		
0100	0200		New Zealand, Radio NZ Intl	15720pa	
0100	0200		Sierra Leone, Radio UNAMSIL	6139af	
0100	0200		Singapore, Mediacorp Radio	6150do	
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do
0100	0200		Sri Lanka, SLBC 6005as	9770as	15745as
0100	0200		UK, BBC World Service	5975ca	6195as
			9410as 9525ca 9825sa	11955as	12095sa
			15280as 15310as	15360as	17790as
0100	0200		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb
			12133usb 12579usb	13362usb	13855usb
0100	0200		USA, KAIJ Dallas TX 5755va		
0100	0200		USA, KJES Vado NM	7555no	
0100	0200		USA, KTBN Salt Lake City UT	7505na	
0100	0200		USA, KWHR Naalehu HI	17510as	
0100	0200		USA, Voice of America	7200va	7255va
			9850va 11705va	11820va	15250va
			15290va 17740va	17820va	
0100	0200		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0100	0200		USA, WBOH Newport NC	5920am	
0100	0200		USA, WEWN Birmingham AL	5825na	7425na
0100	0200		USA, WHRA Greenbush ME	7580va	
0100	0200		USA, WHRI Noblesville IN	5745va	7315am
0100	0200		USA, WINB Red Lion PA	9320am	
0100	0200		USA, WJIE Louisville KY	7490am	11515va
			13595am		
0100	0200		USA, WRMI Miami FL	9955am	
0100	0200		USA, WTJC Newport NC	9370na	
0100	0200		USA, WWCR Nashville TN	3210na	5070na
			5935na 7465na		
0100	0200		USA, WWRB Manchester TN	5050na	5085na
			6890na		
0100	0200		USA, WYFR Okeechobee FL	6065na	9505no
0100	0200	vl	Vanuatu, Radio 3945al	7260do	
0100	0200		Zambia, Radio Christian Voice	4965af	
0105	0115	sm	Austria, Radio Austria Intl	7325am	9870am
0115	0120	mtwhf	Kyrgystan, Radio Kyrghyz	4010irr	4795irr
0115	0130		Austria, Radio Austria Intl	7325am	9870am
0130	0200		Germany, Pan American BC	9495va	
0130	0200		Sweden, Radio 6010na	9435va	
0130	0200	twhfa	USA, Voice of America	5995am	6130am

SELECTED PROGRAMMING BEGINS ON PAGE 55

			9455va	13740am	
0135	0145	sm	Austria, Radio Austria Intl	7325am	9870am
0140	0200		Vatican City, Vatican Radio	7335as	9865as
0145	0200		Albania, Radio Tirana Intl	6115eu	7160eu
0145	0200		Austria, Radio Austria Intl	7325am	9870am

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

0200	0215		Germany, Pan American BC	9495va	
0200	0228		Hungary, Radio Budapest	9835na	
0200	0230		Austria, AWR Europe	7230as	
0200	0230		Serbia & Montenegro, Intl Radio	7130na	
0200	0230		USA, KJES Vado NM	7555na	
0200	0230		Vietnam, Voice of 6175na		
0200	0256		North Korea, Voice of 11335as	4405as	9325as
0200	0256		South Korea, Radio Korea Intl 15575na	9560no	11810so
0200	0257		Canada, Radio Canada Intl	15510as	17860as
0200	0300		Anguilla, Caribbean Beacon	6090am	
0200	0300		Australia, ABC NT Alice Springs	2310irr	4835do
0200	0300		Australia, ABC NT Katherine	5025do	
0200	0300		Australia, ABC NT Tennant Creek	4910do	
0200	0300		Australia, HCJB 15560pa		
0200	0300		Australia, Radio 9660pa 15240pa 21725as	12080va 15415as	13630pa 15515va 17750as
0200	0300		Bulgaria, Radio 9700na	11700no	
0200	0300		Canada, CBC Northern Service	9625do	
0200	0300		Canada, CFRX Toronto ON	6070do	
0200	0300		Canada, CFVP Calgary AB	6030do	
0200	0300		Canada, CKZN St John's NF	6160do	
0200	0300		Canada, CKZU Vancouver BC	6160do	
0200	0300		Costa Rica, University Network 7375am 9725sa	5030am 11870am	6150am 13750na
0200	0300		Cuba, Radio Havana	6000na	9820na
0200	0300		Egypt, Radio Cairo 11855na		
0200	0300	1st a	Finland, Scandinavian Weekend Radio 11720eu		5980eu
0200	0300		Guyana, Voice of 3291do	5950do	
0200	0300		Indonesia, Voice of 9525as	11785as	
0200	0300		Iran, Voice of the Islamic Rep	9905sa	
0200	0300		Malaysia, RTM Radio 4	7295do	
0200	0300		Myanmar, Radio 7185do		
0200	0300		Namibia, Namibian BC Corp 6090af	3270af	3290af
0200	0300		New Zealand, Radio NZ Intl	15720pa	
0200	0300	as	Philippines, Radio Pilipinas 15270me	12015me	15120me
0200	0300		Russia, Voice of 5995me 9765na	6155na 15445na	7180na 15595na
0200	0300		Sierra Leone, Radio UNAMSIL	6139af	
0200	0300		Singapore, Mediacorp Radio	6150do	
0200	0300	vl	Solomon Islands, SIBC	5020do	9545do
0200	0300		Sri Lanka, SLBC 6005as	9770as	15745as
0200	0300		Taiwan, Radio Taiwan Intl 11875as	5950na 15320as	9680na 15465as
0200	0300		UK, BBC World Service 9410me 11955as 15360as	5975co 12095sa 17790as	6195eu 15280as 15310as
0200	0300		USA, Armed Forces Radio 5765usb 12133usb	4319usb 6350usb 12579usb	5446usb 7507usb 13362usb 10320usb 13855usb
0200	0300		USA, KAIJ Dallas TX 5755va		
0200	0300		USA, KTBN Salt Lake City UT	7505na	
0200	0300		USA, KWHR Naalehu HI	17510os	
0200	0300		USA, Voice of America 9850va 15250va	7200va 11705va 15290va	7255va 11705va 11820vo 17740va 17820va
0200	0300	mtwhfa	USA, WBCQ Kennebunk ME	5105na	
0200	0300		USA, WBOH Newport NC	5920am	
0200	0300		USA, WEWN Birmingham AL	5825na	7425na
0200	0300		USA, WHRA Greenbush ME	7580va	
0200	0300		USA, WHRI Noblesville IN	5745va	7315am
0200	0300		USA, WINB Red Lion PA	9320am	
0200	0300		USA, WJIE Louisville KY 13595am	7490am	11515va
0200	0300		USA, WRMI Miami FL	9955am	
0200	0300		USA, WTJC Newport NC	9370na	
0200	0300		USA, WWCR Nashville TN 5935na 7465na	3210na	5070na
0200	0300		USA, WWRB Manchester TN 6890na	5050na	5085na
0200	0300		USA, WYFR Okeechobee FL 9505na	5985na 11855ca	6065na 15255ca
0200	0300	vl	Vanuatu, Radio 3945al	7260do	
0200	0300		Zambia, Radio Christian Voice	4965af	
0215	0220		Nepal, Radio 5005as		
0230	0300		Albania, Radio Tirana Intl	6115eu	7160eu
0230	0300		Sweden, Radio 6010na		
0245	0300		UK, BBC World Service	9610af	
0250	0300		Vatican City, Vatican Radio	7305am	9605am
0250	0300		Zambia, Radio 4910do		

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

0300	0310		Vatican City, Vatican Radio 9660af 17665as	7305am	9605am
0300	0315		Croatia, Voice of 9925na		
0300	0327		Czech Rep, Radio Prague Intl	7345na	9870na
0300	0330	sm w fa	Belarus, Radio Belarus Intl	5970eu	7210eu
0300	0330		Egypt, Radio Cairo 11855na		
0300	0330		Iran, Voice of the Islamic Rep	9905so	
0300	0330	as	Philippines, Radio Pilipinas 15270me	12015me	15120me
0300	0330		Thailand, Radio 15460na		
0300	0330	a	UK, Wales Radio Intl 9735na		
0300	0330		Vietnam, Voice of 6175ca		
0300	0350		Turkey, Voice of 6140va	7270eu	
0300	0355		South Africa, Channel Africa	3345af	9770af
0300	0356		China, China Radio Intl	9690na	9790na
0300	0356		North Korea, Voice of 7140as9345as	3560as	6195as
0300	0400		Anguilla, Caribbean Beacon	6090am	
0300	0400		Australia, ABC NT Alice Springs	2310irr	4835do
0300	0400		Australia, ABC NT Katherine	5025do	
0300	0400		Australia, ABC NT Tennant Creek	4910do	
0300	0400		Australia, Radio 9660pa 15240pa 21725as	12080va 15415as	13630pa 15515va 17750os
0300	0400		Canada, CBC Northern Service	9625do	
0300	0400		Canada, CFRX Toronto ON	6070do	
0300	0400		Canada, CFVP Calgary AB	6030do	
0300	0400		Canada, CKZN St John's NF	6160do	
0300	0400		Canada, CKZU Vancouver BC	6160do	
0300	0400		Costa Rica, University Network 7375am 17645as	5030am 9725sa	6150am 11870am 13750na
0300	0400		Cuba, Radio Havana	6000na	9820no
0300	0400	1st c	Finland, Scandinavian Weekend Radio 11720eu		5980eu
0300	0400		Guyana, Voice of 3291do	5950do	
0300	0400		Japan, Radio 21610pa		
0300	0400		Malaysia, RTM Radio 4	7295do	
0300	0400		Namibia, Namibian BC Corp 6090af	3270af	3290af
0300	0400		New Zealand, Radio NZ Intl	15720pa	
0300	0400		Oman, Radio 15355af		
0300	0400		Russia, Voice of 15445na	6155na 15595na	7180no 7350na
0300	0400		Sierra Leone, Radio UNAMSIL	6139af	
0300	0400		Singapore, Mediacorp Radio	6150do	
0300	0400	vl	Solomon Islands, SIBC	5020do	9545do
0300	0400		Sri Lanka, SLBC 6005as	9770as	15745as
0300	0400	mtwhf	Sudan, Sudan Radio Service	9625af	
0300	0400		Taiwan, Radio Taiwan Intl 11875as	5950na 15125sa	9680na 15320as
0300	0400		Uganda, Radio 4976do	5026do	7196do
0300	0400		UK, BBC World Service 6005af 6190af 9525am 12035af 15410af 21660as	3255af 6195eu 9750af 15280as 15575me	5975ca 7160af 9410eu 11760me 11765af 15310as 15360as 17760as 17790as
0300	0400		Ukraine, Radio Ukraine Intl	7545na	
0300	0400		USA, Armed Forces Radio 5765usb 12133usb	4319usb 6350usb 12579usb	5446usb 7507usb 10320usb 13362usb 13855usb
0300	0400		USA, KAIJ Dallas TX 5755va		
0300	0400		USA, KTBN Salt Lake City UT	7505na	
0300	0400		USA, KWHR Naalehu HI	17510as	
0300	0400		USA, Voice of America 6080af 7265af 9575af 9885af	4960af 7290af	6035af 7340af 7415af
0300	0400	mtwhfa	USA, WBCQ Kennebunk ME	7415na	9330no
0300	0400		USA, WBCQ Kennebunk ME	5105na	
0300	0400		USA, WBOH Newport NC	5920am	
0300	0400		USA, WEWN Birmingham AL	5825na	7425na
0300	0400		USA, WHRA Greenbush ME	7580va	
0300	0400		USA, WHRI Noblesville IN	5745va	7315am
0300	0400		USA, WIN8 Red Lion PA	9320am	
0300	0400		USA, WJIE Louisville KY 13595am	7490am	11515va
0300	0400	mtwhf	USA, WMLK Bethel PA	9465eu	9955al
0300	0400		USA, WRMI Miami FL	9955am	
0300	0400		USA, WTJC Newport NC	9370na	
0300	0400		USA, WWCR Nashville TN 5935na 7465na	3210na	5070na
0300	0400		USA, WWRB Manchester TN 6890na	5050na	5085na
0300	0400		USA, WYFR Okeechobee FL 9505no 11740sa	6065na	7355va
0300	0400	vl	Vanuatu, Radio 3945al	7260do	
0300	0400		Zambia, Radio 4910do		
0300	0400		Zambia, Radio Christian Voice	4965af	
0300	0400	vl	Zimbabwe, ZBC Corp	5975do	
0310	0330		Vatican City, Vatican Radio	9660af	17665as
0330	0358		Hungary, Radio Budapest	9835na	
0330	0400		Czech Rep, Radio Prague Intl	11600va	15600va

0330	0400		UAE, Radio Dubai 12005na	13675na	15400na
0330	0400		UK, BBC World Service 9670eu	7130eu	7265eu
0345	0400		Tajikistan, Radio 7245irr		

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

0400	0415		Israel, Kol Israel 9435eu 17600va	11590eu	15640eu
0400	0430		Belgium, Radio Vlaanderen Intl	11635na	
0400	0430		France, Radio France Intl	9805af	11995af
0400	0430		South Africa, Channel Africa	3345af	
0400	0430		Sri Lanka, SLBC 6005as	9770as	15745as
0400	0445		USA, WYFR Okeechobee FL	6065na	9505na
0400	0456		China, China Radio Intl 9755na	6190na	9560na
0400	0456		Romania, Radio Romania Intl 15235na 17860na	11820na	15140na
0400	0458		New Zealand, Radio NZ Intl	15720pa	
0400	0500		Anguilla, Caribbean Beacon	6090am	
0400	0500		Australia, ABC NT Alice Springs	2310irr	4835da
0400	0500		Australia, ABC NT Katherine	5025do	
0400	0500		Australia, ABC NT Tennant Creek	4910do	
0400	0500		Australia, Radio 9660pa 15240pa 21725as	12080va 15415as	13630pa 15515va 17750as
0400	0500		Canada, CBC Northern Service	9625do	
0400	0500		Canada, CFRX Toronto ON	6070do	
0400	0500		Canada, CKZN St John's NF	6160do	
0400	0500		Canada, CKZU Vancouver BC	6160do	
0400	0500		Costa Rica, University Network 7375am 17645as	5030am 9725sa	6150am 11870am 13750na
0400	0500		Cuba, Radio Havana	6000na	9820na
0400	0500	1st o	Finland, Scandinavian Weekend Radio 11720eu		5980eu
0400	0500		Germany, Deutsche Welle 9710af	6180af	9545at
0400	0500		Germany, Overcomer Ministries	9770au	
0400	0500		Germany, Radio Africa Intl	13810af	
0400	0500		Guyana, Voice of 3291do	5950do	
0400	0500		Malaysia, RTM Radio 4	7295do	
0400	0500		Namibia, Namibian BC Corp 6090af	3270af	3290at
0400	0500		Netherlands, Radio 6165na	9590na	
0400	0500	DRM/as	Netherlands, Radio 15400au		
0400	0500		Russia, Voice of 7125na 7350na	7180no 12010na	7240na 15445no 15595na
0400	0500		Sierra Leone, Radio UNAMSIL	6139af	
0400	0500		Singapore, Mediacorp Radio	6150do	
0400	0500	vl	Solomon Islands, SIBC	5020do	9545do
0400	0500	mtwhf	Sudan, Sudan Radio Service	9625af	
0400	0500		Uganda, Radio 4976do	5026do	7196do
0400	0500		UK, BBC World Service 6005af 6135ca 9410eu 15280as 15575me	6190af 11760me 15310as 17760as	6195eu 11765af 15360as 17790as
0400	0500	DRM	UK, BBC World Service	3255af 6195eu 11765af 15360as 15420af 17640af 17760as 17790as 6010na	5975am 7160af 12035af 15420af 21660as
0400	0500		USA, Armed Forces Radio 5765usb 12133usb	4319usb 6350usb 12579usb	5446usb 7507usb 13362usb 10320usb 13855usb
0400	0500		USA, KAIJ Dallas TX	5755va	
0400	0500		USA, KTBN Salt Lake City UT	7505na	
0400	0500		USA, KWHR Naalehu HI	17780as	
0400	0500		USA, Voice of America 7170va 9575af 9885af	4960af 7290af 15205va	6080af 7415af 9475af
0400	0500	mtwhfo	USA, WBCQ Kennebunk ME	5105na	7415no
0400	0500	s	USA, WBCQ Kennebunk ME	9330na	
0400	0500		USA, WBOH Newport NC	5920am	
0400	0500		USA, WEWN Birmingham AL	5825no	7425na
0400	0500		USA, WHRA Greenbush ME	7580va	
0400	0500		USA, WHRI Noblesville IN	5745va	7315am
0400	0500		USA, WINB Red Lion PA	9320am	
0400	0500		USA, WJIE Louisville KY 13595am	7490am	11515va
0400	0500		USA, WRMI Miami FL	9955am	
0400	0500		USA, WTJC Newport NC	9370na	
0400	0500		USA, WWCR Nashville TN 5770no 5935na	3210na	5070na
0400	0500		USA, WWRB Manchester TN 6890na	5050no	5085no
0400	0500		USA, WYFR Okeechobee FL 9715no	8855va	7355va
0400	0500	vl	Vanuatu, Radio 3945al	7260do	
0400	0500		Zambia, Radio 4910co		
0400	0500		Zambia, Radio Christian Voice	4965af	
0400	0500	vl	Zimbabwe, ZBC Corp	5975do	
0415	0420	mtwhf	Kyrgyston, Radio Kyrghyz	4010irr	4795irr
0430	0500		Nigeria, Radio/Enugu	6025do	
0430	0500		Nigeria, Radio/Ibadan	6050do	
0430	0500		Nigeria, Radio/Kaduna	4770do	6090co
0430	0500		Nigeria, Radio/Lagos	3326do	4990co
0430	0500		Swaziland, TWR 4775af	6120af	
0459	0500		New Zealand, Radio NZ Intl	9615pa	

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

0500	0530		France, Radio France Intl	11850af	13610af
0500	0530		UK, BBC World Service	15280as	17885af
0500	0530	as	UK, BBC World Service 11845eu	7295eu	9670eu
0500	0530		Vatican City, Vatican Radio 11625af	7360af	9660af
0500	0556		China, China Radio Intl	6190na	9560na
0500	0559		Germany, Radio Africa Intl	13810af	
0500	0600		Anguilla, Caribbean Beacon	6090am	
0500	0600		Australia, ABC NT Alice Springs	2310irr	4835do
0500	0600		Australia, ABC NT Katherine	5025do	
0500	0600		Australia, ABC NT Tennant Creek	4910do	
0500	0600		Australia, Radio 9660pa 15160as 15240pa	12080va	13630pa 15515va 17750as
0500	0600		Canada, CBC Northern Service	9625do	
0500	0600		Canada, CFRX Toronto ON	6070do	
0500	0600		Canada, CKZN St John's NF	6160do	
0500	0600		Canada, CKZU Vancouver BC	6160do	
0500	0600		Costa Rica University Network 7375am 17645as	5030am 9725sa	6150am 11870am 13750na
0500	0600		Cuba, Radio Havana 11760na	9550am	9820na
0500	0600	1st o	Finland, Scandinavian Weekend Radio 11690eu 11720eu		6170eu
0500	0600		Germany, Deutsche Welle 12045af 15410af	9565af	11805af
0500	0600	vl	Greece, Voice of	9420eu	12105eu
0500	0600		Guyana, Voice of 3291do	5950do	
0500	0600		Japan, Radio 5975eu 15195as	6110na 17810as	7230eu 21755pa
0500	0600		Malaysia, RTM Radio 4	7295do	
0500	0600		Namibia, Namibian BC Corp	6060af	6175al
0500	0600		New Zealand, Radio NZ Intl	9615po	
0500	0600		Nigeria, Radio/Enugu	6025do	
0500	0600		Nigeria, Radio/Ibadan	6050do	
0500	0600		Nigeria, Radio/Kaduna	4770do	6090do
0500	0600		Nigeria, Radio/Lagos	3326do	4990do
0500	0600		Nigeria, Voice of 17800af		
0500	0600		Russia, Voice of 7125na 12010na	7180na 15445na	7240na 15595na
0500	0600		Sierra Leone, Radio UNAMSIL	6139af	
0500	0600		Singapore, Mediacorp Radio	6150do	
0500	0600	vl	Solomon Islands, SIBC	5020do	9545do
0500	0600		South Africa, Channel Africa	9525af	11710af
0500	0600		Swaziland, TWR 6120af	7205af	9500af
0500	0600		Uganda, Radio 4976do	5026do	7196do
0500	0600		UK, BBC World Service 6190af 6195eu 11765af 15360as 17640af	6005af 7160af 11940af 15420af 17760as	6135ca 9410eu 11955as 15565eu 17790as	11760me 15310as 15575me 21660as
0500	0600		USA, Armed Forces Radio 5765usb 12133usb	4319usb 6350usb 12579usb	5446usb 7507usb 13362usb	10320usb 13855usb
0500	0600		USA, KAIJ Dallas TX	5755va	
0500	0600		USA, KTBN Salt Lake City UT	7505na	
0500	0600		USA, KWHR Naalehu HI	17780as	
0500	0600		USA, Voice of America 6105af 7170va 11835af	6035af 7295af 13710af	6080af 9700va 15205va	11825va
0500	0600		USA, WBCQ Kennebunk ME	7415na	
0500	0600	twhfo	USA, WBCQ Kennebunk ME	9330no	
0500	0600	m	USA, WBCQ Kennebunk ME	5105no	
0500	0600		USA, WBOH Newport NC	5920am	
0500	0600		USA, WEWN Birmingham AL	5825na	7425na
0500	0600		USA, WHRA Greenbush ME	7580af	
0500	0600		USA, WHRI Noblesville IN	5745va	7315am
0500	0600		USA, WINB Red Lion PA	9320am	
0500	0600		USA, WJIE Louisville KY 13595am	7490am	11515va
0500	0600	mtwhf	USA, WMLK Bethel PA	9465eu	9955al
0500	0600		USA, WRMI Miami FL	9955am	
0500	0600		USA, WTJC Newport NC	9370no	
0500	0600		USA, WWCR Nashville TN 5770no 5935na	3210na	5070na
0500	0600		USA, WWRB Manchester TN 6890na	5050no	5085no
0500	0600		USA, WYFR Okeechobee FL	6855va	9355eu
0500	0600	vl	Vanuatu, Radio 3945al	7260do	
0500	0600		Zambia, Radio Christian Voice	9865af	
0500	0600	vl	Zimbabwe, ZBC Corp	5975do	
0515	0525		Rwanda, Radio 6005do		
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do
0530	0545		UK, BBC World Service	6010eu	9865eu
0530	0600		Thailand, Radio 13780eu		
0530	0600		UAE, Radio Dubai 15435va	17830va	21700va
0530	0600	mtwhf	UK, BBC World Service	17885af	

Shortwave Guide

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

0600	0615		South Africa, TWR	11640af		
0600	0620		Vatican City, Vatican Radio	4005eu	5890eu	7250eu
0600	0630		France, Radio France Intl	11725af	15155af	17800af
0600	0630		Swaziland, TWR	6120af	7205af	9500af
0600	0658		France, Radio France Intl	11665af		
0600	0700		Anguilla, Caribbean Beacon	6090am		
0600	0700		Australia, ABC NT Alice Springs	2310irr	4835do	
0600	0700		Australia, ABC NT Katherine	5025do		
0600	0700		Australia, ABC NT Tennant Creek	4910do		
0600	0700		Australia, Radio	9660pa	11880pa	12080va
				15160as	15240pa	15515vo 17750as
0600	0700		Canada, CFRX Toronto ON	6070do		
0600	0700		Canada, CFVP Calgary AB	6030do		
0600	0700		Canada, CKZN St John's NF	6160do		
0600	0700		Canada, CKZU Vancouver BC	6160do		
0600	0700		Costa Rica, University Network	5030am	6150am	7375am 9725sa
				11870am	13750na	17645as
0600	0700		Cuba, Radio Havana	9550am	9820na	11760na
0600	0700	1st a	Finland, Scandinavian Weekend Radio		6170eu	11690eu
0600	0700		Georgia, Radio Georgia	11805eu		
0600	0700		Germany, Deutsche Welle	6140eu	7225af	11785af 15410af
0600	0700		Germany, Radio Africa Intl	15435af		
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do	
0600	0700		Guyana, Voice of	3291do	5950do	
0600	0700		Japan, Radio	11715eu	11740os	11760eu
				15195as	17720va	17870pa 21755pa
0600	0700		Liberia, ELWA	4760do		
0600	0700		Malaysia, RTM Radio 4	7295do		
0600	0700		Malaysia, Voice of	6175os	9750as	15295au
0600	0700		Namibia, Namibion BC Corp	6060af	6175al	
0600	0700		New Zealand, Radio NZ Intl	9615po		
0600	0700		Nigeria, Radio/Enugu	6025do		
0600	0700		Nigeria, Radio/Ibadan	6050do		
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	
0600	0700		Nigeria, Radio/Lagos	3326do	4990do	
0600	0700		Nigeria, Voice of	17800af		
0600	0700		Papua New Guinea, NBC	4890do	9675irr	
0600	0700		Russia, Voice of	21790pa		
0600	0700		Sierra Leone, Radio UNAMSIL	6139af		
0600	0700		Singapore, Mediacorp Radio	6150do		
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do	
0600	0700		South Africa, Channel Africa	9525af	15215af	
0600	0700		Swazilond, TWR	7205af	9500af	
0600	0700	as	UK, BBC World Service	17885af		
0600	0700		UK, BBC World Service	6055af	6190af	6195eu
				7160af	9410eu	11765af
				11940af	11955os	12095eu 15310as
				15360as	15400af	15565eu 15575me
				17640af	17760as	17790as 21660as
0600	0700		USA, Armed Forces Radio	4319usb	5446usb	5765usb
				6350usb	7507usb	10320usb
				12133usb	12579usb	13362usb 13855usb
0600	0700		USA, KAIJ Dallas TX	5755va		
0600	0700		USA, KTBN Salt Loke City UT	7505no		
0600	0700		USA, KWHR Naalehu HI	17780as		
0600	0700		USA, Voice of America	5995va	6035af	6080af 6105af
				7170va	7295af	11825va
				11835af	11930va	11995af 15205va
0600	0700	m	USA, WBCQ Kennebunk ME	5105na		
0600	0700	twhfa	USA, WBCQ Kennebunk ME	9330na		
0600	0700		USA, WBOH Newport NC	5920om		
0600	0700		USA, WEWN Birminghom AL	5825na	7425na	
0600	0700		USA, WHRA Greenbush ME	7580af		
0600	0700		USA, WHRI Noblesville IN	5745va	7315am	
0600	0700		USA, WJIE Louisville KY	7490am	11515va	13595om
0600	0700	mtwhf	USA, WMLK Bethel PA	9465eu	9955al	
0600	0700		USA, WRMI Miami FL	9955om		
0600	0700		USA, WTJC Newport NC	9370na		
0600	0700		USA, WWCR Nashville TN	3210na	5070na	5770na 5935na
0600	0700		USA, WWRB Manchester TN	5050na	5085na	6890na
0600	0700		USA, WYFR Okeechobee FL	7355eu	11530eu	11580eu
0600	0700	vl	Vonuatu, Radio	3945al	4960do	7260irr
0600	0700		Yemen, Rep of Yemen Radio	9780me		
0600	0700		Zambia, Radio Christian Voice	9865af		
0600	0700	vl	Zimbabwe, ZBC Corp	5975do		
0605	0630	s	Austria, Radio Austria Intl	17870me		
0630	0645	as	UK, BBC World Service	9875eu		
0630	0700		Bulgaria, Radio	11600eu	13600eu	
0630	0700		Vatican City, Vatican Radio	9660af	11625af	13765af
0635	0700	s	Austria, Radio Austrio Intl	17870me		
0645	0700	as	Albania, TWR	11865eu		
0645	0700	as	Monaco, TWR	9870eu		

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

0700	0705		New Zealand, Radio NZ Intl	9615pa		
0700	0715		Croatia, Voice of	12110na		
0700	0726		Romania, Radio Romania Intl	11830na	15105na	
0700	0727		Czech Rep, Radio Prague Intl	11600eu		
0700	0727		Slovakia, Radio Slovakia Intl	13715au	15460au	17550au
0700	0730		Belgium, Radio Vlaanderen Intl	5965eu		
0700	0730	a	Tibet, Xizang PBS	9490as	9580as	
0700	0730	as	UK, BBC World Service	17885af		
0700	0745	whf	Germany, Bible Voice Broadcasting		5905eu	
0700	0745		USA, WYFR Okeechobee FL	7355eu		
0700	0750	as	Albania, TWR	11865eu		
0700	0750	as	Monaco, TWR	9870eu		
0700	0800		Anguilla, Caribbean Beacon	6090am		
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do	
0700	0800		Australia, ABC NT Katherine	5025do		
0700	0800		Australia, ABC NT Tennant Creek	4910do		
0700	0800		Australia, Radio	9660po	11880pa	12080va
				13630pa	15160as	15240va 17750as
0700	0800		Canada, CFRX Toronto ON	6070do		
0700	0800		Canada, CFVP Calgary AB	6030do		
0700	0800		Canada, CKZN St John's NF	6160do		
0700	0800		Canada, CKZU Vancouver BC	6160do		
0700	0800		Costa Rica, University Network	5030am	6150am	7375am 9725sa
				11870am	13750na	17645as
0700	0800		Eqt Guinea, Rodio Africa	15184af		
0700	0800	1st a	Finland, Scandinavian Weekend Radio		6170eu	11690eu
0700	0800		France, Radio France Intl	15605af		
0700	0800	as	Germany, Bible Voice Broadcasting		5905eu	
0700	0800		Germany, Deutsche Welle	6140eu		
0700	0800		Germany, Radio Africa Intl	15435af		
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do	
0700	0800		Guyana, Voice of	3291do	5950do	
0700	0800		Liberia, ELWA	4760do		
0700	0800		Malaysia, RTM Radio 4	7295do		
0700	0800		Malaysia, Voice of	6175as	9750as	15295au
0700	0800		Myanmar, Radio	9730do		
0700	0800		Nigeria, Radio Enugu	6025do		
0700	0800		Nigerio, Radio/Ibadan	6050do		
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do	
0700	0800		Nigeria, Radio/Lagos	3326do	4990do	
0700	0800		Nigeria, Voice of	17800of		
0700	0800		Papua New Guinea, NBC	4890do	9675irr	
0700	0800		Russia, Voice of	21790pa		
0700	0800		Sierra Leone, Radio UNAMSIL	6139af		
0700	0800		Singapore, Mediacorp Radio	6150do		
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do	
0700	0800		South Africa, Channel Africa	9525af		
0700	0800		Swaziland, TWR	7205af	9500af	
0700	0800		Taiwan, Radio Taiwan Intl	5950na		
0700	0800		UK, BBC World Service	6190af	6195eu	9410eu
				11760me	11765af	11940af
				11955as	12095eu	15310as 15360os
				15400af	15485eu	15565eu 17640eu
				17760as	17790as	21660as
0700	0800		USA, Armed Forces Radio	4319usb	5446usb	5765usb
				6350usb	7507usb	10320usb
				12133usb	12579usb	13362usb 13855usb
0700	0800		USA, KTBN Salt Lake City UT	7505no		
0700	0800		USA, KWHR Naolehu HI	11565pa	17780as	
0700	0800	n	USA, WBCQ Kennebunk ME	5105na		
0700	0800		USA, WBCQ Kennebunk ME	7415na		
0700	0800		USA, WBOH Newport NC	5920am		
0700	0800		USA, WEWN Birminghom AL	5825na	7425na	
0700	0800		USA, WHRA Greenbush ME	7580af		
0700	0800		USA, WHRI Noblesville IN	5745va	7315am	
0700	0800	mtwhf	USA, WMLK Bethel PA	9465eu	9955al	
0700	0800		USA, WRMI Miami FL	9955am		
0700	0800		USA, WTJC Newport NC	9370na		
0700	0800		USA, WWCR Nashville TN	3210na	5070na	5770na 5935na
0700	0800		USA, WYFR Okeechobee FL	9715af	9930af	
0700	0800	vl	Vanuotu, Radio	3945al	4960do	7260irr
0700	0800		Zambia, Radio Christian Voice	9865af		
0705	0720		UK, BBC World Service	6005af		
0706	0800		New Zealand, Radio NZ Intl	9885pa		
0715	0730		UK, BBC World Service	15575me		
0715	0800	smtwhf	Albania, TWR	11865eu		
0715	0800	mtwhf	Monoco, TWR	9870eu		
0730	0745	mtwhf	Vatican City, Vatican Radio	4005eu	5890eu	6185eu 7250eu
				9645va	11740eu	15595va
0730	0800	as	Guam, TWR/KTWR	15205as		
0730	0800		Switzerland, Swiss Radio Intl	13650af	15445af	21770af
0730	0800	as	UK, BBC World Service	15575me	17885af	
0740	0800	mtwhf	Guam, TWR/KTWR	15205os		
0745	0800	mtwhf	Guam, TWR/KTWR	11840		
0755	0800	s	Monaco, TWR	9870eu		

Shortwave Guide

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

0800	0804		Pakistan, Radio	17835eu	21465eu	
0800	0820	s	Albania, TWR	11865eu		
0800	0820	mtwhfs	Monaco, TWR	9870eu		
0800	0825		Malaysia, Voice of	6175as	9750as	
0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Creek	4910do		
0800	0830		Germany, Pan American BC	21590me		
0800	0830		Myanmar, Radio	9730do		
0800	0845		USA, WYFR Okeechobee FL	9930af		
0800	0900		Anguilla, Caribbean Beacon	6090am		
0800	0900		Australia, ABC NT Alice Springs	2310irr	4835do	
0800	0900		Australia, HCJB	11750pa		
0800	0900		Australia, Radio	5995nc	9580va	9590as
			9710pa	12080va	13630as	15240va
			15415as			
0800	0900		Canada, CFRX Toronto ON	6070do		
0800	0900		Canada, CFVP Calgary AB	6030do		
0800	0900		Canada, CKZN St John's NF	6160do		
0800	0900		Canada, CKZU Vancouver BC	6160do		
0800	0900		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
			17645as			
0800	0900		Eqt Guinea, Radio Africa	15184af		
0800	0900	1st o	Finland, Scandinavian Weekend Radio		6170eu	
			11690eu			
0800	0900		Germany, Deutsche Welle	6140eu		
0800	0900	DRM	Germany, Deutsche Welle	15440af	21675af	
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do	
0800	0900		Guam, TWR/KTWR	15205as		
0800	0900	mtwhf	Guam, TWR/KTWR	11840as		
0800	0900		Guyana, Voice of	3291do	5950do	
0800	0900		Indonesia, Voice of	9525pa	15150as	
0800	0900	as/vl	Italy, IRRS	13840va		
0800	0900		Liberia, ELWA	4760do		
0800	0900		Malaysia, RTM Radio 4	7295do		
0800	0900		New Zealand, Radio NZ Int	9885pa		
0800	0900		Nigeria, Radio Enugu	6025do		
0800	0900		Nigeria, Radio/Ibadan	6050do		
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do	
0800	0900		Nigeria, Radio/Lagos	3326do	4990do	
0800	0900		Nigeria, Voice of	17800af		
0800	0900		Papua New Guinea, NBC	4890do	9675irr	
0800	0900		Russia, Voice of	17495pa	17525pa	17665pa
			21790pa			
0800	0900		Sierra Leone, Radio UNAMSIL	6139af		
0800	0900		Singapore, Mediacorp Radio	6150do		
0800	0900	vl	Solomon Islands, SIBC	5020do	9545do	
0800	0900	s	South Africa, Amateur Radio League		9750af	
			17780af			
0800	0900	a	South Africa, Radio League	9750af	17780af	
0800	0900		South Korea, Radio Korea Intl	9570as	13670eu	
0800	0900		Swaziland, TWR	7205af	9500af	
0800	0900		Taiwan, Radio Taiwan Intl	9610au		
0800	0900		UK, BBC World Service	6190af	9410eu	
			11760me	11940af	11955as	12095eu
			15310as	15360as	15400af	15485eu
			15565eu	17640eu	17760as	17790as
			17830af	17885af	21470af	21660as
0800	0900	as	UK, BBC World Service	15575me		
0800	0900		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0800	0900		USA, KAIJ Dallas TX	5755va		
0800	0900		USA, KNLS Anchor Point AK	11765as		
0800	0900		USA, KTBN Salt Lake City UT	7505na		
0800	0900		USA, KWHR Naalehu HI	9930as	11565pa	
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Birmingham AL	5825na	7425na	
0800	0900		USA, WHRI Noblesville IN	5745va	7315am	
0800	0900		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
0800	0900	mtwhf	USA, WMLK Bethel PA	9465eu	9955al	
0800	0900		USA, WRMI Miami FL	9955am		
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN	3210na	5070na	
			5770na	5935na		
0800	0900		USA, WYFR Okeechobee FL	5950na		
0800	0900	vl	Vanuatu, Radio	3945al	4960do	7260irr
0800	0900		Zambia, Radio Christian Voice	9865af		
0800		mtwhf	Albania, TWR	11865eu		
0815	0900	as	Guam, TWR/KTWR	11840as		
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek	2325do		
0830	0900		Austria, AWR Europe	9660af		
0830	0900		Georgia, Radio Georgia	11910eu		
0830	0900		Switzerland, Swiss Radio Intl	21770af		
0845	0900	DRM	Netherlands, FEBA	9815eu		

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

0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do	
0900	0929		Czech Rep, Radio Prague Intl	21745va		
0900	0930		Guam, TWR/KTWR	11840as		
0900	0945		USA, WYFR Okeechobee FL	5950na		
0900	0956		China, China Radio Intl	15210pa	17690pa	
0900	1000		Anguilla, Caribbean Beacon	6090am		
0900	1000		Australia, ABC NT Alice Springs	2310do	4835irr	
0900	1000		Australia, ABC NT Katherine	2485do		
0900	1000		Australia, ABC NT Tennant Creek	2325do		
0900	1000		Australia, HCJB	11750pa		
0900	1000		Australia, Radio	9580va	9590as	11880as
			15240va	15415as		
0900	1000		Australia, Voice Intl	11955as	13685as	
0900	1000		Canada, CFRX Toronto ON	6070do		
0900	1000		Canada, CFVP Calgary AB	6030do		
0900	1000		Canada, CKZN St John's NF	6160do		
0900	1000		Canada, CKZU Vancouver BC	6160do		
0900	1000		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
			17645as			
0900	1000		Eqt Guinea, Radio Africa	15184af		
0900	1000	1st o	Finland, Scandinavian Weekend Radio		6170eu	
			11690eu			
0900	1000	DRM/ m-f	Germany, Deutsche Welle	15440af	17700af	
			21675af			
0900	1000		Germany, Deutsche Welle	6140eu	15440af	
0900	1000		Guyana, Voice of	3291do	5950do	
0900	1000	as/vl	Italy, IRRS	13840va		
0900	1000		Malaysia, RTM Radio 4	7295do		
0900	1000	DRM	Netherlands, Radio	9815eu		
0900	1000		New Zealand, Radio NZ Intl	9885pa		
0900	1000		Nigeria, Radio Enugu	6025do		
0900	1000		Nigeria, Radio/Ibadan	6050do		
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	
0900	1000		Nigeria, Radio/Lagos	3326do	4990do	
0900	1000		Nigeria, Voice of	17800af		
0900	1000		Palua, KHBN	15725as		
0900	1000		Papua New Guinea, NBC	4890do	9675irr	
0900	1000		Russia, Voice of	17495pa	17525pa	17665pa
0900	1000		Singapore, Mediacorp Radio	6150do		
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do	
0900	1000	s	UAE, Radio UNMEE	21460af		
0900	1000		UK, BBC World Service	6190af	6195as	
			9605as	9740as	11760me	11940af	12095eu
			15190sa	15310as	15360as	15400af
			15485eu	15565eu	15575me	17640eu
			17760as	17790as	17830af	17885af
			21470af	21660as		
0900	1000		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0900	1000		USA, KAIJ Dallas TX	5755va		
0900	1000		USA, KTBN Salt Lake City UT	7505na		
0900	1000		USA, KWHR Naalehu HI	9930as	11565pa	
0900	1000		USA, WBOH Newport NC	5920am		
0900	1000		USA, WEWN Birmingham AL	5825na	7425na	
0900	1000		USA, WHRA Greenbush ME	7580af		
0900	1000		USA, WHRI Noblesville IN	5745va	7315am	
0900	1000		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
0900	1000		USA, WRM Miami FL	9955am		
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCR Nashville TN	3210na	5070na	
			5770na	5935na		
0900	1000	vl	Vanuatu, Radio	3945al	4960do	7260irr
0900	1000		Zambia, Radio Christian Voice	9865af		
0910	0930	s	Armenia, Voice of	4810eu	15270as	
0930	1000		Georgia, Radio Georgia	11910me		
0930	1000		Greece, Voice of	9420eu	12105eu	15630eu
0930	1000		Lithuania, Radio Vilnius	9710eu		
0945	1000		Serbia & Montenegro, Intl Radio	9850eu		

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

1000	1030		Germany, Deutsche Welle	6205as	15190as	
			17820as			
1000	1030		Guam, AWR/KSDA	11705as	11900as	
1000	1030		UK, BBC World Service	9605as	15360as	
1000	1030	as	UK, BBC World Service	15190sa	15400af	
			17830af			
1000	1045		USA, KWHR Naalehu HI	9930as	11565pa	
1000	1056		China, China Radio Intl	15210pa	17690pa	
1000	1056		North Korea, Voice of	3560as	9335am	
			9850as	11709am	11735as	
1000	1059		New Zealand, Radio NZ Intl	9885pa		
1000	1100		Anguilla, Caribbean Beacon	11775am		
1000	1100		Australia, ABC NT Alice Springs	2310do	4835irr	
1000	1100		Australia, ABC NT Katherine	2485do		
1000	1100		Australia, ABC NT Tennant Creek	2325do		
1000	1100		Australia, HCJB	11750pa		
1000	1100		Australia, Radio	9580va	9590as	11880as

			15240va	15415as	
1000	1100		Australia, Voice Intl	11955as	13685as
1000	1100		Canada, CFRX Toronto ON	6070da	
1000	1100		Canada, CFVP Calgary AB	6030do	
1000	1100		Canada, CKZN St John's NF	6160do	
1000	1100		Canada, CKZU Vancouver BC	6160do	
1000	1100		Costa Rico, University Network	5030am	6150om
			7375am	9725so	11870om 13750na
			17645as		
1000	1100		Eqt Guinea, Radio Africa	15184af	
1000	1100	1st a	Finland, Scandinavian Weekend	Radio	6170eu
			11720eu		
1000	1100	mtwhf	Germany, Deutsche Welle	17700va	
1000	1100	DRM/ m-f	Germany, Deutsche Welle	15440eu	17700eu
1000	1100	DRM	Germany, Deutsche Welle	6140eu	
1000	1100		Guyana, Voice of	3291do	5949do
1000	1100		India, All India Radio	7270as	13710as
			15020as	15235as	15260as 17510au
			17800as	17895au	
1000	1100	as/vl	Italy, IRRS	13840va	
1000	1100		Japan, Radio	6120na	9695as 11730as
			17585eu	21755pa	
1000	1100		Maloysia, RTM Radio 4	7295do	
1000	1100	DRM	Netherlands, Radio	9815eu	
1000	1100		Netherlands, Radio	9785au	13710as 12065as
			13820as		
1000	1100		Palau, KH8N	15725as	
1000	1100		Papua New Guinea, NBC	4890do	9675irr
1000	1100		Singapore, Mediacorp Radio	6150do	
1000	1100	vl	Solomon Islands, SIBC	5020do	9545do
1000	1100		South Africa, Radio Veritas	7240af	
1000	1100		UK, B8C World Service	6190af	6195va
			9740as 11760me	12095eu	15190sa 15310as
			15485eu	15565eu	15575me 17640eu
			17760as	17790as	17885af 21470af
1000	1100	DRM	UK, B8C World Service	7320eu	
1000	1100	DRM/ m	UK, Christian Voice	9760eu	
1000	1100		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb 10320usb
			12133usb	12579usb	13362usb 13855usb
1000	1100		USA, KAIJ Dallas TX	5755va	
1000	1100		USA, KTBN Salt Lake City UT	7505na	
1000	1100		USA, WBOH Newport NC	5920am	
1000	1100		USA, WEWN Birmingham AL	5825na	7425na
1000	1100		USA, WHRI Noblesville IN	9495am	9840na
1000	1100		USA, WJIE Louisville KY	7490am	11515va
			13595am		
1000	1100		USA, WTJC Newport NC	9370na	
1000	1100		USA, WWCR Nashville TN	5070na	5770na
			5935na	9435na	
1000	1100		USA, WYFR Okeechobee FL	5950na	9755sa
1000	1100	mtwhfa.vl	Vanuatu, Radio	3945al	4960do 7260irr
1000	1100		Zambia, Radio Christian Voice	9865af	
1010	1020		Israel, Kol Israel	15640va	17535va
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do 9704do
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu
1030	1100		Germany, Deutsche Welle	15440va	
1030	1100	mt hfa	Guam, AWR/KSDA	11900as	
1030	1100		Iran, Voice of the Islamic Rep	15600as	17660as
1030	1100		UAE, Radio Dubai	15370va	
1030	1100	t	UAE, Radio UNMEE	21550af	
1030	1100		UK, BBC World Service	9605as	11945as
			15285as	21660as	
1030	1100	as	UK, BBC World Service	15400af	17830af
1030	1100	mt hfa	Vatican City, Vatican Radio	5890eu	
1045	1100		USA, KWHR Naalehu HI	9930as	
1045	1100	as	USA, KWHR Naalehu HI	11565pa	

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

1100	1104		Pakistan, Radio	17835eu	21465eu
1100	1115	mtwhfa.vl	Vanuatu, Radio	3945al	4960do 7260irr
1100	1130		Iran, Voice of the Islamic Rep	15600as	17660as
1100	1130		Tibet, Xizang PBS	4920as	6110as 9490as
1100	1130	t	UAE, Radio UNMEE	21550af	
1100	1130		UK, BBC World Service	15400af	
1100	1130	mtwhf	UK, BBC World Service	6195ca	15190ca
1100	1130		Vietnam, Voice of	7285as	
1100	1145		USA, WYFR Okeechobee FL	9755so	
1100	1155	DRM/ m-f	UK, BBC World Service	17710eu	
1100	1200		Anguilla, Caribbean Beacon	11775am	
1100	1200		Australia, ABC NT Alice Springs	2310da	4835irr
1100	1200		Australia, ABC NT Katherine	2485do	
1100	1200		Australia, ABC NT Tennant Creek	2325do	
1100	1200		Australia, Radio	5995pa	6020pa 6035va
			9475as 9580vo	9590as	11880as 15240va
1100	1200		Australia, Voice Intl	13685as	
1100	1200		Canada, CFRX Toronto ON	6070do	
1100	1200		Canada, CFVP Calgary AB	6030da	
1100	1200		Canada, CKZN St John's NF	6160do	
1100	1200		Canada, CKZU Vancouver BC	6160do	
1100	1200		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am 13750na
			17645as		
1100	1200		Ecuador, HCJB	12005va	
1100	1200	1st a	Finland, Scandinavian Weekend	Radio	6170eu
			11720eu		
1100	1200		Germany, Deutsche Welle	17670as	21650as
1100	1200	DRM	Germany, Deutsche Welle	15440eu	
1100	1200	s	Germany, Overcomer Ministries	6110eu	
1100	1200	as/vl	Italy, IRRS	13840va	
1100	1200		Japan, Radio	6120na	9695as 11730as
			17585eu		
1100	1200		Malaysia, RTM Radio 4	7295do	
1100	1200		Mongolia, Voice of	9720as	
1100	1200		Netherlands, Radio	11675na	
1100	1200		New Zealand, Radio NZ Intl	9885pa	
1100	1200		Papua New Guinea, NBC	4890do	9675irr
1100	1200		Singapore, Radio Singapore Intl	6080as	6150as
1100	1200		South Africa, Channel Africa	9525af	
1100	1200		South Africa, Radio Veritas	7240af	
1100	1200		Taiwan, Radio Taiwan Intl	7445as	
1100	1200	DRM/ as	UK, B8C World Service	9410eu	
1100	1200	DRM	UK, B8C World Service	7320eu	21780eu
1100	1200		UK, BBC World Service	6190af	6195va
			9740as 11760me	11940af	12095eu 15190am
			15310as	15485eu	15565eu 15575me
			17640eu	17760as	17790as 17830af
			17885af	21470af	
1100	1200		Ukraine, Radio Ukraine Intl	15415eu	
1100	1200		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb 10320usb
			12133usb	12579usb	13362usb 13855usb
1100	1200		USA, KAIJ Dallas TX	5755va	
1100	1200		USA, KT8N Salt Lake City UT	7505na	
1100	1200	as	USA, KWHR Naalehu HI	11565pa	
1100	1200	mtwhf	USA, KWHR Naalehu HI	9930as	
1100	1200		USA, WBOH Newport NC	5920am	
1100	1200		USA, WEWN Birmingham AL	5825na	7425na
1100	1200		USA, WHRI Noblesville IN	9495am	9840na
1100	1200		USA, WINB Red Lion PA	9320am	
1100	1200		USA, WJIE Louisville KY	7490am	11515va
			13595am		
1100	1200		USA, WTJC Newport NC	9370na	
1100	1200		USA, WWCR Nashville TN	5070na	5770na
			5935na	15825na	
1100	1200		USA, WYFR Okeechobee FL	5850na	5950na
			6015na	7355na	11855na
1100	1200		Zambia, Radio Christian Voice	9865af	
1101	1200		Germany, Overcomer Ministries	9485eu	11950eu
			13650eu	15235me	15265me 17590af
			17735as	21590af	21760af
1115	1145		Nepal, Radio	5005as	
1130	1145		UK, BBC World Service	7135as	11920as
1130	1200		Belgium, Radio Vlaanderen Intl	9940as	
1130	1200		Bulgaria, Radio	11700eu	15700eu
1130	1200	va/cs	Germany, Bible Voice Broadcasting		12065as
1130	1200		South Korea, Radio Korea Intl	9650na	
1130	1200	a	UK, Wales Radio Intl	17625au	
1130	1200	f	Vatican City, Vatican Radio	15595va	17515vo
1145	1155		Rwanda, Radio	6055do	

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

1200	1215	vl	Cambodia, National Radio Of	11940as	
1200	1230		France, Radio France Intl	17815af	25820af
1200	1230		South Korea, Radio Korea Intl	9650na	
1200	1230		UAE, AWR Africa	15135as	
1200	1230	as	UK, BBC World Service	6195ca	15190am
1200	1230		Uzbekistan, Radio Tashkent Intl	5060as	5975as
			6025as 9715as		
1200	1245	va/mtwhf	Germany, Bible Voice Broadcasting		12065as
1200	1245		USA, WYFR Okeechobee FL	5850na	5950na
			6015na		
1200	1256		China, China Radio Intl	9730as	9760pa
			11760pa	11980as	15415pa
1200	1259		Canada, Radio Canada Intl	9515am	9660as
			13655am	15190as	17800am
1200	1300		Anguilla, Caribbean Beacon	11775am	
1200	1300		Australia, ABC NT Alice Springs	2310do	4835irr
1200	1300		Australia, ABC NT Katherine	2485do	
1200	1300		Australia, ABC NT Tennant Creek	2325do	
1200	1300		Australia, Radio	5995pa	6020pa 6035va
			9475as 9580va	9590as	11880as 15240va
1200	1300		Australia, Voice Intl	13685as	
1200	1300		Canada, CBC Northern Service	9625do	
1200	1300		Canada, CFRX Toronto ON	6070do	
1200	1300		Canada, CFVP Calgary AB	6030do	
1200	1300		Canada, CKZN St John's NF	6160do	
1200	1300		Conada, CKZU Voncouver BC	6160do	
1200	1300		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am 13750na
			17645as		
1200	1300		Ecuador, HCJB	12005va	
1200	1300	1st a	Finland, Scandinavian Weekend	Radio	6170eu
			11720eu		
1200	1300	DRM	Germany, Deutsche Welle	9655eu	15440eu
1200	1300		Malaysia, RTM Radio 4	7295do	
1200	1300	DRM	Netherlands, Radio	9815eu	

Shortwave Guide

1200	1300		New Zealand, Radio NZ Intl	9885pa		
1200	1300		Papua New Guinea, NBC	4890do	9675irr	
1200	1300		Singapore, Radio Singapore Intl	6080as	6150as	
1200	1300		South Africa, Channel Africa	9525af		
1200	1300		South Africa, Radio Veritas	7240af		
1200	1300		Taiwan, Radio Taiwan Intl	7130as		
1200	1300	DRM	UK, BBC World Service	7320eu	21780eu	
1200	1300	DRM/ as	UK, BBC World Service	9410eu		
1200	1300		UK, BBC World Service	6190af	6195as	
			9740as11760me 11940af	12095eu	15310as	
			15485eu 15565eu	15575me	17640eu	
			17760as 17790as	17830af	17885af	
			21470af			
1200	1300		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb	7507usb	10320usb	
			12133usb 12579usb	13362usb	13855usb	
1200	1300		USA, KAIJ Dallas TX 13815va			
1200	1300		USA, KTBN Salt Lake City UT	7505na		
1200	1300		USA, KWHR Naalehu HI	9930as		
1200	1300	as	USA, KWHR Naalehu HI	11565po		
1200	1300		USA, Voice of America	6110va	9645va	
			9760va 11705va	11715va	15250va	
			15425va			
1200	1300		USA, WBOH Newport NC	5920am		
1200	1300		USA, WEWN Birmingham AL	5825na	7425na	
1200	1300		USA, WHRI Noblesville IN	9495am	9840na	
1200	1300		USA, WINB Red Lion PA	9320am		
1200	1300		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
1200	1300		USA, WTJC Newport NC	9370na		
1200	1300		USA, WWCR Nashville TN	5070na	5770na	
			5935na 15825na			
1200	1300		USA, WYFR Okeechobee FL	13695na	17750na	
1200	1300		Zambia, Radio Christian Voice	9865af		
1215	1300		Egypt, Radio Cairo 17670as			
1230	1245		UK, BBC World Service	15425af	17780af	
			21640af			
1230	1300		Australia, HCJB 15405pa			
1230	1300		Bangladesh, Bangla Betar	7185as	9550as	
1230	1300		Sri Lanka, SLBC 6005as	9770as	15745as	
1230	1300		Sweden, Radio 13580va	15240na	15735va	
1230	1300		Thailand, Radio 9855va			
1230	1300		Turkey, Voice of 15255va	15405eu		
1230	1300		Vietnam, Voice of 12020va			

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

1300	1320		Turkey, Voice of 15255va	15405eu		
1300	1329		Czech Rep, Radio Prague Intl	13580eu	21745af	
1300	1330		Australia, HCJB 15405pa			
1300	1330	DRM	Canada, Radio Canada Intl	9815eu		
1300	1330		Ecuador, HCJB 12005va			
1300	1330		Egypt, Radio Cairo 17670as			
1300	1355		Poland, Radio Polonia	9525eu	11820eu	
1300	1356		China, China Radio Intl	9570na	9755pa	
			11760pa 11900as	11980as	15180as	
1300	1356		North Korea, Voice of	4405as	7505eu	
			9335na 11335eu	11710am		
1300	1356		Romania, Radio Romania Intl	11830eu	15105eu	
1300	1400		Anguilla, Caribbean Beacon	11775am		
1300	1400		Australia, Radio 5995pa	6020pa	6025va	
			9580va 9590as			
1300	1400		Australia, Voice Intl 13685as			
1300	1400		Canada, CBC Northern Service	9625do		
1300	1400		Canada, CFRX Toronto ON	6070do		
1300	1400		Canada, CFVP Calgary AB	6030do		
1300	1400		Canada, CKZN St John's NF	6160do		
1300	1400		Canada, CKZU Vancouver BC	6160da		
1300	1400		Canada, Radio Canada Intl	9515am	13655am	
			17820am			
1300	1400		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa	11870am	13750na	
			17645as			
1300	1400	1st a	Finland, Scandinavian Weekend Radio		6170eu	
			11720eu			
1300	1400	DRM	Germany, Deutsche Welle	9655eu	15440eu	
1300	1400		Germany, Deutsche Welle	6140eu	9655va	
			15440va			
1300	1400		Germany, Overcomer Ministries	6110eu	13810me	
1300	1400		Jordan, Radio 11690eu			
1300	1400		Malaysia, RTM Radio 4	7295do		
1300	1400		New Zealand, Radio NZ Intl	6095po		
1300	1400		Papua New Guinea, NBC	4890do	9675irr	
1300	1400		Singapore, Radio Singapore Intl	6080as	6150as	
1300	1400		South Africa, Radio Veritas	7240af		
1300	1400		South Korea, Radio Korea Intl	9570as	13670as	
1300	1400		Sri Lanka, SLBC 6005as	9770as	15745as	
1300	1400	DRM	UK, BBC World Service	7320eu		
1300	1400	DRM/ m-f	UK, BBC World Service	9410eu		
1300	1400		UK, BBC World Service	6190af	6195va	
			9740as11760me 11940af	12095eu	15190am	
			15310as 15420af	15485eu	15565eu	
			15575me 17640eu	17760as	17790as	
			17830af 17885af	21470af		
1300	1400		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb	7507usb	10320usb	
			12133usb 12579usb	13362usb	13855usb	
1300	1400		USA, KJES Vado NM	11715nc		
1300	1400		USA, KNLS Anchor Point AK	11870as		
1300	1400		USA, KTBN Salt Lake City UT	7505na		
1300	1400		USA, KWHR Naalehu HI	9930as		
1300	1400		USA, Voice of America	6110va	9760vo	
			11705va 15425va			
1300	1400	mtwhf	USA, WBCQ Kennebunk ME	17495na		
1300	1400		USA, WBOH Newport NC	5920am		
1300	1400		USA, WEWN Birmingham AL	5825na	7425na	
1300	1400		USA, WHRA Greenbush ME	17560af		
1300	1400		USA, WHRI Noblesville IN	9840na	15105am	
1300	1400		USA, WINB Red Lion PA	9930am		
1300	1400		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
1300	1400		USA, WTJC Newport NC	9370na		
1300	1400		USA, WWCR Nashville TN	5935na	9475na	
			12160na 15825na			
1300	1400		USA, WYFR Okeechobee FL	11830na	11865na	
			11970as 11970as	13695na	17750na	
1300	1400		Zambia, Radio Christian Voice	9865af		
1305	1315	mtwhfa	Turkmenistan, Turkmen Radio	5015as		
1305	1330	as	Austria, Radio Austria Intl	6155eu	13730eu	
1315	1320	mtwhf	Austria, Radio Austria Intl	17855as		
1315	1330	a	India, TWR 9485as			
1330	1345		UK, BBC World Service	15105af	21640af	
1330	1350		UAE, Radio Dubai 13630eu	13675eu	15395eu	
1330	1400		Guam, AWR/KSDA 11980as			
1330	1400	mt hfa	Guam, AWR/KSDA 15660as			
1330	1400		India, All India Radio	9690as	11620as	
			13710as			
1330	1400		Laos, National Radio	7145as		
1330	1400	DRM	Netherlands, Radio 9815eu			
1330	1400		Serbia & Montenegro, Intl Radio	11835au		
1330	1400		Sweden, Radio 15240na	15735va		
1330	1400		Uzbekistan, Radio Tashkent Intl	5060as	5975as	
			6025as9715as			
1335	1345	as	Austria, Radio Austria Intl	6155eu	13730eu	
1345	1400		Austria, Radio Austria Intl	6155eu	13730eu	
1345	1400	mtwhf	Austria, Radio Austria Intl	17855as		

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

1400	1415		Seychelles, FEBA 9495as			
1400	1415	mtw	UK, BBC World Service	11860at	15420af	
			21490af			
1400	1430		Thailand, Radio 9830as			
1400	1456		China, China Radio Intl	9755na	11675as	
			11765af 13685af	15125na	17720na	
1400	1500		Anguilla, Caribbean Beacon	11775am		
1400	1500		Australia, Radio 5995va	6080pa	7240as	
			9475as9590va 11750as			
1400	1500		Australia, Voice Intl 13635as			
1400	1500		Canada, CBC Northern Service	9625do		
1400	1500		Canada, CFRX Toronto ON	6070do		
1400	1500		Canada, CFVP Calgary AB	6030do		
1400	1500		Canada, CKZN St John's NF	6160do		
1400	1500		Canada, CKZU Vancouver BC	6160do		
1400	1500		Canada, Radio Canada Intl	9515am	13655am	
			17820am			
1400	1500		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa	11870am	13750na	
			17645as			
1400	1500	1st a	Finland, Scandinavian Weekend Radio		6170eu	
			11720eu			
1400	1500		France, Radio France Intl	7175as	11610as	
			17515as 17620as			
1400	1500	va/h	Germany, Bible Voice Broadcasting		17485as	
1400	1500		Germany, Deutsche Welle	6140eu		
1400	1500		Germany, Overcomer Ministries	6110eu	13810me	
			17550as 21590sa			
1400	1500		Germany, Pan American BC	15650me		
1400	1500		India, All India Radio	9690as	11620as	
			13710as			
1400	1500		Japan, Radio 7200as	11730as	11840pa	
1400	1500		Jordan, Radio 11690eu			
1400	1500		Netherlands, Radio 9890as	11835as	12075as	
1400	1500		New Zealand, Radio NZ Intl	6095po		
1400	1500		Oman, Radio 15140eu			
1400	1500	DRM	Russia, Voice of 9495eu			
1400	1500		Singapore, Mediacorp Radio	6150do		
1400	1500	as	South Africa, Channel Africa	9525af		
1400	1500		Sri Lanka, SLBC 6005as	9770as	15745as	
1400	1500		Taiwan, Radio Taiwan Intl	15265as		
1400	1500	DRM	UK, BBC World Service	7320eu	9410eu	
1400	1500		UK, BBC World Service	6190af	6195as	
			7160as9740as 11940af	12095eu	15190am	
			15310as 15485eu	15565eu	15575me	
			17640eu 17790as	17830af	21470af	
			21660at			
1400	1500		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb	7507usb	10320usb	

			12133usb	12579usb	13362usb	13855usb
1400	1500		USA, KJES Vado NM		11715na	
1400	1500		USA, KTBN Salt Lake City UT		7505na	
1400	1500		USA, KWHR Naalehu HI		9930as	
1400	1500		USA, Voice of America		6110va	7125va
			9645va	9760va	11705va	15205va
			15425va			
1400	1500	mtwhf	USA, WBCQ Kennebunk ME		17495na	
1400	1500		USA, WBOH Newport NC		5920am	
1400	1500		USA, WEWN Birmingham AL		5825na	7425na
1400	1500		USA, WHRA Greenbush ME		17560af	
1400	1500		USA, WHRI Noblesville IN		9840na	15105am
1400	1500		USA, WINB Red Lion PA		9930am	
1400	1500		USA, WJIE Louisville KY		7490am	11515va
			13595am			
1400	1500		USA, WTJC Newport NC		9370na	
1400	1500		USA, WWCR Nashville TN		9475na	12160na
			13845na	15825na		
1400	1500	mtwhf	USA, WWRB Manchester TN		9320na	12172na
1400	1500		USA, WYFR Okeechobee FL		11830na	11970as
			17750na			
1400	1500		Zambia, Radio Christian Voice		9865af	
1415	1430		Nepal, Radio	5005as		
1415	1500		Australia, HCJB	15405pa		
1430	1500	va/a	Germany, Bible Voice Broadcasting			5945as
			17485as			
1430	1500	va/as	Germany, Bible Voice Broadcasting			17485as
1430	1500		Myanmar, Radio	5040do	5985do	
1445	1500	mtwhfa	UK, BBC World Service		6140as	7205as
			15425as			

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

1500	1530		Bhutan, Bhutan BC Service		6035do	
1500	1530		Mongolia, Voice of	9720as		
1500	1530		UK, BBC World Service		11860af	15420af
			21490af			
1500	1530		Vietnam, Voice of	7285as		
1500	1556		China, China Radio Intl		7160as	9785as
			11675as	11765as	13685af	15125af
			17720na			
1500	1556		North Korea, Voice of		4405as	7505eu
			9335am	11335eu	11710am	
1500	1557		Canada, Radio Canada Intl		15455as	17720as
1500	1559		Canada, Radio Canada Intl		9515am	13655am
			17820am			
1500	1600		Anguilla, Caribbean Beacon		11775am	
1500	1600		Australia, HCJB	15405pa		
1500	1600		Australia, Radio		5995va	6080pa
			9475as	9590as	11750as	
1500	1600		Australia, Voice Intl	13635as		
1500	1600		Canada, CBC Northern Service		9625do	
1500	1600		Canada, CFRX Toronto ON		6070do	
1500	1600		Canada, CFVP Calgary AB		6030do	
1500	1600		Canada, CKZN St John's NF		6160do	
1500	1600		Canada, CKZU Vancouver BC		6160do	
1500	1600		Costa Rica, University Network		5030am	6150am
			7375am	9725sa	11870am	13750na
			17645as			
1500	1600	1st o	Finland, Scandinavian Weekend Radio			5990eu
			11720eu			
1500	1600	va/s	Germany, Bible Voice Broadcasting			17485as
1500	1600		Germany, Deutsche Welle		6140eu	
1500	1600		Germany, Overcomer Ministries		6110eu	13810me
			21590sa			
1500	1600		Germany, Pan American BC		15650me	
1500	1600		Guam, TWR/KTWR	12105as		
1500	1600		Japan, Radio	7200as	9505am	11730as
1500	1600		Jordan, Radio	11690na		
1500	1600		Myanmar, Radio	5040do	5985do	
1500	1600		Netherlands, Radio	9890as	11835as	12075as
1500	1600		New Zealand, Radio NZ Intl		6095pa	
1500	1600	DRM	Russia, Voice of	9495eu		
1500	1600		Russia, Voice of	6205as	7260as	7315as
			7350as	11500as		
1500	1600		Seychelles, FEBA	7350as		
1500	1600		Singapore, Mediacorp Radio		6150da	
1500	1600		South Africa, Channel Africa		9525af	17770af
1500	1600		Sri Lanka, SLBC	6005as	9770as	15745as
1500	1600	mtwhf	Sudan, Sudan Radio Service		15290af	15530af
1500	1600		UK, BBC World Service		5975as	6190af
			6195as	7160as	9410eu	9740as	11940af
			12095eu	15190am	15310as	15400af
			15485eu	15565eu	17790as	17830af
			21470af	21660af		
1500	1600		USA, Armed Forces Radio		4319usb	5446usb
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1500	1600		USA, KJES Vado NM		11715na	
1500	1600		USA, KTBN Salt Lake City UT		15590na	
1500	1600		USA, KWHR Naalehu HI		9930as	
1500	1600		USA, Voice of America		6110va	7125va
			9575va	9645va	9760va	9765va
			9825va	15205va	15395va	15460va
1500	1600	mtwhf	USA, WBCQ Kennebunk ME		17495na	
1500	1600		USA, WBOH Newport NC		5920am	
1500	1600		USA, WEWN Birmingham AL		5825na	7425na
1500	1600		USA, WHRA Greenbush ME		17650af	
1500	1600		USA, WHRI Noblesville IN		9840na	15105am
1500	1600		USA, WINB Red Lion PA		9930am	
1500	1600		USA, WJIE Louisville KY		7490am	11515va
			13595am			
1500	1600		USA, WTJC Newport NC		9370na	
1500	1600		USA, WWCR Nashville TN		9475na	12160na
			13845na	15825na		
1500	1600	mtwhf	USA, WWRB Manchester TN		9320na	12172na
1500	1600		USA, WYFR Okeechobee FL		11830na	17750na
1500	1600		Zambia, Radio Christian Voice		9865af	
1515	1530		Vatican City, Vatican Radio		9865as	13765as
			15235as			
1530	1600		Germany, Bible Voice Broadcasting			16510eu
1530	1600		Iran, Voice of the Islamic Rep		9635as	11650as
1530	1600		UAE, AWR Africa	15225as		
1530	1600		UK, BBC World Service		11685as	15540as
1530	1600	a	Vatican City, Vatican Radio		9865af	13765af
			15235af			
1545	1600	va/mtwh	Germany, Bible Voice Broadcasting			15680me

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

1600	1615	va/mtwf	Germany, Bible Voice Broadcasting			15680me
1600	1615		Pakistan, Radio		9395me	11570me	11640af
			15725af	17820af			
1600	1627		Czech Rep, Radio Prague Intl		5930eu	17485af
1600	1628	s	Hungary, Radio Budapest		6025eu	9585eu
1600	1630		Guam, AWR/KSDA	15495as		
1600	1630		Iran, Voice of the Islamic Rep		9635as	11650as
1600	1630		Sri Lanka, SLBC	6005as	9770as	15745as
1600	1630		Vietnam, Voice of	7220as	9550as	11630va
1600	1635		UAE, Radio Dubai	13630am	13675eu	15395eu
			21605eu			
1600	1645	va/h	Germany, Bible Voice Broadcasting			15680me
1600	1645		USA, WYFR Okeechobee FL		17750na	
1600	1656		China, China Radio Intl		7190af	9570af
			13685af	15125af		
1600	1656		North Korea, Voice of		3560as	9975af
			11735af			
1600	1700		Anguilla, Caribbean Beacon		11775am	
1600	1700		Australia, HCJB	15405pa		
1600	1700		Australia, Radio		5995va	6080pa	7240as
			9475as				
1600	1700		Australia, Voice Intl	13635as		
1600	1700		Canada, CBC Northern Service		9625do	
1600	1700		Canada, CFRX Toronto ON		6070do	
1600	1700		Canada, CFVP Calgary AB		6030do	
1600	1700		Canada, CKZN St John's NF		6160do	
1600	1700		Canada, CKZU Vancouver BC		6160do	
1600	1700		Costa Rica, University Network		5030am	6150am
			7375am	9725sa	11870am	13750na
			17645as			
1600	1700		Ethiopia, Radio		5990af	7110af	7165af
			9560af	9704af	11800af		
1600	1700	1st a	Finland, Scandinavian Weekend Radio			5990eu
			11720eu			
1600	1700		France, Radio France Intl		6010af	9730af
			11615af	15160af	15605af	17605af
			17850af			
1600	1700	DRM	Germany, Deutsche Welle		6140eu	
1600	1700		Germany, Deutsche Welle		6170as	7225as
			11695as			
1600	1700		Jordan, Radio	11690na		
1600	1700		New Zealand, Radio NZ Intl		6095pa	
1600	1700		Russia, Voice of		4940va	4965va	4975va
			6005me	7260as	9830me		
1600	1700	DRM	Russia, Voice of	9495eu		
1600	1700		South Korea, Radio Korea Intl		5975am	7255va
			9870va			
1600	1700	mtwhf	Sudan, Sudan Radio Service		15290af	15530af
1600	1700		Taiwan, Radio Taiwan Intl		11550as	
1600	1700		UK, BBC World Service		3915as	5975as
			6190af	6195as	7160as	9410eu	9510as
			11940af	12095eu	15190am	15310as
			15400af	15485eu	15565eu	17790as
			17830af	21470af	21660af	
1600	1700		USA, Armed Forces Radio		4319usb	5446usb
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1600	1700		USA, KTBN Salt Lake City UT		15590na	
1600	1700		USA, KWHR Naalehu HI		9930as	
1600	1700		USA, Voice of America		6035af	6110va
			7125va	9575va	9645va	9760va
			13600va	13710af	15205va	15225af
			15395va	15240af	15445va	17640va
			17715af	17895af		
1600	1700	mtwhf	USA, WBCQ Kennebunk ME		17495na	
1600	1700		USA, WBOH Newport NC		5920am	
1600	1700		USA, WEWN Birmingham AL		13615na	17840af
1600	1700		USA, WHRA Greenbush ME		17650af	
1600	1700		USA, WHRI Noblesville IN		13760va	15105am
1600	1700		USA, WINB Red Lion PA		9930am	

1600	1700		USA, WJIE Louisville KY 13595am	7490am	11515va
1600	1700	mtwhf	USA, WMLK Bethel PA	9465eu	15265al
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na
1600	1700	mtwhf	USA, WWRB Manchester TN	9320na	12172na
1600	1700		USA, WYFR Okeechobee FL 11865na 15130na 21525eu	6085as 18980eu	11830na 21455eu
1600	1700		Zambia, Radio Christian Voice	4965af	
1605	1610	as	Austria, Radio Austria Intl	17865na	
1610	1625		Austria, Radio Austria Intl	17865na	
1625	1630	as	Austria, Radio Austria Intl	17865na	
1630	1700		Egypt, Radio Cairo 9855af		
1630	1700		Georgia, Radio Georgia	6180me	
1630	1700		Guam, AWR/KSDA 11980as	15495as	
1630	1700	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu
1630	1700		UK, BBC World Service	15420af	
1630	1700	as	UK, BBC World Service	11860af	21490af
1635	1640	as	Austria, Radio Austria Intl	17865na	
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930as	
1640	1655		Austria, Radio Austria Intl	17865na	
1645	1700		Tajikistan, Radio 7245irr		
1655	1700	as	Austria, Radio Austria Intl	17865na	

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

1700	1715	va/t	Germany, Bible Voice Broadcasting		15680me
1700	1715		Israel, Kol Israel 11605va	15640va	17535va
1700	1715	vl	Somalia, Radio Galkayo	6985va	9615va
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af
1700	1730		Australia, HCJB 15405pa		
1700	1730		Azerbaijan, Voice of 6110eu	9155eu	
1700	1730		France, Radio France Intl	11615af	15605af
1700	1730		Jordan, Radio 11690na		
1700	1730	mtwhf	Moldava, Radio Pridnestrovye	5960eu	
1700	1730		Vietnam, Voice of 9725eu		
1700	1745		UK, BBC World Service	6005eu	
1700	1756		China, China Radio Intl 13685af 15125af	7190af	9570af
1700	1800		Anguilla, Caribbean Beacon	11775am	
1700	1800		Australia, Radio 5995va 9475as9710va 11880va	6080po	7240as
1700	1800		Australia, Voice Intl 13635as		
1700	1800		Canada, CBC Northern Service	9625do	
1700	1800		Canada, CFRX Toronto ON	6070do	
1700	1800		Canada, CFVP Calgary AB	6030do	
1700	1800		Canada, CKZN St John's NF	6160do	
1700	1800		Canada, CKZU Vancouver BC	6160do	
1700	1800		Costa Rica, University Network 7375am 9725sa 17645as	5030am 11870am	6150am 13750na
1700	1800		Egypt, Radio Cairo 9855af		
1700	1800		Eqt Guinea, Radio Africa	7189af	15184al
1700	1800	1st a	Finland, Scandinavian Weekend Radio 11720eu		5990eu
1700	1800	va/mf	Germany, Bible Voice Broadcasting		15680me
1700	1800	as	Germany, Bible Voice Broadcasting		15235me
1700	1800	DRM	Germany, Deutsche Welle	6140eu	
1700	1800		Germany, Radio Africa Intl 17550al	13820af	15715al
1700	1800	a	Greece, Voice of 9420na	15630eu	17705na
1700	1800	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu
1700	1800		Japan, Radio 9535am	11970eu	15355af
1700	1800		New Zealand, Radio NZ Intl	6095pa	
1700	1800	DRM	Russia, Voice of 9495eu		
1700	1800		Russia, Voice of 5910as	5945as	9830af
1700	1800		Swaziland, TWR 3200af	9500af	
1700	1800	DRM	Sweden, Radio 5955eu		
1700	1800		Taiwan, Radio Toiwan Intl	11550as	
1700	1800		UK, BBC World Service 5975as6190af 9510as9630af 15420af	3255af 6195eu 12095eu 15565eu	3915as 7160as 9410eu 15310as 15400af 17830af 21470af
1700	1800		USA, Armed Forces Radio 5765usb 12133usb	4319usb 6350usb 12579usb	5446usb 7507usb 13362usb 13855usb
1700	1800		USA, KTBN Salt Lake City UT	15590na	
1700	1800		USA, Voice of America 7125va 15205va 17895af	6040va 9645va 15240af	6110va 9760va 15395va 15445af
1700	1800	mtwhf	USA, Voice of America 9525va 13600af	5990va 9795va 15255va	6045va 11955va 12095va
1700	1800	mtwhf	USA, WBCQ Kennebunk ME	9330na	17495na
1700	1800		USA, WBOH Newport NC	5920am	
1700	1800		USA, WEWN Birmingham AL	13615na	17840af
1700	1800		USA, WHRA Greenbush ME	17650af	
1700	1800		USA, WHRI Noblesville IN	13760va	15105am
1700	1800		USA, WINB Red Lion PA	9930am	
1700	1800		USA, WJIE Louisville KY	7490am	115 5va
			13595am		
1700	1800	mtwhf	USA, WMLK Bethel PA	9465eu	15265al
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na
1700	1800	smtwhf	USA, WWRB Manchester TN	9320na	12172na
1700	1800		USA, WYFR Okeechobee FL 21455eu	17795eu	18980eu
1700	1800		Zambia, Radio Christian Voice	4965af	
1715	1730		Vatican City, Vatican Radio 7250eu 9645eu	4005eu	5890eu 15595va
1730	1740	vl	Libya, Voice of Africa 15660irr 17880irr		15220irr 15615irr
1730	1745	mtwhf	UK, United Nations Radio 17810af 21535af	7170af	15495me
1730	1800		Belgium, Radio Vlaanderen Intl	9925eu	11640eu
1730	1800		Guam, AWR/KSDA 11560me		
1730	1800		Liberia, ELWA 4760do		
1730	1800		Philippines, Radio Pilipinas 15190me	11730me	11890me
1730	1800		Slovakia, Radio Slovakia Intl 7345eu	5915eu	6055eu
1730	1800	mtwhfa	Sweden, Radio 6065va		
1730	1800		Switzerland, Swiss Radio Intl 17870af	13750af	15515af
1730	1800		UK, BBC World Service 7105eu 7230af	3390af 9530eu	5875eu 9685af
1730	1800		Vatican City, Vatican Radio 17515af	13765af	15570af
1735	1745	vl/th	Paraguay, Radio Nacional	9739sa	
1745	1755	mtwhfa	Turkmenistan, Turkmen Radio	4930as	
1745	1800		Bangladesh, Bangla Betar	7185eu	15550eu
1745	1800		India, All India Radio 9950eu 15075af	7410eu 11620eu 15155af	9445af 11935af 13605af 17670af

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

1800	1810		Zanzibar, Voice of Tanzania	11734do	
1800	1815		Bangladesh, Bangla Betar	7185eu	15520eu
1800	1830		Egypt, Radio Cairo 9855af		
1800	1830	s	Germany, Universal Life	15675af	
1800	1830		South Africa, AWR Africa 11985af	5960af	7265af
1800	1830		UK, BBC World Service	5975as	9510as
1800	1830		Vietnam, Voice of 13740va		
1800	1845	va/h	Germany, Bible Voice Broadcasting		13710me
1800	1850		New Zealand, Radio NZ Intl	6095po	
1800	1855		Poland, Radio Polonia	5995eu	7150eu
1800	1856		Romania, Radio Romania Intl	11940eu	15380eu
1800	1859		Canada, Radio Canada Intl 13730af 15255as	9530af	11770af
1800	1859		Germany, Radio Africa Intl 17550al	13820af	15715al
1800	1900		Anguilla, Caribbean Beacon	11775am	
1800	1900		Australia, Radio 6080pa 9580va 9710pa	7240va 11880va	9475as
1800	1900		Australia, Voice Intl 6115as		
1800	1900		Canada, CBC Northern Service	9625do	
1800	1900		Canada, CFRX Toronto ON	6070do	
1800	1900		Canada, CFVP Calgary AB	6030do	
1800	1900		Canada, CKZN St John's NF	6160do	
1800	1900		Canada, CKZU Vancouver BC	6160do	
1800	1900		Costa Rica, University Network 7375am 9725sa 17645as	5030am 11870am	6150am 13750na
1800	1900		Eqt Guinea Radio Africa	7189af	15184al
1800	1900	1st a	Finland, Scandinavian Weekend Radio 11720eu		6170eu
1800	1900	va/as	Germany, Bible Voice Broadcasting 11965as 13710me		5970eu
1800	1900		India, All India Radio 9950eu 15075af	7410eu 11620eu 15155af	9445af 11935af 13605af 17670af
1800	1900	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu
1800	1900		Latvia, Laser Radio 9290eu		
1800	1900		Liberia, ELWA 4760do		
1800	1900		Netherlands, Radio 6020af	9895af	11655af
1800	1900		Nigeria, Voice of 15120af	17800al	
1800	1900		Philippines, Radio Pilipinos 15190me	11730me	11890me
1800	1900		Russia, Voice of 5910as 9830af11510af	5945as	7290eu
1800	1900	as	Russia, Voice of 5950eu	6175eu	
1800	1900		Sierra Leone, Radio UNAMSIL	6139af	
1800	1900		South Africa, Channel Africa	15265af	
1800	1900		Swaziland, TWR 3200af	9500af	
1800	1900		Taiwan, Radio Taiwan Intl	3955eu	
1800	1900		UK, BBC World Service 6190af6 95eu 15310me 21470af	3255af 9410eu 15400af	6055af 9630af 12095eu 15420af 17830af
1800	1900		USA, Armed Forces Radio 5765usb	4319usb 6350usb	5446usb 7507usb 10320usb

			12133usb 12579usb	13362usb	13B55usb	
1800	1900		USA, KJES Vado NM	15385na		
1800	1900		USA, KTBN Solt Lake City UT	15590na		
1800	1900		USA, Voice of America	6035af	6040va	
			9760va 9885va	11975af	13710af	
			15240af 15580af	17895af		
1800	1900	mtwhfa	USA, WBCQ Kennebunk ME	9330na	17495na	
1800	1900		USA, WBOH Newport NC	5920am		
1800	1900		USA, WEWN Birmingham AL	13615na	17840af	
1800	1900		USA, WHRA Greenbush ME	17650af		
1800	1900		USA, WHRI Noblesville IN	9495am	13760va	
1800	1900		USA, WINB Red Lion PA	9930am		
1800	1900		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
1800	1900	mtwhf	USA, WMLK Bethel PA	9465eu	15265al	
1800	1900		USA, WTJC Newport NC	9370na		
1800	1900		USA, WWCR Nashville TN	9475na	12160na	
			13B45no 15825na			
1800	1900	smtwhf	USA, WWRB Manchester TN	9320na	12172na	
1800	1900		USA, WYFR Okeechobee FL	17795eu	18980eu	
1800	1900		Yemen, Rep of Yemen Radio	9780me		
1800	1900		Zambia, Radio Christian Voice	4965af		
1815	1830	va/mtwhf	Germany, Bible Voice Broadcasting		5970eu	
1815	1900		Bangladesh, Bangla Betar	7185eu	9550eu	
			15550eu			
1820	1830	vl	Libya, Voice of Africa	11635irr	11715irr	
			11860irr 17880irr			
1830	1845		Germany, IBRA Radio	9520af		
1830	1845	m w	UK, BBC World Service	6050eu	7105eu	
			9685eu			
1830	1900		Austria, AWR Europe	11865af		
1830	1900		Georgia, Radio Georgia	11910eu		
1830	1900		South Africa, AWR Africa	11985af		
1830	1900		Turkey, Voice of 9785eu			
1845	1900	mtwhfa	Albania, Radio Tirano Intl	7210eu	9520eu	
1845	1900		Congo, RTV Congoloise	4765af	5985af	
1851	1900		New Zealand, Radio NZ Intl	9885pa		

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

1900	1915		Congo, RTV Congolaise	4765af	5985af	
1900	1920		Turkey, Voice of 9785eu			
1900	1925		Israel, Kol Israel	11605va	15615af	15640va
			17535va			
1900	1930	s	Germony, Universal Life	13820me		
1900	1930	s	Greece, Voice of 7475eu	9420eu	15630eu	
			17705na			
1900	1930		Philippines, Radio Pilipinos	11730me	11890me	
			15190me			
1900	1930		Vietnam, Voice of 13740va			
1900	1945		India, All India Radio	7410eu	9445af	
			9950eu 11620eu	11935af	13605af	
			15075af 15155af	17670af		
1900	1945		USA, WYFR Okeechobee FL	6085af	15130af	
1900	1950		New Zealand, Radio NZ Intl	9885po		
1900	1956		China, Chino Radio Intl	9440af	9585af	
1900	1956		North Koreo, Voice of	4405as	7505eu	
			11335eu 11710eu			
1900	2000		Anguilla, Caribbean Beacon	11775am		
1900	2000		Australia, Radio 6080pa	7240va	9500as	
			9580vo 9710pa	11880vo		
1900	2000		Australia, Voice Intl 6115as			
1900	2000		Canado, CBC Northern Service	9625do		
1900	2000		Canada, CFRX Toronto ON	6070do		
1900	2000		Canada, CFVP Calgary AB	6030do		
1900	2000		Conado, CKZN St John's NF	6160do		
1900	2000		Conoda, CKZU Vancouver BC	6160do		
1900	2000		Costa Rica, University Network	5030am	6150om	
			7375om 9725so	11870om	13750na	
			17645as			
1900	2000		Eqt Guinea, Radio Africa	7189af	15184al	
1900	2000	1st a	Finland, Scandinavian Weekend Radio		5990eu	
			11690eu			
1900	2000	as	Germany, Bible Voice Broadcasting		9425af	
1900	2000		Germany, Deutsche Welle	6180af	11865af	
			13590af 13780af			
1900	2000	vl	Ghana, Ghona BC Corp	3366do	4915do	
1900	2000	vl	Italy, IRRS 5755va			
1900	2000		Latvia, Laser Radio 9290eu			
1900	2000		Liberia, ELWA 4760do			
1900	2000		Maloysio, RTM Radio 4	7295do		
1900	2000		Nomibia, Namibian BC Corp	3270af	3290af	
			6060af			
1900	2000		Netherlands, Radio	7120af	9895af	11655af
			17810af			
1900	2000	os	Netherlands, Radio	15315na	17660na	17735na
1900	2000		Nigeria, Radio/Enugu	6025do		
1900	2000		Nigeria, Radio/Ibadan	6050do		
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do	
1900	2000		Nigeria, Radio/Logos	3326do	4990do	
1900	2000		Nigeria, Voice of 15120af	17800al		
1900	2000		Russia, Voice of	6175eu	6235eu	7335af
			7360eu 7290eu	11510af		
1900	2000		Sierra Leone, Radio UNAMSIL	6139af		
1900	2000		Sierra Leone, SLBS 3316do			
1900	2000	vl	Solomon Islands, SIBC	5020do	9545do	
1900	2000	m	South Africa, Amateur Radio League		3215af	
1900	2000		South Africa, Channel Africa	3345af		
1900	2000	m	South Africa, Radio League	3215af		
1900	2000		South Korea, Radio Koreo Intl	5975am	7275eu	
1900	2000	a	Sri Lanka, SLBC 6010eu			
1900	2000		Swaziland, TWR 3200af			
1900	2000		Thailand, Radio 9535eu			
1900	2000		Uganda, Radio 4976do	5026do	7196do	
1900	2000		UK, BBC World Service	3255af	6005af	
			6190af 6195eu 9410eu	9630af	12095af	
			15310me 15400af	17830af		
1900	2000		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb	7507usb	10320usb	
			12133usb 12579usb	13362usb	13855usb	
1900	2000		USA, KAIJ Dollas TX 13815va			
1900	2000		USA, KJES Vado NM	15385na		
1900	2000		USA, KTBN Solt Lake City UT	15590na		
1900	2000		USA, Voice of Americo	4950af	6035af	
			7415af 9525va 9690va	9760va	9785va	
			11870va 11975af	12015va	13640va	
			13710af 15180va	15240af	15580af	
			17895af			
1900	2000	s	USA, WBCQ Kennebunk ME	7415na		
1900	2000	mtwhfa	USA, WBCQ Kennebunk ME	9330na	17495na	
1900	2000		USA, WBOH Newport NC	5920am		
1900	2000		USA, WEWN Birmingham AL	13615na	17840af	
1900	2000		USA, WHRA Greenbush ME	17650af		
1900	2000		USA, WHRI Noblesville IN	9495am	13760va	
1900	2000		USA, WINB Red Lion PA	9930am		
1900	2000		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
1900	2000	mtwhf	USA, WMLK Bethel PA	9465eu	15265al	
1900	2000		USA, WTJC Newport NC	9370na		
1900	2000		USA, WWCR Nashville TN	9475na	12160na	
			13845na 15825na			
1900	2000	smtwhf	USA, WWRB Monchester TN	9320no	12172na	
1900	2000		USA, WYFR Okeechobee FL	17750af	17795eu	
			17845eu 18980eu			
1900	2000	vl	Vanuatu, Radio 3945al	7260do		
1900	2000		Zambia, Radio Christian Voice	4965af		
1900	2000	vl	Zimbabwe, ZBC Corp	5975do		
1915	1925		Rwonda, Radio 6005do			
1915	1930		UK, BBC World Service	15105af	17885af	
1915	1945	f	Germany, Bible Voice Broodcasting		9425af	
1923	1930	vl	Libya, Voice of Africa	15105af	15315af	
1930	2000		Belgium, Radio Vlaonderen Intl	9925eu		
1930	2000		Georgia, Rodio Georgia	11760eu		
1930	2000	mtwh a	Germany, AWR Europe	11845eu		
1930	2000		Greece, Voice of 5865eu			
1930	2000	s	Greece, Voice of 7475eu	9420eu	15630eu	
			17705na			
1930	2000		Iran, Voice of the Islomic Rep	11750eu		
1930	2000		Papua New Guinea, NBC	4890do	9675irr	
1930	2000		Serbia & Montenegro, Intl Radio	6100eu		
1930	2000		Slovakia, Radio Slovakia Intl	5915eu	6055eu	
			7345eu			
1930	2000		Sweden, Radio 6065va			
1930	2000		Switzerland, Swiss Radio Intl	11815va	13645va	
			15220va 15795va			
1935	1955		Italy, RAI Intl 5970eu	9605eu		
1945	2000	f	Germany, Bible Voice Broodcasting		12050af	
1951	2000		New Zealand, Radio NZ Intl	11725po		

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

2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600va
2000	2028		Hungary, Radio Budapest	3975eu	6025eu
2000	2030	f	Germany, Universol Life	5775va	
2000	2030		Iran, Voice of the Islomic Rep	11750eu	
2000	2030	vl	Italy, IRRS 5775va		
2000	2030		Mongolia, Voice of 9720as		
2000	2030		Vatican City, Vatican Radio	7365af	9660af
			11625af		
2000	2030		Vietnam, Voice of 7220as	9550as	
2000	2045		Swaziland, TWR 3200af		
2000	2045	mtwhfa	USA, WBCQ Kennebunk ME	9330na	17495na
2000	2045	s	USA, WBCQ Kennebunk ME	7415no	
2000	2045		USA, WYFR Okeechobee FL	17750af	
2000	2050		New Zealand, Radio NZ Intl	11725pa	
2000	2056		China, China Radio Intl	5965eu	9440af
			9840eu 11640af	13630af	
2000	2059		Conoda, Radio Canada Intl	5850eu	7235eu
			11690af 13700eu	17800eu	
2000	2059	mtwhf	Spain, Radio Exterior Espana	9595af	9680eu
2000	2100		Anguilla, Caribbean Beocon	11775am	
2000	2100		Australia, ABC NT Alice Springs	2310do	4835irr
2000	2100		Australia, ABC NT Kotherine	2485do	
2000	2100		Australia, ABC NT Tennant Creek	2325do	
2000	2100		Australia, Radio 9500as	9580va	11650va
			11880vo 12080va		
2000	2100	as	Australia, Radio 6080pa		
2000	2100		Australia, Voice Intl 6115as		
2000	2100		Canada, CBC Northern Service	9625do	
2000	2100		Canado, CFRX Toronto ON	6070do	
2000	2100		Canado, CFVP Calgary AB	6030do	

Shortwave Guide

2000	2100		Canada, CKZN St John's NF	6160do	
2000	2100		Canada, CKZU Vancouver BC	6160do	
2000	2100		Casta Rica, University Network	5030am	6150am
			7375am 9725sa	11870am	13750na
			17645as		
2000	2100		Eqt Guinea, Radio Africa	7189af	15184al
2000	2100	1st a	Finland, Scandinavian Weekend Radio		5990eu
			11690eu		
2000	2100		Germany, Deutsche Welle	13590af	13780af
			15205af 15410af		
2000	2100		Germnay, Overcomer Ministries	9755af	
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do
2000	2100		Indonesia, Voice of	15150eu	
2000	2100	s	Ireland, Reflections Europe	3910eu	6295eu
			12255eu		
2000	2100		Latvia, Laser Radio	9290eu	
2000	2100		Liberia, ELWA	4760do	
2000	2100		Malaysia, RTM Radio 4	7295do	
2000	2100		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
2000	2100		Netherlands, Radio	7120af	9895af 11655af
			17810af		
2000	2100	as	Netherlands, Radio	15315na	17660na 17735na
2000	2100		Nigeria, Radio/Enugu	6025do	
2000	2100		Nigeria, Radio/Ibadan	6050do	
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do
2000	2100		Nigeria, Radio/Lagos	3326do	4990do
2000	2100		Nigeria, Voice of	17800af	
2000	2100		Papua New Guinea, NBC	4890do	9675irr
2000	2100		Russia, Voice of	6145eu	6235eu 7290eu
			7360eu		
2000	2100		Sierra Leone, Radio UNAMSIL	6139af	
2000	2100		Sierra Leone, SLBS	3316do	
2000	2100	vl	Solomon Islands, SIBC	5020do	9545do
2000	2100		South Africa, AWR Africa	15295af	
2000	2100		South Africa, Channel Africa	3345af	
2000	2100		Syria, Radio Damascus	12085eu	13610eu
2000	2100		Uganda, Radio	4976do	5026do 7196do
2000	2100		UK, BBC World Service	3255af	6005af
			6190af 6195eu 9410eu		9630af 12095af
			15400af 17830af		
2000	2100		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb
			12133usb 12579usb	13362usb	13855usb
2000	2100		USA, KAIJ Dallas TX	13815va	
2000	2100		USA, KTBN Salt Lake City UT	15590na	
2000	2100		USA, Voice of America	4950af	6035af
			6095va 7415af	9690va	7415af
			9690va 9760va	11855af	11975af
			13710af 15240af	15580af	17885af
			17895af		
2000	2100		USA, WBOH Newport NC	5920am	
2000	2100		USA, WEWN Birmingham AL	13615na	17595af
2000	2100		USA, WHRA Greenbush ME	17650as	
2000	2100		USA, WHRI Noblesville IN	5745va	9495am
2000	2100		USA, WINB Red Lion PA	9930am	
2000	2100		USA, WJIE Louisville KY	7490am	11515va
			13595am		
2000	2100	mtwhf	USA, WMLK Bethel PA	9465eu	15265al
2000	2100		USA, WTJC Newport NC	9370na	
2000	2100		USA, WWCR Nashville TN	9475na	12160na
			13845na 15825na		
2000	2100	smtwhf	USA, WWRB Manchester TN	9320na	12172na
2000	2100		USA, WYFR Okeechobee FL	17725sa	17795eu
			18980eu		
2000	2100	vl	Vanuatu, Radio	3945al	7260do
2000	2100		Zambia, Radio Christian Voice	4965af	
2000	2100	vl	Zimbabwe, ZBC Corp	5975do	
2025	2045		Italy, RAI Intl	6185af	9670af 11880af
2030	2045		Thailand, Radio	9535eu	
2030	2100	t h	Belarus, Radio Belarus Intl	7105eu	7210eu
2030	2100		Cuba, Radio Havana	9505eu	11760eu
2030	2100		Egypt, Radio Cairo	15375af	
2030	2100	DRM	Netherlands, Radio	9800na	
2030	2100		Turkey, Voice of	7170as	
2030	2100	as	USA, Voice of America	4950af	
2030	2100		Uzbekistan, Radio Toshkent Intl	5025eu	7185eu
			11905eu		
2030	2100		Vietnam, Voice of	9725eu	13740va
2040	2100	mtwhfa	Armenia, Voice of	4810eu	9960eu
2045	2100		India, All India Radio	7410eu	9445eu
			9575au 9910au	9950eu	11620va
			11715au		
2045	2100		USA, WBCQ Kennebunk ME	7415na	
2045	2100	mtwhfa	USA, WBCQ Kennebunk ME	5105na	9330na
			17495na		
2050	2100		Vatican City, Vatican Radio	4005eu	5890eu
			7250eu		
2051	2100		New Zealand, Radio NZ Intl	15720pa	
2055	2100	DRM	Vatican City, Vatican Radio	9800eu	

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

2100	2110		Vatican City, Vatican Radio	4005eu	5890eu
			7250eu		
2100	2115	mtwhf	UK, BBC World Service	5975ca	
2100	2120		Turkey, Voice of	7170as	
2100	2130		Australia, ABC NT Katherine	2485do	
2100	2130		Australia, ABC NT Tennant Creek	2325do	
2100	2130		China, China Radio Intl	5965eu	9855eu
			11640af 13630af		
2100	2130		Cuba, Radio Havana	9505na	11760eu
2100	2130	mtwhf	Nigeria, Radio Jakada Intl	7380af	
2100	2130		South Korea, Radio Korea Intl	3955eu	
2100	2130	mtwhfa	USA, WBCQ Kennebunk ME	5105na	9330na
			17495na		
2100	2130	DRM	Vatican City, Vatican Radio	9800eu	
2100	2145		USA, WYFR Okeechobee FL	17795eu	18980eu
2100	2156		North Korea, Voice of	4405as	7505eu
			11335eu		
2100	2159	DRM	Canada, Radio Canada Intl	9800na	
2100	2200		Anguilla, Caribbean Beacon	11775am	
2100	2200		Australia, ABC NT Alice Springs	2310do	4835irr
2100	2200		Australia, Radio	9500as	9660pa 11650va
			11880va 12080va	13630va	21740va
2100	2200		Austria, AWR Europe	9660af	
2100	2200		Bulgaria, Radio	5800eu	7500eu
2100	2200		Canada, CBC Northern Service	9625do	
2100	2200		Canada, CFRX Toronto ON	6070do	
2100	2200		Canada, CFVP Calgary AB	6030do	
2100	2200		Canada, CKZN St John's NF	6160do	
2100	2200		Canada, CKZU Vancouver BC	6160do	
2100	2200		Costa Rica, University Network	5030am	6150am
			7375am 9725sa	11870am	13750na
			17645as		
2100	2200		Egypt, Radio Cairo	15375af	
2100	2200		Eqt Guinea, Radio Africa	7189af	15184al
2100	2200	1st f	Finland, Scandinavian Weekend Radio		5990eu
			11720eu		
2100	2200		Germany, Deutsche Welle	9615af	13780af
			15410af		
2100	2200	vl	Ghana, Ghana BC Corp	3366do	4915do
2100	2200		Guyana, Voice of	5949do	
2100	2200		India, All India Radio	7410eu	9445eu
			9575au 9910au	9950eu	11620va
			11715au		
2100	2200	s	Ireland, Reflections Europe	3910eu	6295eu
			12255eu		
2100	2200		Japan, Radio	6035pa	6055eu 6180eu
			11855af	17825pa	21670pa
2100	2200		Latvia, Laser Radio	9290eu	
2100	2200		Liberia, ELWA	4760do	
2100	2200		Malaysia, RTM Radio 4	7295do	
2100	2200		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
2100	2200	DRM	Netherlands, Radio	15150eu	
2100	2200		New Zealand, Radio NZ Intl	15720pa	
2100	2200		Nigeria, Radio/Enugu	6025do	
2100	2200		Nigeria, Radio/Ibadan	6050do	
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do
2100	2200		Nigeria, Radio/Lagos	3326do	4990do
2100	2200		Nigeria, Voice of	17800af	
2100	2200		Papua New Guinea, NBC	4890do	9675irr
2100	2200		Russia, Voice of	6235eu	7290eu 7360eu
2100	2200		Sierra Leone, Radio UNAMSIL	6139af	
2100	2200		Sierra Leone, SLBS	3316do	
2100	2200		South Africa, Channel Africa	3345af	
2100	2200		Syria, Radio Damascus	12085eu	13610eu
2100	2200		UK, BBC World Service	3255af	3915as
			5965as 5975ca 6005af	6110as	6190af
			6195va 9410eu	9605af	12095sa
			15400af		
2100	2200		Ukraine, Radio Ukraine Intl	7420eu	
2100	2200		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb
			12133usb 12579usb	13362usb	13855usb
2100	2200		USA, KAIJ Dallas TX	13815va	
2100	2200		USA, KTBN Salt Lake City UT	15590na	
2100	2200		USA, Voice of America	6035af	6040va
			6095va 7415af	9595va	9670va
			9760va 11870va	11975af	13710af
			15185va 15240af	15580af	17735va
			17820va 17895af		
2100	2200		USA, WBCQ Kennebunk ME	7415na	17495na
2100	2200		USA, WBOH Newport NC	5920am	
2100	2200		USA, WEWN Birmingham AL	13615na	17595af
2100	2200		USA, WHRA Greenbush ME	17650af	
2100	2200		USA, WHRI Noblesville IN	5745va	9495am
2100	2200		USA, WINB Red Lion PA	9930am	
2100	2200		USA, WJIE Louisville KY	7490am	11515va
			13595am		
2100	2200	mtwhf	USA, WMLK Bethel PA	9465eu	15265al
2100	2200		USA, WTJC Newport NC	9370na	
2100	2200		USA, WWCR Nashville TN	7465na	9475na
			12160na 13845na		
2100	2200	smtwhf	USA, WWRB Manchester TN	9320na	12172na
2100	2200		USA, WYFR Okeechobee FL	17725sa	17845eu
			18930sa		
2100	2200	vl	Vanuatu, Radio	3945al	7260do
2100	2200		Zambia, Radio Christian Voice	4965af	
2100	2200	vl	Zimbabwe, ZBC Corp	5975do	
2115	2130	mtwhf	UK, BBC World Service	5975ca	11675ca
			15390ca		
2115	2200		Egypt, Radio Cairo	9990eu	

2123	2130	vl	Libya, Voice of Africa	15105af	15315af
2130	2156		China, China Radio Intl	5965eu	9855eu
2130	2156		Romonia, Radio Romanio Intl 15285eu 17735eu	7285eu	9725eu
2130	2200	mtwhfa	Albanio, Radio Tirana Intl	7130eu	9540eu
2130	2200		Australia, ABC NT Katherine	5025do	
2130	2200		Australia, ABC NT Tennant Creek	4910do	
2130	2200	t h	Belarus, Radio Belarus Intl	7105eu	7210eu
2130	2200		Guam, AWR/KSDA 11980as	12010as	
2130	2200		Sweden, Radio 6065va	9925va	
2130	2200	f	UK, Wales Radio Intl	7110eu	
2130	2200	mtwhfa	USA, WBCQ Kennebunk ME 17495na	5105na	9330na
2130	2200		Uzbekistan, Radio Tashkent Intl 11905eu	5025eu	7185eu

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

2200	2228		Hungary, Radio Budapest	6025eu	11965af
2200	2229		Canada, Radio Canada Intl 15170am	5960am	13785am
2200	2230		Belgium, Radio Vlaanderen Intl	11635na	
2200	2230		India, All India Radio 9575au 9910au	7410eu	9445eu 9950eu 11620va 11715au
2200	2230	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu
2200	2230		Liberia, ELWA 4760do		
2200	2230		Serbia & Montenegro, Intl Radio	6100eu	
2200	2230	mtwhf	USA, Voice of America 11655af 11975af	6035af	7415af 13710af
2200	2245		Egypt, Radio Cairo 9990eu		
2200	2245		USA, WYFR Okeechobee FL 15770na	11740na	15695no
2200	2250		Turkey, Voice of 9830va		
2200	2256		China, China Radio Intl	7170eu	
2200	2300		Anguilla, Caribbean Beacon	6090am	
2200	2300		Australia, ABC NT Alice Springs	2310do	4835irr
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Creek	4910do	
2200	2300		Australia, Radio 9660va 13620va 13630va	11880va	12080va 15230as 21740va
2200	2300		Canada, CBC Northern Service	9625do	
2200	2300		Canada, CFRX Toronto ON	6070do	
2200	2300		Canada, CFVP Calgary AB	6030do	
2200	2300		Canada, CKZN St John's NF	6160do	
2200	2300		Canada, CKZU Vancouver BC	6160do	
2200	2300		Costa Rico, University Network 7375am 9725sa 17645os	5030am	6150am 11870am 13750na
2200	2300		Eqt Guinea, Radio Africa	7189af	15184al
2200	2300	1st f	Finland, Scandinavian Weekend Radio 11720eu		5980eu
2200	2300		Germany, Deutsche Welle	6180os	6225as
2200	2300		Germany, Overcomer Ministries 9480sa 9695af 9730as 11950va 12020va	6045eu	6055na 9745as 11935va
2200	2300	vl	Ghano, Ghana BC Corp	3366do	4915do
2200	2300		Guyana, Voice of 3291do	5949do	
2200	2300		Malaysia, RTM Radio 4	7295do	
2200	2300		Namibia, Namibian BC Corp 6060af	3270af	3290af
2200	2300	DRM	Netherlands, Radio 15525na		
2200	2300		New Zealand, Radio NZ Intl	15720pa	
2200	2300		Nigeria, Radio/Enugu	6025do	
2200	2300		Nigeria, Radio/Ibadan	6050do	
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do
2200	2300		Nigeria, Radio/Lagos	3326do	4990do
2200	2300		Nigeria, Voice of 15120af	17800al	
2200	2300		Papua New Guinea, NBC	4890do	9675irr
2200	2300		Sierra Leone, Radio UNAMSIL	6139af	
2200	2300		Sierra Leone, SLBS 3316do		
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do
2200	2300	as	Spain, Radio Exterior Espana	9595af	9680eu
2200	2300		Taiwan, Radio Taiwan Intl	9355eu	
2200	2300		UK, BBC World Service 6195va 7105as 11955as 12095sa	5965as	5975ca 9605af 9740as 15400af
2200	2300		USA, Armed Forces Radio 5765usb 6350usb 12133usb 12579usb	4319usb	5446usb 7507usb 10320usb 13362usb 13855usb
2200	2300		USA, KAIJ Dallas TX 13815va		
2200	2300		USA, KTBN Salt Lake City UT	15590na	
2200	2300		USA, KWHR Naalehu HI	17510as	
2200	2300		USA, Voice of America 9890va 15305va 11760va 17735va	7215va	9705va 15185va 15290va 17820va
2200	2300	mtwhfa	USA, WBCQ Kennebunk ME 9330na 17495na	5105na	7415na
2200	2300		USA, WBOH Newport NC	5920am	
2200	2300		USA, WEWN Birmingham AL	9975na	17595af
2200	2300		USA, WHRA Greenbush ME	17650af	
2200	2300		USA, WHRI Noblesville IN	5745va	9495am
2200	2300		USA, WINB Red Lion PA	9930am	
2200	2300		USA, WJIE Louisville KY 13595am	7490am	11515va
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCR Noshville TN 9475na 13845na	5070na	7465na
2200	2300	smtwhf	USA, WWRB Manchester TN	9320na	12172na
2200	2300	vl	Vanuatu, Radio 3945ol	7260do	
2200	2300		Zambia, Radio Christian Voice	4965af	
2205	2230		Italy, RAI Intl 11895as		
2230	2257		Czech Rep, Radio Prague Intl	7345no	9415no
2230	2259		Conoda, Radio Canada Intl 12035as	9525as	11810as
2245	2300		India, All India Rodio 11620as 13605as	9705os	9950as

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

2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	2310do	4835irr
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennant Creek	4910do	
2300	0000		Australia, Radio 9660pa 13620as 13630as 17795va 21740va	11695as	12080va 15230as 17750as
2300	0000		Bulgaria, Radio 9700na	11700na	
2300	0000		Canada, CBC Northern Service	9625do	
2300	0000		Canada, CFRX Toronto ON	6070do	
2300	0000		Canada, CFVP Calgary AB	6030do	
2300	0000		Canada, CKZN St John's NF	6160do	
2300	0000		Canada, CKZU Vancouver BC	6160do	
2300	0000		Costa Rica, University Network 7375am 9725sa 17645as	5030am	6150am 11870am 13750na
2300	0000		Cuba, Radio Havana	9550am	
2300	0000		Egypt, Radio Cairo 11725na		
2300	0000	1st f	Finland, Scandinavian Weekend Radio 11690eu		5980eu
2300	0000		Germany, Deutsche Welle 12035as	7250as	9815as
2300	0000	DRM	Germany, Deutsche Welle	9800as	
2300	0000	vl	Ghano, Ghana BC Corp	3366do	4915do
2300	0000		Guyana, Voice of 3291do	5949do	
2300	0000		India, All India Radio 11620as 13605as	9705as	9950as
2300	0000		Malaysia, RTM Radio 4	7295do	
2300	0000		Namibia, Namibian BC Corp 6060af	3270af	3290af
2300	0000		New Zealand, Radio NZ Intl	15720pa	
2300	0000		Papua New Guinea, NBC	4890do	9675irr
2300	0000		Sierra Leone, Radio UNAMSIL	6139af	
2300	0000		Sierra Leone, SLBS 3316do		
2300	0000		Singapore, Mediacorp Radio	6150do	
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do
2300	0000		UK, BBC World Service 6035as 6195va 9740as 12095sa 15280as	3915as	5965as 11945as 11955as
2300	0000		USA, Armed Forces Radio 5765usb 6350usb 12133usb 12579usb	4319usb	5446usb 7507usb 10320usb 13362usb 13855usb
2300	0000		USA, KAIJ Dallas TX 13815va		
2300	0000		USA, KTBN Salt Lake City UT	15590na	
2300	0000		USA, KWHR Naalehu HI	17510as	
2300	0000		USA, WBCQ Kennebunk ME 9330na	5105na	7415na
2300	0000		USA, WBOH Newport NC	5920am	
2300	0000		USA, WEWN Birmingham AL	9975na	17595af
2300	0000		USA, WHRA Greenbush ME	7580va	
2300	0000		USA, WHRI Noblesville IN	5745va	9495am
2300	0000		USA, WINB Red Lion PA	9320am	
2300	0000		USA, WJIE Louisville KY 13595am	7490am	11515va
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000		USA, WWCR Noshville TN 7465na 13845na	3210na	5070na
2300	0000		USA, WWRB Manchester TN 6890na	5050na	5085na
2300	0000		USA, WYFR Okeechobee FL 17750na	5985sa	11855ca
2300	0000	vl	Vanuatu, Radio 3945ol	7260do	
2300	0000		Zambia, Radio Christian Voice	4965af	
2300	2306		Nigeria, Radio/Lagos	3326do	
2300	2330		USA, Voice of America 9780va 11655va	6180va	7205va 15150va
2300	2330	w	USA, WBCQ Kennebunk ME	17495na	
2300	2345		USA, WYFR Okeechobee FL	11740na	
2300	2356		China, China Radio Intl 13680na	5990ca	6040na
2300	2356		Romania, Radio Romania Intl 9645au 11940au	7280au	9590au
2304	0000		USA, WYFR Okeechobee FL	15255sa	
2330	0000		Lithuania, Radio Vilnius	9875na	
2330	0000		Switzerland, Swiss Radio Intl	9885sa	11905sa
2330	0000		Switzerland, Swiss Radio Intl	9885sa	11660sa
2330	0000		USA, Voice of America 7205va 9620va 11805va 13640va	6180va	7130va 9780va 11735va 15110va 15205va
2330	0000		Vietnam, Voice of	9840as	
2330	2359	DRM	Sweden, Radio	9800na	

Notes:
1. **BBCWS stream abbreviations: (am)=Americas; (eu)=Europe; (waf)=West Africa.**
2. **The 2100 broadcast remains the best bet for those in North America to hear DW on shortwave.**
3. **Days and times are in UTC, are approximate. Programs and times are always subject to change. This is especially true for the U.S. based private broadcasters.**

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

NEWSCASTS (*extended)
0000 BBCWS(am) D ... News
R. Australia D News
R. Japan D World News
R. Netherlands S/M News
R. New Zealand Int. S/A News
M-F Midday Report*
R. Prague D News
R. Ukraine Int. D ... News
Spanish Foreign R. . T-A REE News Service*

CURRENT AFFAIRS MAGAZINES/FEATURES
0000 R. Netherlands T-A . Newsline
0005 R. Netherlands S ... Wide Angle
0006 BBCWS(am) F ... Assignment (in-depth report)
0010 R. Australia H Background Briefing (documentaries)
A Pacific Review
0015 R. Japan T-A 44 Minutes
0025 R. Netherlands M .. Insight [commentary)

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
0015 R. Prague F Economic Report
0030 R. Netherlands A ... A Good Life (development issues)
0032 BBCWS(am) F ... The Music Biz

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0010 R. Australia T The Science Show
R. Prague W Czech Science
0030 BBCWS(am) H ... Global Perspective (on health care)
R. Australia A Ockham's Razor (opinian)
R. Netherlands T ... The Research File

ARTS & CULTURE
0000 Spanish Foreign R. . M Window on Spain
0006 BBCWS(am) W .. Masterpiece (cultural ideas)
0010 R. Australia M Awaye! (Aboriginal)
R. Prague A The Arts
0015 R. Prague M Czech Books (biweekly)
A Stepping Out (Prague nightlife)
Spanish Foreign R. . S/M History or cultural series
0030 R. Netherlands M .. Vox Humana
0035 R. Ukraine Int. M .. Roots
0048 Spanish Foreign R. . T-A A Language Without Baunds (lesson)

LOCAL LIVES & VIEWS
0000 Spanish Foreign R. . S Visitors Book
0005 R. Netherlands M .. Europe Unzipped
R. Prague S Magazine
T-A Current Affairs
R. Ukraine Int. T-A . Ukraine Today
00`0 R. Australia W The National Interest
F Hindsight (social history)
R. Japan M Weekend Japanology
R. Prague S Letter from Prague
M ABC of Czech (language)
H Witness (history)
0012 R. New Zealand Int. S The Week in Parliament
A Focus an Politics
0015 R. Prague S/W One on One (interview)
T Talking Point
H Czechs in History [or]
Czechs Today [or] Spotlight (places)
0017 Spanish Foreign R. . T-A Spain Day-by-Day (magazine)
0030 R. Netherlands W .. EuroQuest (Europe in context)
F Dutch Horizons
0033 R. New Zealand Int. S Spectrum

INFORMATIONAL FEATURES
0000 R. for Peace Int. W .. RadioNation
0006 BBCWS(am) M .. Everywoman (magazine)
T Documentaries
0030 R. Netherlands H ... Documentary
0045 R. Australia A Lingua Franca (rhetaric)
0047 Spanish Foreign R. . T-A Spanish Language Course

MUSIC
0000 WBCQ (7415) S ... A Different Kind of Oldies Show
0006 BBCWS(am) S ... Top of the Pops (UK music charts)
0010 R. Ukraine Int. M .. Music from Ukraine
0015 R. Prague M Encore [or] Magic Carpet
0032 BBCWS(am) T ... The Music Feature
W White Label (new)
H Charlie Gillett (world)
A John Peel (eclectic)
0033 R. New Zealand Int. A The Sampler (new CDs)

ENTERTAINMENT
0000 WBCQ (7415) M .. Radio New York International
WBCQ (5105) M .. Firesign Theatre Hour (satire)
0032 BBCWS(am) M .. Westway Omnibus (drama serial)

SWL, MEDIA & COMMUNICATIONS
0018 R. Ukraine Int. S ... Whole World on Radio Dial
0030 WBCQ (9330) S ... World of Radio
WHRI (7315) S ... DXing with Cumore
0045 R. Bulgaria A R. Bulgaria Calling
Spanish Foreign R. . S Radio Waves

LISTENER CONTACT/INTERACTIVE
0000 WBCQ (7415) A ... Allan Weiner Worldwide
0005 R. Prague M Mailbox
WHRA (7580) T-A . For the People (populism)
0010 R. Japan S Hello from Tokyo
0030 R. Netherlands S ... Amsterdam Forum
0035 R. Ukraine Int. S ... Hello from Kiev

SPORT
0006 BBCWS(am) A ... Sports International (magazine)

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

NEWSCASTS (*extended)
0100 BBCWS(am) D ... News
China R. Int. D ... News & Reports*
R. Australia D News
R. Budapest D ... News
R. Canada Int. D ... The World at Six*
R. Habana Cuba ... D News
R. Netherlands S/M News
R. New Zealand Int. S/A News
M-F Pacific Regional News
R. Prague D News
R. Slovakia Int. D ... News
Voice of Russia D ... News
Voice of Vietnam ..... D News
0130 VOA Spec. Eng. ..... T-A News

CURRENT AFFAIRS MAGAZINES/FEATURES
0100 R. Netherlands T-A . Newsline
0105 R. Australia S Correspondents' Report
A Asia Pacific Weekend Edition
R. Netherlands M .. Wide Angle (one topic focus)
0110 China R. Int. S ... Report on Developing Countries
R. Australia M-F Asia Pacific
R. Habana Cuba ... M Weekly Review
R. Slovakia Int. T ... Insight Central Europe
0115 R. Habana Cuba ... T-S Viewpoint
0120 China R. Int. S ... CRI Roundup
0130 R. Canada Int. T ... Media Zone
R. Sweden T-A 60 Degrees North
0140 R. Habana Cuba ... A Weekly Review
VOA Spec. Eng. ..... A In the News

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
0105 R. Budapest M .. Europe Unlimited (trade-monthly)
R. Canada Int. S ... Business Sense
0106 R. New Zealand Int. A Your Money
0115 R. Prague F Economic Report
Voice of Vietnam ..... F Vietnam Economy
0130 China R. Int. T ... Biz China
R Canada Int. F ... Business Sense
0140 VOA Spec. Eng. ..... T Development Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0106 BBCWS(am) T ... Health Matters
W Go Digital
H Discovery (research)
F One Planet (ecology)
A Science in Action (magazine)
0110 R. Prague W Czech Science
0115 China R. Int. A ... Cutting Edge
0130 R. Australia S In Conversation
M The Health Report
R. Canada Int. S/A Sci-Tech File
0140 VOA Spec. Eng. ..... W Agriculture Today
H Health Report
A Environment Report
0145 R. Sweden F Green Scan (environment)[2nd F]
Heart Beat (health)[3rd F]
VOA Spec. Eng. ..... W Science in the News
H Explorations
0150 R. Habana Cuba ... M Breakthrough

ARTS & CULTURE
0105 R. Budapest M .. Spatlight (monthly)
0106 BBCWS(am) M .. The Ticket (global survey)
R. New Zealand Int. S At the Movies
0110 R. Prague A The Arts
0115 R. Prague M Czech Books (biweekly)
H Witness (oral history)
A Stepping Out (Prague nightlife)
Voice of Vietnam ..... W Culture & Society
0120 Voice of Vietnam ..... A Literature & Arts
0130 China R. Int. S ... In the Spotlight
R. Canada Int. M/H Spatlight
R. New Zealand Int. S Bookmarks
[exc. last S: National Radio Bookclub]
R. Sweden S Spectrum [3rd S]
0132 BBCWS(am) F ... The Word (books, writers & readers)
[exc last F: World Book Club]
0145 VOA Spec. Eng. ..... A American Stories
H The Making of a Natian

LOCAL LIVES & VIEWS
0105 R. Austria Int. S/M Insight Central Europe
R. Budapest S ... Insight Central Europe
M Heading for Hungary (monthly)
T-A Hungary Today
R. Netherlands S ... Europe Unzipped
R. Prague M Magazine (local color)
T-A Current Affairs
Voice of Vietnam ..... D Current Affairs
0110 R. Prague S Letter from Prague
M ABC of Czech (language)
R. Slovakia Int. T-A . Slovakia Today (feature magazine)
0111 Voice of Russia T-A . Commonwealth Update
0115 R. Austria Int. ..... T-A Report from Austria
R. Prague S/W One on One (interview)
T Talking Point
H Czechs in History [or]
Czechs Today [or] Spotlight (places)
Voice of Vietnam .... T Vietnam: Lond and People
A Rural Vietnom
0130 China R. Int. M .. People in the Know
W China Horizons
H Voices from Other Lands
F Life in Chino
R. Australia A The Chat Room (interviews)
R. Sweden S Network Europe (1st S)
Sweden Today (2nd S)
Studio 49 (4th S)
0132 Voice of Russia S ... Moscow Yesterday and Todoy
0135 R. Austria Int. S/M Insight Central Europe
0140 R. Habana Cuba ... T/H/F . Caribbean Outlook
0145 R. Austria Int. T-A . Report from Austria
R. Sweden W Close-Up (profiles of Swedes)
H Nordic Lights [1st H]
The S Files (things Swedish) [4th H]
VOA Spec. Eng. ..... T This is America
F Making of a Nation

Shortwave Guide

A American Mosoic
0154 Voice of Russia H ... Russia: People and Events

INFORMATIONAL FEATURES
0100 WBCQ (7415) T ... The Secular Bible Study (critique)
0130 R. AustralioT The Low Report
W The Religion Report
0132 Voice of Russia A ... Christian Message from Moscow
0140 VOA Spec. Eng. ..... F Education Report
0145 BBCWS(am) H ... Heart and Soul (beliefs & values)
A What's the Problem? (advice)

MUSIC
0105 WHRA (7580) S ... Turn Your Radio On (southern gospel)
WHRI (7315) S ... Turn Your Radio On (southern gospel)
0106 R. New Zealond Int. M-F Wayne's Music (favorites)
0115 R. Prague S Encore [or] Magic Carpet
0120 Voice of Vietnam ..... S Vietnamese Music
0130 R. Sweden M Sounds Nordic [exc. 1st M]
0132 BBCWS(am) W .. Music Review (magazine)
Voice of Russio T ... Folk Box
W Jazz Show
H Musical Tales of St. Petersburg
F Moscow Calling (rock)
0146 Voice of Russia F ... Music At Your Request

ENTERTAINMENT
0100 WBCQ (5105) M .. Tesla's Ear (radio theatre)
WBCQ (7415) S ... Marion's Attic (vintage recordings)
M Radio New York Internotional
A Tasha Takes Control
WBCQ (9330) M .. Odin Lives (Norse legends/ music)
0101 BBCWS(am) S ... Play of the Week (radio theatre)
0110 Voice of Vietnam ..... M Sunday Show
0130 R. New Zealand Int. A Comedy Zone
0132 BBCWS(am) T ... Fanshawe Gets to the Bottom Of...
H/S Westway (drama serial)
Voice of Russia M .. Timelines

SWL, MEDIA & COMMUNICATIONS
0115 R. Canada Int. M .. CIDX Report (bi-weekly)
0120 R. Budapest A ... DX Corner
0130 R. AustraliaH The Media Report
0135 R. Habana Cuba ... S DXers Unlimited
0140 R. Habana Cuba ... S/W DXers Unlimited
0145 R. Canada Int. W .. CIDX Report (bi-weekly)

LISTENER CONTACT/INTERACTIVE
0105 R. Budapest M .. And the Gatepost (monthly)
R. Canada Int. M .. Maple Leaf Mailbag
R. Prague M Mailbox
0110 R. Slovakia Int. M .. Listeners' Tribune
0111 Voice of Russia S/M Moscow Mailbag
0115 Voice of Vietnam ..... H Letterbox
0125 R. Austria Int. S/M Listener Letters
0130 China R. Int. A ... Listeners' Garden
R. Canada Int. W .. Maple Leaf Mailbag
R. Sweden M In Touch w/Stockholm (1st M)
0140 R. Habana Cuba ... M Mailbag Show
0155 R. Austria Int. S/M Listener Letters

SPORT
0130 R. AustraliaF The Sports Factor
0135 R. Habana Cuba ... T-A Time Out
0135 R. New Zealand Int. D Live Sport (as avoilable)
0145 R. Sweden T Sports Scan

0200 UTC/ 10pm E/7pm P - Page 46 Freqs

NEWSCASTS (*extended)
0200 BBCWS(am) D ... The World Today*
R. AustraliaD News
R. BulgariaD News
R. Habana Cuba ... D News
R. Korea Int. D ... News
R. New Zealand Int. D News
R. Taiwan Int. D ... News
Voice of Russia D ... News
0230 R. Budapest D ... News
Voice of Vietnam ..... D News

CURRENT AFFAIRS MAGAZINES/FEATURES
0205 R. AustraliaA Background Briefing (documentaries)
0210 R. AustraliaM-F The World Today
0211 Voice of Russia M .. Sunday Panorama
T-S News & Views
0230 R. Sweden T-A 60 Degrees North
0245 BBCWS(am) T/W/F/A Analysis
H From Our Own Correspondent
0255 R. AustraliaA Perspective

BUSINESS/ECONOMICS (also in Newscosts & Current Affairs)
0232 BBCWS(am) S ... Global Business (trends/ideas)
M World Business Review
T-A World Business Report
0235 R. Budapest M .. Europe Unlimited (trade-monthly)
0245 Voice of Vietnam ..... F Vietnam Economy

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0204 R. New Zealand Int. A Eureka
0230 R. New Zealand Int. A Health [or] Environment Matters
0245 R. Sweden F Green Scan (ecology)[2nd F]
Heart Beat (health)[3rd F]

ARTS & CULTURE
0215 R. Taiwan Int. T ... Culture Express
0230 R. BulgariaT Bulgarian Ploza
R. Sweden S Spectrum [3rd S]
0235 R. Budapest M .. Spotlight (monthly)
0245 Voice of Vietnam ..... W Culture & Society
0250 Voice of Vietnam ..... A Literature and Arts

LOCAL LIVES & VIEWS
0210 R. BulgarioT-A Events & Developments
0215 R. Korea Int. T-A . Seoul Calling (magazine)
R. Taiwan Int. W .. Taiwan Today
H Discover Taiwan
F Taipei Magazine
0230 R. BulgariaT Walks & Talks
R. Korea Int. T ... Korea Today & Tomorrow
W Korean Kaleidoscope (society)
H Wonderful Korea (travelogue)
F Seoul Report (around the capital)
R. Sweden S Weekend (Europe magazine)[1st S]
Sweden Today [2nd S]
Studio 49 (topical discussion)[4th S]
R. Taiwan Int. S ... Hakka World (native Taiwanese)
Voice of Russia T ... Kaleidoscope (events)
H Moscow Yesterday ond Today
0235 R. Budapest S ... Insight Central Europe
M Heading for Hungary (monthly)
T-A Hungary Today
R. BulgariaW-M ..... Keyword Bulgaria
0245 R. Sweden W Close Up (profiles) [1st W]
F Nordic Report [1st F]; The S-Files (things Swedish)[4th F]
A Review of the Newsweek
R. Taiwan Int. A ... Kaleidoscope
Voice of Vietnam ..... T Vietnam: Land & People
A Rural Vietnam
0254 Voice of Russia W .. Russia: People & Events

INFORMATIONAL FEATURES
0232 Voice of Russia M/F Russian by Radio
0235 R. Habana Cuba ... S The World of Stamps
0245 BBCWS(am) M .. The Instant Guide (issue background)
R. Taiwan Int. M-F Let's Learn Chinese

MUSIC
0200 WBCQ (5105) M .. Squad 51 (dance, trance, active rock)
WBCQ (7415) M .. Radio NY International [cont'd]
0210 R. BulgariaM Folk Studio
R. Habana Cuba ... M From Habana
R. Korea Int. M .. Korean Pop Interactive
0215 R. Taiwan Int. M .. Jade Bells and Bambao Pipes (traditional)
0230 R. Habana Cuba ... M The Jazz Place [or] Top Tens
R. Sweden M Sounds Nordic [exc. 1st M]
WHRA (7580) S ... World Harvest Country Style
0332 Voice of Russia S ... Songs from Russia
W Musical Portraits
0250 Voice of Vietnom ..... S Music (Vietnamese)

ENTERTAINMENT
0200 WBCQ (7415) S ... Pan Global Wireless
0205 R. AustraliaS Margaret Throsby Interview
0230 R. Taiwan Int. W .. Instant Noodles (the weird news)
0232 Voice of Russia A ... Audio Book Club
0240 Voice of Vietnam ..... M Sunday Show

SWL, MEDIA & COMMUNICATIONS
0200 WRMI (7385) S ... Wavescan
WWCR (3210) M .. Cyber Line (digital)
WWCR (5070) S ... DX Partyline
0230 WHRA (7580) S ... DXing with Cumbre
WRMI (7385) S ... Voice of the NASB
M Wavescan
WWCR (5070) S ... World of Radio
0245 R. BulgariaS R. Bulgaria Calling
0250 R. Budapest A ... DX Corner

LISTENER CONTACT/INTERACTIVE
0210 R. Korea Int. S ... Worldwide Friendship
0230 R. Sweden M In Touch with Stockholm [1st M]
0235 R. Budapest M .. And the Gatepost [monthly]
R. BulgariaT Answering Your Letters
0240 R. Taiwan Int. S ... Mailbag Time
0245 Voice of Vietnam ..... H Letterbox
0246 Voice of Russia S ... You Write to Moscow

SPORT
0200 R. New Zealand Int. D Live Sport (as available)
0205 R. AustraliaS/A Grandstand (live sports action*)
0245 R. Sweden T Sport Scan
(*special on 9660, 12080, 17580, 21725 kHz. only.)

0300 UTC/ 11pm E/8pm P - Page 46 Freqs

NEWSCASTS (*extended)
0300 BBCWS(am) D ... News
China R. Int. D ... News & Reports*
R. AustraliaD News
R. Habana Cuba ... D News
R. New Zealand Int. S/A News
M-F Pacific Regional News
R. Prague D News
R. Taiwon Int. D ... News
R. Ukraine Int. D ... News
Voice of Russia D ... News
Voice of Turkey D ... News
0330 VOA Africa M-F News
Voice of Vietnam ..... D News

CURRENT AFFAIRS MAGAZINES/FEATURES
0300 VOA Africa M-F Daybreak Africa
0305 Voice of Turkey D ... Press Review
0306 BBCWS(am) ..... S From Our Own Correspondent
T-A Outlook (magazine)
0310 China R. Int. S ... Report on Developing Countries
R. Habana Cuba ... M Weekly Review
R. New Zealand Int. M-F Dateline Pacific
0315 R. Habana Cuba ... T-S Viewpoint
0320 China R. Int. S ... CRI Roundup
0330 R. New Zealand Int. F Pacific Correspondent
R. Sweden T-A 60 Degrees North
0332 BBCWS(am) S ... The Interview (trends)
0340 R. Habana Cuba ... T/H/F . Caribbean Outlook
A Weekly Review
0345 R. Sweden A Review of the Newsweek
VOA Africa M-F Dateline (daily documentary)

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
0311 Voice of Russia F ... Newmarket
0315 R. Progue F Economic Report
R. Taiwan Int. M .. Taiwan Economic Journal
0330 China R. Int. T ... Biz China
R. New Zealand Int. W Tradewinds
0333 VOA Africa M-F Business Report
0345 Voice of Vietnam ..... F Vietnam Economy

Shortwave Guide

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0311 Voice of Russia H ... Science Plus
0315 China R. Int. A ... Sci-Tech
0345 R. Sweden F Greenscan (ecology-2nd wk.)
Heartbeat (health-3rd wk.)
0350 R. Habana Cuba ... M Breakthrough

ARTS & CULTURE
0310 R. Prague M ABC of Czech (language)
A The Arts
0315 R. Prague M Czech Books (biweekly)
A Stepping Out (Prague nightlife)
0330 China R. Int. S ... In the Spotlight
R. Sweden S Spectrum (3rd wk.)
R. Taiwan Int. M .. Stage, Screen & Studio
F Bookworm
R. Ukraine Int. M .. Roots
0332 Voice of Russia F ... Russian history/culture program
0345 Voice of Vietnam ..... W Culture and Society
0350 Voice of Vietnam ..... A Literature & Arts

LOCAL LIVES & VIEWS
0305 R. Australia S Australian Express (magazine)
A Rural Reporter (outback)
R. Prague S Magazine (local color)
T-A Current Affairs
R. Ukraine Int. T-A . Ukraine Today
0310 R. Prague S Letter from Prague
H Witness (oral history)
0311 Voice of Russia M .. This is Russia
0315 R. Prague S/W One on One (interview)
T Talking Point (Czech issues)
H Czechs in History [or] Czechs Today [or] Spotlight (places)
R. Taiwan Int. S ... Hakka World (indigenous culture)
A Kaleidoscope
Voice of Turkey S ... Outlook
0320 R. Australia M-F Life Matters (social issues)
0330 China R. Int. M .. People in the Know
W China Horizons
H Voices from Other Lands
F Life in China
R. Sweden S Network Europe (magazine-1st wk); Sweden Today (2nd wk); Studio 49 (topical discussion-4th wk)
0345 R. Sweden F Nordic Report (1st wk.); The S-Files (things Swedish-4th wk)
A Review of the Newsweek
Voice of Vietnam ..... T Vietnam: Land and People
A Rural Vietnam
0354 R. Australia S/A Heywire (Aussie rural youth views)

INFORMATIONAL FEATURES
0305 R. New Zealand Int. S RPM (international documentaries)
0332 Voice of Russia T/H/A The River of Time
0345 R. Taiwan Int. M-F Let's Learn Chinese

MUSIC
0300 WHRI (5745) S ... Powersource Top 20 (Christian rock)
WRMI (7385) M .. VCS Radio (Christian hard rock)
0302 WHRI (7315) S ... Countdown Magazine (Christian rock)
0305 R. New Zealand Int. A Home Grown (NZ performers)
0310 R. Ukraine Int. M .. Music from Ukraine
0311 Voice of Russia S ... Music & Musicians
T Musical Portraits
0315 R. Prague M Encore [or] Magic Carpet [monthly]
R. Taiwan Int. T ... Jade Bells & Bamboo Pipes (traditional)
Voice of Turkey M .. Tunes Spanning Centuries
0330 R. Australia S Jazz Notes
A Australian Country Style
R. New Zealand Int. M New Releases
A Musical Chairs (NZ artist profile)
R. Sweden M Sounds Nordic (rock-exc. 1st wk.)
WWCR (5070) S ... The Old Record Shop (big band vinyl)
0332 Voice of Russia M .. Moscow Calling (rock)
0350 Voice of Vietnam ..... S Music (Vietnamese)

ENTERTAINMENT
0300 WBCQ (7415) S ... Michael Ketter (satire/free form)
M Radio NY International [cont'd]
WBCQ (9330) S ... Radio Timtran Worldwide
0306 BBCWS(am) A ... Pick of the World (BBC's best)
0315 R. Taiwan Int. H ... Instant Noodles ("wacky" news)
0340 Voice of Vietnam ..... M Sunday Show
0345 BBCWS(am) T-A . Off the Shelf (book readings)

SWL, MEDIA & COMMUNICATIONS
0300 WBCQ (5105) M .. The Pirate's Cave (pirate radio)
WRMI (7385) S ... World Radio Network relay
0315 R. Ukraine Int. S ... Whole World on Radio Dial
0320 Voice of Turkey S ... DX Corner (fortnightly)
0330 R. New Zealand Int. H RNZI Talk (fortnightly)
WHRI (7315) M .. DXing with Cumbre
0340 R. Habana Cuba ... S/W DXers Unlimited
0345 R. Bulgaria S R. Bulgaria Calling

LISTENER CONTACT/INTERACTIVE
0305 R. Prague M Mailbox
0306 BBCWS(am) M .. Talking Point (current issues)
0310 Voice of Turkey W .. Live from Turkey
0311 Voice of Russia W/A Moscow Mailbag
0320 Voice of Turkey H ... Letterbox
0330 China R. Int. A ... Listeners' Garden
R. New Zealand Int. H Mailbox (fortnightly)
R. Sweden M In Touch with Stockholm (1st wk.)
R. Ukraine Int. S ... Hello from Kiev
0340 R. Habana Cuba ... M Mailbag Show
R. Taiwan Int. A ... Mailbag Time
0345 BBCWS(am) A ... Write On
Voice of Vietnam ..... H Letterbox

SPORT
0300 R. Australia S/A Grandstand (live action)*
R. New Zealand Int. D Live Sport (as available)
0310 R. Australia M-F Regional Sports Report
0330 R. New Zealand Int. H The World in Sport
0335 R. Habana Cuba ... T-A Time Out
0345 R. Sweden T Sportscan
(*special on 9660, 12080, 17580, 21725 kHz. only)

0400 UTC/ 12am E/9pm P - Page 47 Freqs

NEWSCASTS (*extended)
0400 BBCWS(am) D ... World Briefing*
China R. Int. D ... News & Reports
Deutsche Welle D ... News
R. Australia D News
R. Habana Cuba ... D News
R. Netherlands S/A News
R. New Zealand Int. D News
RVi Belgium T-A . News
VOA Africa M-F News & Reports*
Voice of Russia D ... News
0432 BBCWS(am) M-F The World Today*

CURRENT AFFAIRS MAGAZINES/FEATURES
0400 R. Netherlands T-A . Newsline
0405 Deutsche Welle S ... Inside Europe
T-A Newslink Africa
R. Netherlands S ... Wide Angle (one topic focus)
0410 China R. Int. S ... Report on Developing Countries
0415 VOA Africa M-F Focus (one topic in-depth)
0425 R. Netherlands S ... Insight (commentary)
0430 Deutsche Welle T ... Insight
VOA Africa M-F Daybreak Africa
0455 R. Australia M-F Perspective

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
0411 Voice of Russia H ... Newmarket
0430 BBCWS(am) S ... World Business Review
China R. Int. T ... Biz China
Deutsche Welle W .. World in Progress (development)
H Money Talks
R. Netherlands A ... A Good Life (development issues)
0445 Deutsche Welle T ... Business German

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0411 Voice of Russia W/A Science Plus
0415 China R. Int. A ... Cutting Edge
0430 Deutsche Welle F ... Man & Environment
A Spectrum
R. Netherlands T ... Research File

ARTS & CULTURE
0430 China R. Int. S ... In the Spotlight
R. Netherlands M .. Vox Humana

LOCAL LIVES & VIEWS
0405 R. Netherlands M .. Europe Unzipped
R. New Zealand Int. M-F In Touch with NZ
RVi Belgium T-A . Flanders Today
0410 RVi Belgium M .. Tourism in Flanders
0430 China R. Int. M .. People in the Know
W China Horizons
H Voices from Other Lands
F Life in China
R. Australia S The Chat Room (interviews)
R. Netherlands W .. Euroquest (Europe in context)
F Dutch Horizons
0432 Voice of Russia S ... Kaleidoscope
W Moscow Yesterday and Today

INFORMATIONAL FEATURES
0405 R. Australia S The Europeans
0430 R. Netherlands H ... Documentary
0435 R. Habana Cuba ... S The World of Stamps
0432 BBCWS(am) A ... Reporting Religion
0445 BBCWS(am) S ... The Instant Guide (queries answered)

MUSIC
0400 RVi Belgium S ... Music from Flanders
WHRI (5745) S ... Powersource Top 20 [cont'd]
WHRI (7315) S ... Countdown Magazine [cont'd]
0405 R. New Zealand Int. A Home Grown (from 0305)
0410 R. Habana Cuba ... M From Habana
0411 Voice of Russia S/M Musical Portraits
0430 R. Habana Cuba ... M The Jazz Place [or] Top Tens
0432 Voice of Russia T ... Music Around Us
H Folk Box
0447 Voice of Russia T ... Music At Your Request

ENTERTAINMENT
0400 WBCQ (7415) M-A Amos 'n Andy (classic comedy)
0405 R. New Zealand Int. S Sunday Drama (a play for radio)
WWCR Tennessee .... A Golden Age of Radio Theatre (3215 kHz)
0410 R. Australia M-F Margaret Throsby Interview
0415 WBCQ (7415) T ... Odin Lives (Norse myths/music)
0432 Voice of Russia M/F Audio Book Club
A Timelines

SWL, MEDIA & COMMUNICATIONS
0400 RVi Belgium M .. Radio World
WBCQ (7415) S ... Tom & Darryl
WRMI (7385) S/M World Radio Network relay
WWCR (5070) S ... Cyber Line (digital)
0415 WBCQ (7415) M .. World of Radio

LISTENER CONTACT/INTERACTIVE
0405 Deutsche Welle M .. Mailbag
0411 Voice of Russia T/F Moscow Mailbag
0415 RVi Belgium M .. Brussels 1043
0430 China R. Int. A ... Listeners' Garden
R. Netherlands S ... Amsterdam Forum

SPORT
0400 R. Australia S/A Grandstand (live action)*
0423 VOA Africa M-F Sports
(*special on 9660, 12080, 17580, 21725 kHz. only.)

0500 UTC/ 1am E/10pm P - Page 47 Freqs

NEWSCASTS (*extended)
0500 BBCWS(waf)(eu) D ... The World Today*
China R. Int. D ... News & Reports*
R. Australia D News

R. Habana Cuba ... D News
R. Japan D News
R. New Zealand Int. D News
VOA Africa M-F News & Reports*
Voice of Nigeria S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES
0500 Channel Africa S ... Network Africa
M-F Dateline Africa
Voice of Nigeria M-F VON Scope
0505 R. New Zealand Int. M-F Checkpoint
0510 China R. Int. S ... Report on Developing Countries
R. Australia M-F Pacific Beat
R. Habana Cuba ... M Weekly Review
0515 R. Habana Cuba ... T-S Viewpoint
R. Japan M-F 44 Minutes
0520 China R. Int. S ... CRI Roundup
0540 R. Habana Cuba ... T/H/F . Caribbean Outlook
A Weekly Review
0545 VOA Africa M-F Dateline (short documentary)

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
0530 China R. Int. T ... Biz China
0533 VOA Africa M-F Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0515 China R. Int. A ... Cutting Edge
0530 WWCR (5070) M-F Natural Health Clinic
0550 R. Habana Cuba ... M Breakthrough

ARTS & CULTURE
0530 China R. Int. S ... In the Spotlight

LOCAL LIVES & VIEWS
0505 R. Australia A Australian Express (magazine)
0510 R. New Zealand Int. A Tagata o te Moana (Pacific magazine)
0529 BBCWS(waf) D ... African News
0530 China R. Int. M .. People in the Know
W China Horizons
H Voices from Other Lands
F Life in China
0532 BBCWS(eu) A People & Politics
BBCWS(waf) S ... African Perspective
M-F Network Africa
A African Quiz (1st A) [or] This Week & Africa

INFORMATIONAL FEATURES
0505 R. Australia S All in the Mind (the brain)
0510 R. New Zealand Int. S Religion feature or series
0530 R. Australia S The Ark (religious history)
A All in the Mind (the brain)
0532 BBCWS(eu) S Reporting Religion

MUSIC
0510 R. Japan S Pop Joins the World
0530 WHRI (5745/7315) . A World Harvest Country Style
0535 R. Australia A Fine Music Australia (classical)
0540 R. New Zealand Int. S Jazz Spotlight

ENTERTAINMENT
0500 WBCQ Maine S ... Juliet's Wild Kingdom
M Joe Mazza ("everything but politics")
0530 Voice of Nigeria D ... Moving On (lifestyles magazine)

SWL, MEDIA & COMMUNICATIONS
0500 WHRI (5745, 7315) A DXing with Cumbre
WRMI (7385) S/M World Radio Network relay
0540 R. Habana Cuba ... S/W DXers Unlimited

LISTENER CONTACT/INTERACTIVE
0510 R. Japan A Hello from Tokyo
0530 China R. Int. A ... Listeners' Garden
0540 R. Habana Cuba ... M Mailbag Show

SPORT
0500 R. Australia S/A Grandstand (live action)*
0523 VOA Africa M-F Sports Report
0535 R. Habana Cuba ... T-A Time Out
R. New Zealand Int. D Live Sport (as available)
(*special on 9660, 12080, 17580, 21725 kHz. only.)

0600 UTC/ 2am E/11pm P - Page 48 Freqs

NEWSCASTS (*extended)
0600 BBCWS(waf)(eu) D ... The World Today*
R. Australia D News
R. Habana Cuba ... D News
R. Japan D News
R. New Zealand Int. D News
VOA Africa S/A News & Reports*
Voice of Nigeria M-F News*

CURRENT AFFAIRS MAGAZINES/FEATURES
0600 VOA Africa M-F Daybreak Africa
0605 R. New Zealand Int. M-F Worldwatch & Pacific Report
0615 R. Japan M-F Asian Top News (region's radio)
0630 Voice of Nigeria S ... In the News
A Newsmaker
0632 BBCWS(eu) S The Interview (trends)
0645 BBCWS(waf) S ... The Instant Guide (backgrounder)

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
0632 BBCWS(waf) S ... World Business Review

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0605 R. Australia S The Buzz (technology)
0620 R. Australia M Ockham's Razor (opinion)
T In Conversation

ARTS & CULTURE
0620 R. Australia F The Makers

LOCAL LIVES & VIEWS
0607 R. New Zealand Int. S Mana Korero (Maori magazine)
0610 R. Japan S Weekend Japanology
0632 BBCWS(waf) M-F Network Africa
A African Quiz (1st A) [or] This Week & Africa (exc. 1st A)
0633 VOA Africa S/A Main Street (life in the USA)
0645 Voice of Nigeria A ... Window on Abuja (regional report)
0654 R. Japan S Japan: Take Five

INFORMATIONAL FEATURES
0620 R. Australia W The Ark (religious issues)
H Lingua Franca (language)
0625 R. Japan T Basic Japanese for You
H Brush Up Your Japanese
0635 R. Habana Cuba ... S World of Stamps

MUSIC
0605 WHRI (7315) S ... Turn Your Radio On (southern gospel)
0607 R. New Zealand Int. A The Mix
0610 R. Habana Cuba ... M From Havana (Cuban musicians)
R. Japan M-F Songs for Everyone
A Pop Joins the World
0625 R. Japan M Japon Music Treasure Box
W Japan Musicscape
F Music Beat (pop)
0630 R. Australia S Blacktracker (modern Aboriginal)
A Oz Sounds
R. Habana Cuba ... M The Jazz Place [or] Top Tens
0640 R. Australia M Australian Music Show (modern rock)
T Music Deli (international)
W Blacktracker (Aboriginal)
H Australia Country Style
F Jazz Notes

ENTERTAINMENT
0600 WBCQ (7415) M .. Joe Mazza [cont'd]
0645 R. New Zealand Int. M-F Storytime (for children)

SWL, MEDIA & COMMUNICATIONS
0600 WRMI (7385) S/M World Radio Network relay
0630 WHRI (5745) S ... DXing with Cumbre
WWCR (3210) S ... World of Radio

SPORT
0600 R. Australia S/A Grandstand (live action)*
R. New Zealand Int. D Live Sport (as available)
0610 R. Australia M-F Regional Sports Report
0623 VOA Africa S/A Sparts
0632 BBCWS(eu) A World Football
(*special on 9660, 12080, 17580, 21725 kHz. only.)

1000 UTC/6am E/3am P - Page 49 Freqs

NEWSCASTS (*extended)
1000 BBCWS(am) S/A News
M-F World Briefing*
R. Australia D News
R. New Zealand Int. D News

CURRENT AFFAIRS MAGAZINES/FEATURES
1005 R. Australia M-F Asia Pacific
A Background Briefing
R. New Zealand Int. M-F Late Edition
1006 BBCWS(am) S ... From Our Own Correspondent
A Assignment (one topic in-depth)
1010 WWCR (5070) S ... A View from Europe

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
1032 BBCWS(am) M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1030 R. Australia M Health Report

LOCAL LIVES & VIEWS
1035 R. New Zealand Int. S Sunday Supplement

INFORMATIONAL FEATURES
1030 R. Australia T Law Report
W Religion Report
1032 BBCWS(am) S ... Reporting Religion

MUSIC
1000 WWCR (15825) M-F Worldwide Country Radio
1005 R. Australia S Keys to Music
WHRI (9495) S ... Turn Your Radio On (southern gospel)
1012 R. New Zealand Int. A Deep Purple (relaxing)

SWL, MEDIA & COMMUNICATIONS
1012 R. New Zealand Int. S Mediawatch
1030 R. Australia H Media Report
WWCR (5070) A ... World of Radio

LISTENER CONTACT/INTERACTIVE
1015 WWCR (15825) S ... Ask WWCR

SPORT
1030 R. Australia F Sports Factor
1045 BBCWS(am) M-F Sports Roundup

1100 UTC/ 7am E/4am P - Page 50 Freqs

NEWSCASTS (*extended)
1100 BBCWS(am) D ... World Briefing
R. Australia D News
R. Japan D News
R. Netherlands S/A News
R. New Zealand Int. S/A News
1130 R. Korea Int. D ... News

CURRENT AFFAIRS MAGAZINES/FEATURES .
1100 R. Netherlands D ... Newsline
1105 BBCWS(am) M-F Caribbean Morning Report
R. Australia M-A Asia Pacific
WWCR Tennessee(15825) A . A View from Europe
1106 R. Netherlands S ... Wide Angle (one issue in focus)
1108 R. New Zealand Int. M-F Dateline Pacific
1115 R. Japan M-F Asian Top News (region's radio)
1130 R. New Zealand Int. F Pacific Correspondent
R. Sweden M-F 60 Degrees North
1132 BBCWS(am) S ... Letter from America (Alistair Cooke)
M The Instant Guide (backgrounder)
TWFA Analysis
H From Our Own Correspondent
1140 R. Korea Int. M-F News Commentary

Shortwave Guide

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
1130 R. Netherlands F ... A Good Life (development issues)
R. New Zealand Int. W Tradewinds (Pacific commerce)

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1130 R. Netherlands M .. Research File
1145 R. Sweden H Green Scan (environment)[2nd H]
Heart Beat (health)[3rd H]

ARTS & CULTURE
1130 R. Netherlands S ... Vox Humana
R. Sweden A Spectrum [3rd A]

LOCAL LIVES & VIEWS
1100 China R. Int. D ... Real Time Beijing
R. New Zealand Int. M-F Pacific Regional News
1105 R. Australia S Sunday Profile
R. New Zealand Int. S/A NZ Forces Radio
1106 R. Netherlands A ... Europe Unzipped
1110 WWCR (5070) A ... A View from Europe
1115 BBCWS(am) M-F Caribbean Magazine
1120 BBCWS(am) D ... British News
1130 R. Australia S Speaking Out (Aboriginal views)
M-F Bush Telegraph (rural life)
R. Netherlands T ... EuroQuest (Europe in context)
H Dutch Horizons
R. Sweden A Network Europe [1st A]
Sweden Today [2nd A]
Studio 49 [4th A]
1145 R. Korea Int. M-F Seoul Calling
R. Sweden T Close Up (2nd T]
H Nordic Lights [1st H]
The S Filess [4th H]
F Review of the Newsweek

INFORMATIONAL FEATURES
1125 R. Japan T Basic Japanese for You
H Brush Up Your Japanese
1130 R. Australia A All in the Mind (the brain)
R. Netherlands W .. Weekly Documentary

MUSIC
1110 R. Japan A Pop Jains the World
1115 China R. Int. S ... China Beat (pop)
A China Roots (traditional)
1125 R. Japan M Japan Music Treasure Box
W Japon Musicscape
F Music Beat (pop)
1130 R. New Zealand Int. M New Music Releases
R. Sweden S Saunds Nordic [exc. 1st A]
1140 R. Korea Int. S ... Korean Pop Interactive

SWL, MEDIA & COMMUNICATIONS
1100 WRMI (9955) W .. Voice of the NASB
1130 R. New Zealand Int. T RNZI Talk (station news)[fortnightly]
WRMI (9955) F ... Wavescan

LISTENER CONTACT/INTERACTIVE
1100 WRMI (9955) T/F Viva Miami
1110 R. Japon S Hello From Tokya
1130 R. Netherlands A ... Amsterdam Forum (discussions)
R. New Zealand Int. T Mailbox (letters/DX news)[fortnightly]
R. Sweden S In Touch with Stockholm [1st A]
1140 R. Korea Int. A ... Worldwide Friendship

SPORT
1105 R. New Zealand Int. F Sports Story
1110 BBCWS(am) M-F Caribbean Sport
1130 R. New Zealand Int. H The World in Sport
1145 BBCWS(am) F ... Football Extra
A-H Sports Roundup

1200 UTC/ 8am E/5am P - Page 50 Freqs

NEWSCASTS (*extended)
1200 BBCWS(am) D ... Newshaur* ..
R. Australia D News
R. Canada Int. M-F News
R. New Zealand Int. D News

CURRENT AFFAIRS MAGAZINES/FEATURES
1200 HCJB Ecuador M-F Morning in the Mountains
1205 R. Canada Int. M-F The Current
R. New Zealand Int. M-F Late Edition
1210 BBCWS(am) M-F Caribbean Morning Report
1230 R. Sweden M-F 60 Degrees North

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
1205 BBCWS(am) M-F Caribbean Business

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1245 R. Sweden H Green Scan (ecology-2nd H)
Heart Beat (3rd H)

ARTS & CULTURE
1230 R. Sweden A Spectrum (3rd wk.)

LOCAL LIVES & VIEWS
1200 R. Korea Int M-F Seoul Calling [cont'd]
1205 R. Australia M-H Late Night Live (discussion)
R. New Zealand Int. A NZ Forces Radio [cont'd]
1215 R. Korea Int. M .. Korea, Today & Tomorrow
T Korean Kaleidoscope (society)
W Wonderful Korea (travelogue)
H Seoul Report (interviews)
1230 R.Sweden A Network Europe (Europe magazine-1st A)
Sweden Today (2nd A)
Studio 49 (discussion-4th A)
1245 R. Sweden T Close-Up (profiles-1st T)
H Nordic Report (1st H)
The S-Files (things Swedish-4th H)
F Review of the Newsweek

INFORMATIONAL FEATURES
1205 R. Australia S The Spirit of Things (spiritual matters)

MUSIC
1200 R. Korea Int. S ... Korean Pop Interactive [cont'd]
1205 R. Australia F Sound Quality (innovative)
A The Music Show
WHRI (9840) A ... Turn Your Radio On (southern gospel)
1230 R. Sweden S Sounds Nordic (rock-exc. 1st S)

SWL, MEDIA & COMMUNICATIONS
1200 WRMI (15725) A ... World Radio Network relay
1230 HCJB Ecuador A ... DX Partyline
WHRI (9495) A ... DXing with Cumbre

LISTENER CONTACT/INTERACTIVE
1200 R. Korea Int. S ... Worldwide Friendship [cont'd]
1230 R. Sweden S In Touch with Stockholm (1st S)

SPORT
1205 R. New Zealand Int. S Sportsworld (weekend review)
1245 R. Sweden M Sport Scan

1300 UTC/ 9am E/6am P - Page 51 Freqs

NEWSCASTS
1300 BBCWS(am) D ... News
China R Int. D ... News & Reports*
R. Australia D News
R. Canada Int. D ... News
R. New Zealand Int. S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES
1306 BBCWS(am) M-F Outlook
1308 R. New Zealand Int. M-F Dateline Pacific
1310 China R Int. S ... Report on Developing Countries
1330 R. New Zealand Int. H Pacific Correspondent
1355 R. Australia S Perspective

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
1330 China R Int. T ... Biz China
R. New Zealand Int. T Tradewinds (Pacific commerce)

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1306 BBCWS(am) S ... Global Perspective (on health care)
1315 China R. Int. A ... Cutting Edge

Arts/Culture
1330 China R. Int. S ... In the Spotlight

LOCAL LIVES & VIEWS
1305 R. Canada Int. S ... The Sunday Edition (interviews/documentaries)
M-F Saunds Like Canada
A The House (Parliament)
R. New Zealand Int. S Tagata o te Moana (Maori magazine)
1320 China R. Int. S ... CRI Raundup
1330 China R. Int. M .. People in the Know
W China Horizons
H Voices from Other Lands
F Life in China

INFORMATIONAL FEATURES
1305 R. Australia S Encounter (religious expression)
1332 BBCWS(am) S ... In Praise of God (warship services)

MUSIC
1305 R. Australia M-F The Planet (international)
A The Music Show [from 1205]
R. New Zealand Int. A New Music Releases
VOA News Now ..... S/A Jazz America
M American Gold (oldies)
T Roots & Branches (folk)
W Classic Rock
H Top 20 ..
F Country Hits
WWCR (15825) M-F Worldwide Country Radio
1330 WHRA S World Harvest Country Style

ENTERTAINMENT
1306 BBCWS(am) A ... Pick of the World (BBC's best)
1345 BBCWS(am) M-F Off the Shelf (book readings)

SWL, MEDIA & COMMUNICATIONS
1300 WRMI (15725) A ... World Radio Network relay
1330 R. New Zealand Int. M RNZI Talk (station news)[fortnightly]

LISTENER CONTACT/INTERACTIVE
1330 China R. Int. A ... Listeners' Garden
R. New Zealand Int. M Mailbox (letters/DX news)[fortnightly]
WRMI (15725) S ... Viva Miami
1345 BBCWS(am) A ... Write On

SPORT
1330 R. New Zealand Int. W The World in Sport
F Sports Story

1400 UTC/ 10am E/7am P - Page 51 Freqs

NEWSCASTS (*extended)
1400 BBCWS(am) D ... News
China R. Int. D ... News & Reports*
R. Australia D News
R. Canada Int. D ... News
R. Japan D News
R. New Zealand Int. D News

CURRENT AFFAIRS MAGAZINES/FEATURES
1405 R. Australia A Background Briefing
1406 BBCWS(am) H ... Assignment (one topic in-depth)
1410 China R. Int. S ... Report on Developing Countries
1415 R. Japan M-F 44 Minutes

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
1400 WRMI Florida M-F Stock Talk Live (from 1330)
1410 China R. Int. T ... Biz China
1432 BBCWS(am) H ... The Music Biz

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1405 R. Australia S The Science Show
1415 China R. Int. A ... Cutting Edge

Shortwave Guide

ARTS & CULTURE
1406 BBCWS(am) T ... Masterpiece (cultural ideas)
1430 China R. Int. S ... In the Spotlight

LOCAL LIVES & VIEWS
1405 R. Canada Int. S ... The Sunday Edition (from 1305)
M-F Sounds Like Canada (from 1305)
1410 R. Japan A Weekend Japanology
1420 China R. Int. S ... CRI Roundup
1430 China R. Int. M .. People in the Know
W China Horizons
H Voices from Other Lands
F Life in China
R. Canada Int. F ... C'est la Vie (in French Canada)
1445 R. Canada Int. M-H Out Front ("first person" radio)
1454 R. Japan A Japan: Take Five

INFORMATIONAL FEATURES
1405 R. New Zealand Int. A Religion program or series
1406 BBCWS(am) M/W Documentaries

MUSIC
1405 R. Japan S Pop Joins the World
R. New Zealand Int. S In a Mellow Tone
M-F Wayne's Music (decade by decade)
1432 BBCWS(am) M .. The Music Feature
T Top of the Pops (UK top 20)
W Charlie Gillett (world)
F John Peel (eclectic)

ENTERTAINMENT
1405 R. Australia M-F Margaret Throsby (interview/music)
R. Canada Int. A ... Vinyl Cafe (music/humor)

SWL, MEDIA & COMMUNICATIONS
1400 WRMI (15725) S ... Wavescan
A World Radio Network relay
LISTENER CONTACT/INTERACTIVE
1406 BBCWS(am) S ... Talking Point (current events call-in)
1430 China R. Int. A ... Listeners' Garden

SPORT
1406 BBCWS(am) F ... Sports International (magazine)
BBCWS(am)(eas) A ... Sportsworld (live action)

1500 UTC/ 11am E/8am P - Page 52 Freqs

NEWSCASTS
1500 BBCWS(am) D ... News
China R. Int. D ... News
R. Australia D News
R. Canada Int. S/A News
R. Japan D News

CURRENT AFFAIRS MAGAZINES/FEATURES
1505 R. Australia M-F Asia Pacific
1506 BBCWS(am) S ... Assignment (one topic in-depth)
1510 China R. Int. S ... Report on Developing Countries
1515 R. Japan M-F Asian Top News

Business/Finance (also in Newscasts & Current Affairs)
1530 China R. Int. T ... Biz China
1555 R. Australia A Business Weekend

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1505 R. Canada Int. A ... Quirks and Quarks
1506 BBCWS(am) M .. Health Matters
T Go Digital (infotech)
W Discovery (research)
H One Planet (ecology)
F Science in Action (magazine)
1515 China R. Int. A ... Cutting Edge
1530 R. Australia M The Health Report

ARTS & CULTURE
1530 China R. Int. S ... In the Spotlight

LOCAL LIVES & VIEWS
1505 R. Australia S The National Interest
R. Austria Int. S/A Insight Central Europe
R. Canada Int. S ... The Sunday Edition (from 1305)
1515 R. Austria Int. M-F Report from Austria
1520 China R. Int. S ... CRI Roundup
1530 China R. Int. M .. People in the Know
W China Horizons
H Voices from Other Lands
F Life in China
1535 R. Austria Int. S/A Insight Central Europe
1545 R. Austria Int. M-F Report from Austria

INFORMATIONAL FEATURES
1525 R. Japan T Basic Japanese for You
H Brush Up Your Japanese
1530 R. Australia T The Law Report
W The Religion Report
1532 BBCWS(am) H ... The Word (books, writers & readers)(exc. last H)
World Book Club (discussion)(last H)
1545 BBCWS(am) W .. Heart & Soul (beliefs & values)
F What's the Problem? (advice)

MUSIC
1501 BBCWS(eas) S ... In Concert (by BBC ensembles)
1505 R. Japan A Pop Joins the World
1525 R. Japan M Japan Music Treasure Box
W Japan Musicscape
F Music Beat (pop)
1532 BBCWS(am) T ... Music Review (magazine)

ENTERTAINMENT
1532 BBCWS(am) M .. Fanshawe Gets to the Bottom of...
W/F Westway (drama serial)

SWL, MEDIA & COMMUNICATIONS
1500 WHRI (13760) A ... DXing with Cumbre
WRMI (15725) A ... World Radio Network relay
1505 R. Australia A In the Pipeline (media convergence)
1530 R. Australia H The Media Report
WHRI (15105) S ... DXing with Cumbre

LISTENER CONTACT/INTERACTIVE
1505 R. Japan S Hello from Tokyo
1525 R. Austria Int. S/A Listener Letters
1530 China R. Int. A ... Listeners' Garden
1555 R. Austria Int. S/A Listener Letters

SPORT
1505 BBCWS(am) A ... Sportsworld (from 1405)
1530 R. Australia F The Sports Factor

1600 UTC/ 12pm E/9am P - Page 52 Freqs

NEWSCASTS (*extended)
1600 BBCWS(am) S/A News
R. Australia D News
VOA Africa M-F News & Reports*

CURRENT AFFAIRS MAGAZINES/FEATURES
1600 BBCWS(am) M-F Europe Today
VOA Africa S/A Nightline Africa
1615 VOA Africa M-F Focus (a topic in depth)
1630 VOA Africa M-F Africa World Tonight

ARTS & CULTURE
1605 R. Australia S Books & Writing
1635 R. Australia S Book Talk ..

LOCAL LIVES & VIEWS
1605 R. Australia M-F Bush Telegraph (rural issues)
A Hindsight (social history)

Information Feature
1600 WWCR (15725) S ... Latin Catholic Mass

MUSIC
1600 WRMI Florida S ... Solid Rock Radio (from 1400)
WWCR (15825) M-F Worldwide Country Radio

SWL, MEDIA & COMMUNICATIONS
1600 KWHR Hawaii(9930) A DXing with Cumbre
WRMI (15725) A ... World Radio Network (relay)

LISTENER CONTACT/INTERACTIVE
1600 WBCQ (17495) A ... Allan Weiner Worldwide

SPORT
1600 WHRI (15105) A ... Sports Spectrum Live
1605 BBCWS(am) S/A Sportsworld (live action)
1623 VOA Africa M-F Sports

1700 UTC/ 1pm E/10am P - Page 53 Freqs

NEWSCASTS (*extended)
1700 R. Australia D News
R. Japan D News
VOA Africa M-A News

CURRENT AFFAIRS MAGAZINES/FEATURES
1715 R. Japan M-F 44 Minutes

LOCAL LIVES & VIEWS
1705 R. Australia M-F Australia Talks Back (phone-in)
1710 WWCR (12160) S ... A View from Europe

INFORMATIONAL FEATURES
1705 R. Australia A The Spirit of Things (spir tual matters)

MUSIC
1700 WBCQ (17495) A ... Zomba's Mando Record Party
1705 R. Australia S Sound Quality (innovative)
1710 R. Japan S Pop Joins the World
1730 VOA Africa S Music Time in Africa

SWL, MEDIA & COMMUNICATIONS
1700 WRMI (15725) A ... World Radio Network relay

LISTENER CONTACT/INTERACTIVE
1706 VOA Africa M-F Talk to America (listener phone-in)

1710 R. Japan A Hello from Tokyo
1715 WWCR (15825) W .. Ask WWCR (exc. 2nd/3rd wk)
1730 WWCR (12160) S ... Ask WWCR

2100 UTC/ 5pm E/2pm P - Page 55 Freqs

NEWSCASTS (*extended) .....
2100 BBCWS(am) D ... News
Deutsche Welle D ... News
R. Australia D News
R. Japan D News

CURRENT AFFAIRS MAGAZINES/FEATURES
2105 Deutsche Welle M-F Newslink Africa
2110 R. Australia S-H AM (morning news magazine)
2115 R. Japan M-F Asian Top News (region's radio)
2145 R. Australia A Asia Sunday

Business/Finance (also in Newscasts & Current Affairs)

SCIENCE/TECHNOLOGY (incl. Health & Environment)
2106 BBCWS(am) S ... Global Perspective (on health care)
M Health Matters
T Go Digital (infotech)
W Discovery (research)
H One Planet (ecology)
F Science in Action (magazine)
2130 R. Australia M Earthbeat (ecology)
T Innovations (new products)
H All in the Mind (the brain)

ARTS & CULTURE
2130 Deutsche Welle T ... Arts on the Air (magazine)

LOCAL LIVES & VIEWS
2105 R. Australia F Verbatim (oral history)
A Australia All Over
2110 R. Japan A Weekend Japanology
2115 BBCWS(am) M-F Caribbean Report*
2120 BBCWS(am) M-F British News

Shortwave Guide

2130 BBCWS(am) T/F Calling the Falklands ^
Deutsche Welle W .. Living in Germany
A Africa This Week
R. Australia S Country Breakfast (rural issues)
2145 Deutsche Welle W .. Europe in Capitals
2154 R. Japan A Japan: Take Five
(*special service on 5975, 11675, 15390 kHz. only.)
(^ special service on 11680 kHz.)

Information Features
2105 Deutsche Welle A ... Religion & Society
WHRI (5745) M-H For the People (populism)
2115 Deutsche Welle S ... Inspired Minds
A German by Radio
R. Japan T Basic Japanese for You
H Brush Up Your Japanese
2130 Deutsche Welle H ... Cool! (Euro youth culture)
2132 BBCWS(am) H ... The Word (books, readers, writers) [exc last H]
World Book Club (discussion) [last H]
2145 BBCWS(am) ..... W Heart & Soul (beliefs/values)
F What's the Problem? (advice)

MUSIC
2105 R. Japan S Pop Joins the World
VOA News Now ..... M American Gold (oldies)
T Roots & Branches (folk)
W Classic Rock
H Top 20 ..
F Country Hits
2125 R. Japan M Japan Music Treasure Box
W Japan Musicscape
F Music Beat (pop)
2130 Deutsche Welle S ... Hits in Germany [or] Melody Time
M A World of Music
F Focus on Folk
2132 BBCWS(am) T ... Music Review (magazine)

ENTERTAINMENT
2100 WBCQ Maine(7415) S Radio Free Euphoria/ Radio Three
M Jean Shepherd
H Planet World News (satire)
2101 BBCWS(am) A ... Play of the Week (radio theatre)
2130 WBCQ Maine(7415) F The Pab Sungenis Project
2132 BBCWS(am) M .. Fanshawe Gets to the Bottom of...
W/F Westway (drama serial)

SWL, MEDIA & COMMUNICATIONS
2100 WHRA (17650) F ... DXing with Cumbre
WHRI (5745) S ... DXing with Cumbre
2130 R. Australia W In the Pipeline (media convergence)
WHRI (9495) A ... DXing with Cumbre

LISTENER CONTACT/INTERACTIVE
2100 WBCQ (9330) A ... Allan Weiner Worldwide

2200 UTC/ 6pm E/3pm P - Page 56 Freqs

NEWSCASTS (*extended)
2200 BBCWS(am) D ... The World Today*
R. Australia D News
R. Canada Int. M-F The World at Six*
RVi Belgium M-F News
Voice of Turkey D ... News
2230 R. Prague D News

CURRENT AFFAIRS MAGAZINES/FEATURES
2200 R. Canada Int. S/A The World This Weekend
R. for Peace Int. M-F Democracy Now!
2205 R. Australia F Asia Pacific
A Correspondents Report
Voice of Turkey D ... Press Review
2210 R. Australia S-H AM (morning news magazine)
2230 R. Australia F AM Saturday
R. Canada Int. M-F As It Happens

Business/Finance (also in Newscasts & Current Affairs)
2245 R. Prague H Economic Report

ARTS & CULTURE
2235 Voice of Turkey H ... Culture Parade
A Turkish Arts
2240 R. Prague F The Arts
2245 R. Prague S Czech Books [forthnightly]
F Stepping Out (Prague nightlife)

LOCAL LIVES & VIEWS
2204 RVi Belgium M-F Flanders Today
2208 RVi Belgium S ... Tourism in Flanders
2210 Voice of Turkey F ... Archaeological Settlements
2232 BBCWS(am) F ... People & Politics
2235 R. Prague S ABC of Czech (language)
M-F Current Affairs
A Insight Central Europe
2240 R. Australia S-H Australia Wide (national report)
R. Prague W Witness (oral history)
2245 R. Prague M Talking Point (Czech issues)
T One on One (interview)
W Czechs in History [or] Czechs Today [or] Spotlight (places)

INFORMATIONAL FEATURES
2230 WBCQ (9330) S ... Alternative Transportation Show
2232 BBCWS(am) A ... The Interview

MUSIC
2200 RVi Belgium A ... Music from Flanders
WBCQ (9330) A ... Country Music Hour
2205 WHRI (5745) A ... Turn Your Radio On (southern gospel)
2210 Voice of Turkey S ... Tunes Spanning Centuries
2230 R. Australia A Music Deli (international)
WBCQ (7415) H ... Uncle Ed's Musical Memories
F WDCD
2245 R. Prague S Encore (classical) [or] Magic Carpet (world) [both monthly]

ENTERTAINMENT
2200 WBCQ (7415) F ... Pab Sungenis Project
A Radio Timtron Worldwide
2230 R. Canada Int. A ... Madly Off in All Directions (comedy/satire)
WBCQ (7415) W .. Think Tank North America (the bizarre)

SWL, MEDIA & COMMUNICATIONS
2200 RVi Belgium S ... Radio World
WBCQ (17495) W .. World of Radio
2220 Voice of Turkey F ... DX Corner (fortnightly)
2230 WRMI Florida A ... Wavescan

LISTENER CONTACT/INTERACTIVE
2215 Voice of Turkey T ... Live from Turkey
2216 RVi Belgium S ... Brussels 1043
2220 Voice of Turkey W .. Letterbox
2230 WRMI (15725) A ... Viva Miami
2235 R. Prague S Mailbox

SPORT
2230 R. Canada Int. S ... The Inside Track

2300 UTC/ 7pm E/4pm P - Page 56 Freqs

NEWSCASTS (*extended)
2300 BBCWS(am) D ... News
China R. Int. D ... News & Reports*
R. Australia D News
R. Canada Int. D ... News

CURRENT AFFAIRS MAGAZINES/FEATURES
2305 R. Canada Int. M-F As It Happens (from 2230)
2306 BBCWS(am) M-F Outlook
2310 China R. Int. A ... Report on Developing Countries
R. Australia S-H Asia Pacific
2330 R. Canada Int. W .. Dispatches (international)

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
2330 China R Int. M .. Biz China

SCIENCE/TECHNOLOGY (incl. Health & Environment)
2305 R. Canada Int. A ... Quirks & Quarks
2315 China R. Int. F ... Cutting Edge
2330 R. Australia H The Buzz (infotech)
A Innovations

ARTS & CULTURE
2330 China R. Int. A ... In the Spotlight
R. Australia W The Arts

LOCAL LIVES & VIEWS
2305 R. Australia F Country Breakfast (rural issues)
2320 China R. Int. S ... CRI Roundup
2330 China R. Int. S ... People in the Know
T China Horizons
W Voices from Other Lands
H Life in China
R. Australia S Verbatim (oral history)
T Rural Reporter

INFORMATIONAL FEATURES
2305 WHRA (7580) M-F For the People (populism)
2306 BBCWS(am) S ... Documentary
2330 R. Australia M The Europeans

MUSIC
2300 WBCQ Maine H ... Uncle Ed's Musical Memories [cont'd]
F Lost Discs Radio Show
A Fred Flintstone Music Show
2305 R. Canada Int. S ... Global Village (world/folk)
WHRA (7580) S ... Turn Your Radio On (southern gospel)
2330 WHRI (5745) A ... World Harvest Country Style

ENTERTAINMENT
2300 WBCQ (5105) S ... Radio Reaction Theatre
WBCQ (7415) S ... Le Show
WBCQ (9330) A ... Tampon Tea Bingo Hour
2306 BBCWS(am) A ... Pick of the World (BBC's best)
2330 WBCQ (7415) T ... Duhh News ..
2332 BBCWS(am) S ... Fanshawe Gets to the Bottom of...
2345 BBCWS(am) M-F Off the Shelf (readings)

SWL, MEDIA & COMMUNICATIONS
2300 WBCQ (7415) W .. Off the Hook (public telecom issues)
A Real Amateur Radio Show
2330 WHRI (9495) A ... DXing with Cumbre

LISTENER CONTACT/INTERACTIVE
2330 China R. Int. F ... Listeners' Garden
2345 BBCWS(am) A ... Write On
WWCR (5070) A ... Ask WWCR

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo, *NASWA Flash Sheet*; Wolfgang Bueschel, Germany; Swopan Chakroborty, Kolkata, India; Alfredo E. Cotroneo, Italy; Andrew Flynn, Christian Voice; Glenn Hauser, Enid, OK, *DX Listening Digest, World of Radio;* Alokesh Gupta, New Delhi, India; Jose Jacob VU2JOS, India; Evelyn Marcy, WYFR; Marty McLaughlin Bible Voice BC; Anker Petersen, *DX Window;* Harold Sellers, Canada, ODXA/DX Ontario; Adrian Sainsbury, R. New Zealand Intl; Andy Sennitt, R. Netherlands; Larry Van Horn N5FPW, MT Asst. Editor; Loyd Van Horn KI4EPB, WRGC Sylva, NC; Jeff White, WRMI; Alexander Yegotov, R. Ukraine Intl; *BBC On Air; BCL News; BCDXC; CIDX; Cumbre DX; DX News;* Fineware; *Hard Core DX; NASWA Journal; Observer; Worldwide DX Club.*

Larry Van Horn
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Who are the Black Daggers?

Photos courtesy of the US Army Special Operations Command

There is an air show demonstration team that many radio hobbyists have never heard about. But thanks to *MT* reader Mark Anderson in Delaware, we at least now know that the Black Daggers exist.

I have been putting together the annual air show listing in the March issue of *MT* for the last six years and have been a regular monitor on a lot of military related internet newsgroups for almost a decade. Until now, I have never heard of a group performing under the name Black Daggers.

The Black Daggers are an elite parachute team comprised solely of soldiers from the United States Army Special Operations Command (USASOC). USASOC was activated December 1, 1989, at Fort Bragg, North Carolina, as the Army component of U.S. Special Operations Command. This parachute demonstration team – mere infants compared to the older, highly-revered United States Army Golden Knights – is comprised entirely of volunteers from throughout the Army Special Operations community. They have diverse backgrounds and various military specialties.

The Black Daggers use the military variant of the ram air parachutes which allow the free fall parachutist the ability to jump with over 100 pounds of additional equipment attached to him. In addition to the extra weight, the jumper must also withstand the high winds, frigid temperatures and low oxygen common at high altitude, requiring the jumper to be highly skilled. When exiting the aircraft, the jumpers free fall at approximately 120 miles per hour. They fly their bodies to perform maneuvers using their hands, arms, legs, and shoulders to control their flight. The parachutes used are flexible wing gliders.

And, of course, the question has been asked, "What frequency do I hear the Black Daggers on?" At this point, unfortunately, we have no definitive answer. We have never received a single report on this group. Hopefully, someone in the field may be able to help us out.

To help out the cause, here is a list of VHF and UHF air-to-ground frequencies assigned to Fort Bragg that have not been identified. If you are going to be at a show were the Black Daggers are performing, please check out these freqs and see if they are active. If you are in the Fort Bragg area, I would appreciate any reports on what the following are being used for.

Fort Bragg Air-to-Ground Freqs (AM mode)

139.100	139.125	139.200	139.225
139.375	139.425	141.100	141.150
141.200	141.275	141.325	141.425
141.475	141.500	142.425	142.450
142.475	142.600	142.900	143.000
143.200	143.300	143.350	143.400
143.975	148.025	148.575	148.600
148.625	148.675	148.775	148.800
148.850	148.900	149.400	149.600
149.650	149.725	149.750	149.825
149.850	149.875	150.475	150.600
226.450	226.600	226.650	227.050
227.300	227.600	229.350	229.700
230.850	231.400	231.850	231.900
232.250	232.650	233.200	233.300
234.300	237.200	237.300	237.650
237.700	240.800	240.900	241.200
241.700	241.850	241.900	242.300
242.600	242.750	243.800	244.350
244.600	244.850	244.950	245.150
245.300	245.800	246.300	246.800
247.300	247.400	247.700	247.900
247.950	248.150	248.800	249.150
260.700	264.800	265.750	267.100
267.150	276.600	280.800	280.850
280.900	283.700	300.100	304.750
321.600	339.900	340.100	356.600
356.700	356.850	356.900	357.350
364.900	365.300	365.400	365.800
366.200	366.750	367.900	367.950
368.300	369.800	369.850	370.300
370.400	370.700	370.750	373.300
373.700	373.800	376.600	376.700
376.750	386.300	386.700	387.900
389.300	393.500	397.700	399.200

Also, some other frequencies that bear watching are those reportedly used by the Golden Knights. Check out 123.450, 123.475 and 367.700 MHz.

◆ Georgia on my Mil Mind!

Mike Crenshaw in La Grange, Georgia, recently snail mailed us a comprehensive list of military frequencies used at Dobbins JARB/NAS Atlanta. Thanks for the list, Mike.

47.000	1-171 AVN Company C Operations "Dobbins Ops"
120.225	Ground Controlled Approach
120.750	Tower
121.000	Atlanta Approach/Departure Control
125.300	Ground Control
126.975	Atlanta Approach/Departure Control
127.350	Ground Controlled Approach *[I show it is used for Flight Following Advisories-LVH]*
134.125	Ground Controlled Approach
138.450	VMFA-142 Air to Air "Gator"
140.450	Navy Tactical Air-to-Air
142.200	Lockheed Flight Test F-22 Air-to-Air/ Air-to-Ground "Raptor Control/Raptor"
143.875	VMFA-142 CAP Air to Air "Gator"
233.700	VR-46 Squadron Common "Eagle"
239.975	94AW/700AS Air-to-Air "Cobb"
249.800	VMFA-142 Maintenance "Gator Base"
252.200	94AW/700AS Air-to-Air "Cobb"
252.500	94AW/700AS Air-to-Air "Cobb"
253.100	VMFA-142 Maintenance (Status) "Gator Base"
254.250	Atlanta Approach/Departure Control *[I show this as the ground control frequency for Fort Benning-LVH]*
255.725	Lockheed Flight Test Support – Mission Uniform"Raptor Control"
259.300	VFA-203 Operations "Dolphin Ops"
264.200	HMLA-773/4 MAW Air-to-Air "Red Dog"
268.700	Atlanta Approach/Departure Control
271.600	ATIS
274.750	Metro *[One of my old Spectrum Holes-LVH]*
275.800	Ground Control
284.700	Atlanta Departure Control
285.100	VAW-77 Squadron Common "Wolf Base"
289.000	VMFA-142 Air to Air "Gator"
299.500	VFA-203 Air to Air "Dolphin"
302.000	VMFA-142 Air to Air "Gator"
304.100	VAW-77 Air-to-Air "Wolf"
306.975	Ground Controlled Approach [*One of my old Spectrum Holes-LVH*]
307.900	Atlanta ARTCC (Mt. Oglethorpe RCAG)
312.400	Ground Controlled Approach
317.575	Ground Controlled Approach
317.700	Atlanta ARTCC (Atlanta A Austell RCAG)
323.050	Atlanta ARTCC (Unknown RCAG)
327.000	VMFA-142 Air to Air "Gator"
328.550	VMFA-142 Air to Air "Gator"
333.350	VFA-203 Air to Air "Dolphin"
335.575	Ground Controlled Approach
337.850	VFA-203 Squadron Common "Dolphin Base"
340.200	NAS Atlanta Base Operations
344.400	VMFA-142 Air to Air "Gator"
345.050	VMFA-142 Air to Air "Gator"
346.800	Ground Controlled Approach
355.100	VFA-203 Air to Air "Dolphin"
355.150	VFA-203 Air to Air "Dolphin"
357.000	VFA-203 Air to Air "Dolphin"
369.900	Atlanta ARTCC (Atlanta A Austell

RCAG) High Altitude: Tactical special use for the military
370.875 Tower
372.200 Pilot-to-Dispatcher (PTD)
379.525 94AW/700AS Command Post "Dapper Dan"
379.900 Approach Control
381.550 Atlanta ARTCC (Albany RCAG)
381.600 Hartsfield-Jackson International Airport Tower/Ground Control
381.650 Departure Control (Black Jack Mountain-Marietta)
382.600 Lockheed Flight Test Support "Lockheed Ops"
396.900 VFA-203/VFC-12 Air-to-Air ACM "Dolphin/Omar"

◆ Fort Eustis VHF-Lo Band Frequencies

An old friend of this column, Mark Cobbledick, recently passed along some interesting VHF low band convoy frequencies he found on the Fort Eustis, VA, website. If anyone has monitored any traffic on any of these from Fort Eustis, please contact us at the address in the masthead and let us know what you heard.

Convoy frequencies are single channel, Non-secure only:

March Unit #1	30.100 MHz
March Unit #2	32.300 MHz
March Unit #3	34.900 MHz
March Unit #4	36.300 MHz
March Unit #5	38.450 MHz
March Unit #6	40.900 MHz
March Unit #7	32.500 MHz
March Unit #8	36.700 MHz
March Unit #9	34.550 MHz
March Unit #10	32.700 MHz

◆ Military Frequency Potpourri

An anonymous contributor to this column has passed along some on-site monitor reports for Beale AFB, CA; Military Ocean Terminal at Sunnyport, NC; Pope AFB, NC; and Seymour-Johnson AFB, NC.

And as a reminder to all our contributors: Spacing in the 138-144/148-150.8 MHz is 12.5 kHz. All of the old odd splits were done away with in this portion of the frequency spectrum in the mid-1980s. Old, outdated lists in books and internet websites may show frequencies like 148.055 or 143.315, or your frequency counter may read out a frequency like that. But if it isn't a 12.5 kHz split frequency, you are not reporting a legitimate assignment in the frequency ranges indicated above.

Beale AFB
148.050 Unknown [*Base Commanders Net 148.050/149.525-LVH*]
148.100 Unknown [*Medical Net-LVH*]
148.200 Fire Department repeater output (input 149.500)
148.225 CES Operations repeater output (input 150.200)
148.500 Security Police repeater output [*Perimeter Security-LVH*]
149.150 Unknown [*Munitions Net-LVH*]
149.250 Airfield Operations
149.325 Unknown "Air Boss" mentioned [*Maintenance Net C-LVH*]
149.550 Security Police repeater output (input 149.050) [*Special Security Tactical Ops-LVH*]
150.325 Unknown [*POL Trucks Dispatch Net-LVH*]

Military Ocean Terminal Southport (MOTSU), NC
141.375 Transportation Operations repeater output (input 143.225)
142.325 Base Security repeater output (input 148.650)
148.750 Cargo Operations repeater output (input 143.100)

Pope AFB, NC
148.250 Ground Operations [*I show the Civil Engineers here-LVH*]
149.175 Fire/Crash Net
149.250 Base Operations "Golf Ops" [*I show this is a maintenance frequency-LVH*]
149.525 Security
357.800 Departure Control

Seymour Johnson AFB, NC
148.075 CES [*My records indicate this was a Commanders Net repeater input freq-LVH*]
149.275 CES [*My records indicate this was a simplex munitions net freq-LVH*]
148.475 Tower [*This is a ramp operations freq-LVH*]
150.250 CES
165.0125 Fire Dept [*My records indicate this is a Security Net paired with 163.4975, 164.500, and 165.1625 MHz-LVH*]
165.140 CES [*This is 165.1375. 165.140 is not a valid 12.5 kHz assignment-LVH*]
165.160 Security [*This is 165.1625 with a 163.4875 repeater input. 165.160 is not a valid 12.5 kHz assignment. My notes indicate that this is a Flight Line Security freq-LVH*]
169.600 CES [*My records indicate this was a Command Net freq paired with 164.9625-LVH*]
170.125 CES
171.975 DP [*Disaster Preparedness-LVH*]
173.570 CES [*This is 173.5625. 173.570 is not a valid 12.5 kHz assignment. My notes also indicate this was a medical net assignment-LVH*]
173.590 CES [*This is 173.5875. 173.590 is not a valid 12.5 kHz assignment. My notes also indicate that this was a Fire/Crash Net assignment-LVH*]

◆ NOTAM Frequency Changes

Milcom regular, Jack NeSmith in Florida, checks in again this month with some more frequency changes courtesy of the NOTAM (Notice to Airmen) system.

Campbell AAF, KY
Approach/Departure Control
269.525 ex-255.600

Camp Mackall/Mackall AAF, NC
Range Control Advisory
254.400 ex-340.600
Base Operations 395.225 (Spectrum Hole)

Choctaw NOLF, FL
Tower 305.750 ex-380.800

El Paso International Airport, TX
Tower 239.275 ex-257.800 (common FAA UHF tower assignment nationwide)

Fort Lewis/Gray AAF
Operations (UAV Flight Info), WA
32.775 "Shadow Ops"

Grand Forks AFB, ND
ATIS 273.450 ex-274.675

Mayport Naval Station, FL
Pilot-to-Dispatcher (PTD)
308.500 ex-301.300

MCAS New River, NC
Approach/Departure Control
124.850 ex-132.200

NAS Whidbey Island, WA
Base Operations 350.100 ex-350.000
Boardman Range 305.800
Clearance Delivery 379.900 ex-380.800
Landing Signal Officer (LSO)
363.100 ex-363.600

Robins AFB, GA
Tower 133.225 ex-126.200

◆ Spectrum Holes

Continuing where we left off last month, here are some more spectrum holes from the *MT Milcom* database.

230.250	230.450	230.750	233.650
234.650	234.750	235.650	236.950
237.050	238.450	238.550	240.250
240.350	240.550	240.750	241.450
241.550	241.950	242.050	242.150
242.250	242.850	242.950	243.050
243.150	243.250	243.350	243.450
243.550	243.650	243.850	243.950
244.050	244.250	245.250	245.450
245.850	246.050	246.250	246.650
246.850	247.050	247.250	247.450
247.650	247.850	248.050	248.250
250.050	252.350	252.450	252.550
252.650	252.750	252.950	254.650
255.650	255.850	256.350	258.050
258.150	258.850	259.050	259.250
259.650	259.850	260.150	261.050
261.150	262.750	265.650	265.950
267.450	267.650	267.950	268.050
268.650			

And that does it for another month. Until next time, 73 and good hunting.

Chris Parris
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Interoperability – Let's Talk!

Interoperability is the latest buzzword in public safety and federal government communications systems these days. Basically, it assures that two different communications systems or government agencies are able to communicate with each other. After the terrorist attacks of September 11, 2001, a priority of emergency communications planners was to make sure that various city, state and federal agencies are able to communicate with each other effectively in the event of another terrorist incident or natural disaster.

This becomes even more critical when you have different government agencies using different technology for their radio communications. Many cities, counties and even state agencies are using 800 MHz trunked radio systems that are sometimes not compatible with each other, let alone with a federal government VHF or UHF radio system. Officials realize that a system needs to be developed that will allow different agencies to talk to each other when they are all working together. (See April *Closing Comments* - ed.)

One way to help all agencies communicate is by assigning common frequencies for everyone to use. These already exist in the form of police and fire "mutual aid" frequencies such as 155.4750 and 154.2800. Federal agencies can be heard using such state and local frequencies when needed. I have heard some operations involving the US Marshals and police departments that were coordinated on local, not federal radio frequencies.

Many federal agency radios include not only their own federal frequencies, but also local and state police frequencies. I have personally monitored surveillance operations that required federal agents to use state or local police frequencies for assistance. State and local police agencies often set aside unit numbers to be used by federal agencies so the police agency dispatchers can identify them. Be sure to listen for units using call signs such as "Justice"," Treasury", or "Homeland Security" on your area law enforcement frequencies.

The federal government has recently assigned another level of common communications frequencies. The frequencies exist in the federal VHF and UHF bands, which have previously been off limits to local agencies. Here is a quick run down of these new frequencies, courtesy of the *Grove Federal Frequency Directory* CD-ROM: All frequencies listed are in Megahertz (MHz);

Wide-Area, Common-Use Paired Frequencies

Repeater Transmit	Repeater Receive
163.1000	168.3500
409.0500	418.0500
409.3375	418.3375

The following simplex frequencies are for use in wide area operations of a transient nature that do not require the use of a repeater; use of a base station is allowed.

Wide-Area, Common-Use Simplex Frequencies
412.825, 412.8375, 412.850, 412.8625

Local-Area, Common-Use Paired Frequencies

Repeater Transmit	Repeater Receive
173.6250	167.1375
407.5250	416.5250
409.0750	418.0750

Local-Area, Common-Use Simplex Frequencies
163.7125 168.6125 412.875 412.8875 412.900 412.9125

◆ New Interagency Law Enforcement Frequencies

Frequencies 167.0875 and 414.0375 are designated as National Calling Channels and should be used for initial contact using the analog FM mode. The agency in control of the incident for which these frequencies are being used will assign specific operational channels as required for incident support operations. The interoperability frequencies in mobile and portable radios will use a 167.9-Hz Continuous Tone-Controlled Squelch Systems (CTCSS) and/or a network access code (NAC) of \$68F for digital radios.

Interagency Law Enforcement VHF Interoperability Frequencies

Ident	Mobile Transmit	Mobile Receive	
LE A	167.0875	167.0875	SimplexLE
1	162.0875	167.0875	
LE 2	162.2625	167.2500	
LE 3	162.8375	167.7500	
LE 4	163.2875	168.1125	
LE 5	163.4250	168.4625	
LE 6	167.2500	167.2500	Simplex
LE 7	167.7500	167.7500	Simplex
LE 8	168.1125	168.1125	Simplex
LE 9	168.4625	168.4625	Simplex

Interagency Law Enforcement UHF Interoperability Frequencies

Ident	Mobile Transmit	Mobile Receive	
LE 8	414.0375	414.0375	Simplex
LE 10	418.9875	409.9875	
LE 11	419.1875	410.1875	
LE 12	419.6125	410.6125	
LE 13	414.0625	414.0625	Simplex
LE 14	414.3125	414.3125	Simplex
LE 15	414.3375	414.3375	Simplex
LE 16	409.9875	409.9875	Simplex
LE 17	410.1875	410.1875	Simplex
LE 18	410.6125	410.6125	Simplex

A new series of frequencies has also been set aside for interagency incident response. The frequencies 169.5375 paired with 164.7125, and 410.2375 paired with 419.2375, are designated as calling channels for initial contact using analog FM (no CTCSS tones). Here are the new government incident response VHF/UHF frequency plans.

Interagency VHF Incident Response Frequencies

Ident	Mobile Transmit	Mobile Receive	CTCSS
NC 1	Calling		
	164.7125	169.5375	None
IR 1	165.2500	170.0125	As Required
IR 2	165.9625	170.4125	As Required
IR 3	166.5750	170.6875	As Required
IR 4	167.3250	173.0375	As Required
IR 5	169.5375	169.5375	As Required/ Simplex
IR 6	170.0125	170.0125	As Required/ Simplex
IR 7	170.4125	170.4125	As Required/ Simplex
IR 8	170.6875	170.6875	As Required/ Simplex
IR 9	173.0375	173.0375	As Required/ Simplex

Interagency UHF Incident Response Frequencies

Ident	Mobile Transmit	Mobile Receive	CTCSS
NC 2	Calling		
	419.2375	410.2375	None
IR 10	419.4375	410.4375	As Required
IR 11	419.6375	410.6375	As Required
IR 12	419.8375	410.8375	As Required
IR 13	413.1875	413.1875	As Required/ Simplex
IR 14	413.2125	413.2125	As Required/ Simplex
IR 15	410.2375	410.2375	As Required/ Simplex
IR 16	410.4375	410.4375	As Required/ Simplex
IR 17	410.6375	410.6375	As Required/ Simplex
IR 18	410.8375	410.8375	As Required/ Simplex

Keep an ear on these frequencies and please pass along any activity you might hear. These frequencies will probably be inactive for most of the time, but perhaps will become active during testing or drills.

Courtesy US Customs and Immigration

❖ Trunking Takes Over

In recent years, many local and state public safety communications systems have moved from conventional VHF or UHF systems to 800 MHz trunked radio systems. Many times federal agencies work closely with local police departments on certain investigations involving federal crimes, such as drug trafficking or bank robberies. In some cities federal agencies are being given access to local government trunked systems with trunked radios or their own talk-groups on the system. In other cases the trunked systems have set up interconnects or "patches" to federal VHF or UHF radio systems.

In Portland, Oregon, the county-wide trunked radio system has talk groups assigned to various federal agencies such as US Forest Service (a patch to 169.9500), Marshal Service, and the Coast Guard. The Coast Guard talk group is sometimes listed as being linked to a VHF marine channel, but is used very heavily by itself and referred to as "800" by the Coast Guard units operating around Portland. FBI, DEA and Customs are all reported to have assigned talk-groups on this trunked system, but I cannot confirm that I have heard any activity on those groups.

In many cases, we have seen some limited use of these talk-groups, and in others there is very little if any use. Sometimes the federal agents will be using the same tactical talk-groups that the local police agencies are using. If you live in an area that has a trunked system used by law enforcement, check and see if there are known talk-groups that are assigned to federal agencies. A good place to check for information on almost any trunked radio system is Lindsay Blanton's terrific resource site, **http://www.radioreference.com**

Sometimes federal agencies use local trunked systems for other reasons than interoperability. There are tales of federal agencies "hiding" their operations on business or SMR trunked radio systems. There were reports of Customs operations being heard on a small South Florida business trunked system. I can confirm that at one time the DEA was using a similar situation in the Houston, Texas, area, probably for their HIDTA operations.

❖ Federal Trunked Systems:

Bureau of Prisons

Shortly after trunking radio technology began gaining a foothold with local public safety radio systems, federal trunking systems started showing up in the 406 to 420 MHz band. Many listeners assumed that this would lead to a number of wide-area trunked systems that would serve many federal agencies in a given area. However, this has not always happened. Most of these UHF trunked systems have either turned out to be exclusively military or belonging to a single agency or facility.

In many areas of the country, the Bureau of Prisons – part of the Justice Department – has started implementing 5 channel UHF trunked systems at its detention facilities. In the past, the Bureau of Prisons used VHF channels at all its facilities, such as 170.6000, 170.6250, 170.6500, 170.8250, 170.8500 and 170.9500 MHz.

Although these frequencies are still in use in some areas, some prison facilities are now using their own trunked systems. Many are using APCO P-25 digital modes, which is receivable with the new line of digital scanners. Here are some of the identified Bureau of Prisons trunked systems that I have monitored:

Federal Correctional Institution,
Miami (South Dade), Florida -
406.9500, 408.1500, 408.5500, 409.9500
Bureau of Prisons,
Chicago, Illinois -
407.1250, 408.2500, 409.2125, 409.9500, 410.4000
Women's Federal Prison,
Bryan, Texas -
406.6000, 407.0500, 408.2500, 410.5250, 410.8125
Federal Detention Center,
Houston, Texas -
408.1000, 409.6500, 410.0250, 412.4250, 414.3000
Sheridan Federal Correctional Institution,
Sheridan, Oregon –
408.8125, 409.0125, 409.4125, 409.9500, 410.5250

Check the UHF federal bands in your area. You might soon find a new trunking system if there is a federal prison near by. You can find information on federal prison locations at the Bureau of Prisons web site, **http://www.bop.gov**

❖ Changing Channels

Be sure to keep looking for new federal activity on previously unused frequencies. All federal agencies and even the military are undergoing changes in their radio systems with new rules by the NTIA. As part of the federal interoperability plans, all federal radio systems will be required to operate using 12.5 kHz "narrowband" frequencies and must comply with the APCO P-25 digital standards. Users in the federal VHF band are required to operate under these new standards by 2005 and those in the UHF band by 2008.

These changes are likely to mean some agencies changing frequencies or adding new ones. Many of the old tried and true frequency lists we have been using for years are likely to go out the window, so keep using the search feature in your scanner and let us know what you hear.

❖ Checking the Mail:

Listener Logs

I recently received some frequency logs from Matt Cawby in the Seattle, Washington, area. Here's what Matt passed along:

163.0000 - Army Corp of Engineers, Lake Washington Ship Canal Locks control tower.
163.4125 - Army Corp of Engineers, Radio tech adjusting levels in a building-unknown location.
163.6750 - KAK 780, Border Patrol, Blaine, WA
163.9125 - KOD 220, FBI, Seattle, WA
164.1500 - KOE 654, KOE 651, US Forest Service, Mt Baker-Snoqualmie National Forest
164.8000 – Hoodsport, US Forest Service
165.2375 - Customs, no voice heard, intermittent digital noise
165.2875 - BATF, no voice heard, intermittent digital noise
165.7625 - Customs, occasional license plate checks
166.6125 - US Postal Service, possibly Bulk Mailing Center in Seattle
166.6375 - Bureau of Indian Affairs, patrol units in Burlington, Sedro and Woolley, WA
167.2375 - KOD 220 FBI Seattle
167.3875 - KOD 220 FBI Seattle
167.4125 - KOD 220 FBI Seattle, no unit call signs monitored, several radio checks heard
167.5375 - KOD 220 FBI Seattle, CW ID, no voice transmissions monitored.
167.6375 - KOD 220 FBI Seattle
167.7125 - KOD 220 FBI Seattle

I also received this message from Ken Windyka via the QTH Fedcom mail list (*fedcom@qth.net*) regarding some new Postal Service frequencies he's hearing:

"I was getting some interference close to the FAA VHF frequency, so I put the scanner in the search mode, discovering the following:

166.1625 Repeater (CTCSS 114.8) - Bulk Mail Sorting Facility Springfield - Outside Yard Operations (e.g. moving trailers to various loading doors.)
164.3875 Repeater (CTCSS 110.9) - Bulk Mail Sorting Facility Springfield - Inside Operations (e.g. repair of mail sorting machines). *Very* boring activity to monitor!

"*Grove's Federal Frequency Directory* indicated that no activity had been heard on these frequencies. Apparently USPS is using these frequencies, at least at this facility. They used to use 171.2625 repeater as primary operations along with 162.2250 simplex. In the 30 minutes that I searched the band I didn't get any hits on these frequencies, but perhaps they are the inputs for the new repeaters."

Until next time, keep those frequencies coming in and keep your scanners scanning!

Doug Smith, W9WI
dougsmith@monitoringtimes.com

12th Street Gets Tough

445 12th Street Southwest is the headquarters of the Federal Communications Commission – where there have been some interesting developments over the last few months.

The first indecency incident dealt with by the Commission involved KRON-TV in San Francisco. During an interview program, the station aired the performance of a dance troupe that normally performs in the nude. For television, the performers wore robes – but one of them briefly opened his robe and exposed himself to the TV audience. The Commission ruled this "flashing" incident was reasonably foreseeable given the nature of the troupe. KRON was fined $27,500, the maximum fine allowed by the Communications Act for a single incident.

A much more serious charge was levied against four Clear Channel FM stations in Florida, and the "Bubba the Love Sponge" morning show. The complaint lists seven incidents in July, November, and December 2001 in which WPLA-FM, WXTB-FM, and WRLX-FM aired explicit sexual references. WRLR-FM picked up the "Bubba" program in October, so it missed the first two incidents, airing only five.

Seven incidents times three stations makes 21, plus five incidents on WRLR makes a total of 26 indecency violations. The "base" fine for indecency is $7,000, but this may be adjusted upwards when circumstances permit. The Commission felt the large number of violations, and past violations on other Clear Channel stations, justified an increase to the $27,500 maximum. $27,500 times 26 = $715,000 for (against?!) indecency.

In addition, the complainants learned that their complaints to the stations were not placed in the "public file." Stations are required to maintain such a file, and to keep in it copies of any correspondence received from the public. They are also required to allow the public to inspect this file during business hours. The base forfeiture for this violation is $10,000. Multiplied by four stations, this is an additional $40,000 for a total of $755,000 levied against the stations.

Commissioners expressed some regret they couldn't levy even greater penalties. Chairman Powell suggested that in the future, they might levy $27,500 for each indecent utterance, not for each broadcast. Commissioner Martin concurred, indicating that under that standard there would have been 49 violations in this case. That would have led to a total fine of $1,387,500. Commissioners Copps and Adelstein went a step further – suggesting that the Commission should have started steps to revoke the four stations' licenses. If you want to read the Notice of Apparent Liability, it's on **http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-17A1.pdf** *Be warned: this document contains transcripts of the indecent broadcasts.*

Then, came the Janet Jackson/Super Bowl incident. Whether you believe it was an accident or intentional, it was certainly poorly timed! Ironically, the Commission cannot penalize the CBS network; it has no power to regulate networks. It can, however, fine the stations which air that network's programs. Any fines would likely start with the affiliates that are owned by the network. Some Commissioners have suggested that *every* CBS affiliate be fined – including the great majority that are owned by other broadcast companies.

◆ Other FCC Activity

Then, there's the case of KVEZ-FM, Parker, Arizona. In late 2001, this station notified the Commission they would be going off the air for up to 60 days to move their transmitter to a new site. As of late 2002, KVEZ had not yet received approval for the new site. If they didn't return to the air by the 1st anniversary of going off, their license would be lost. So they notified the Commission that they'd installed a new transmitter and antenna at the original site, and returned to the air.

Unfortunately, that wasn't true. The FCC received a complaint suggesting that KVEZ was operating from the *new* site without authorization. When contacted by the Commission, the station admitted the complaint was accurate.

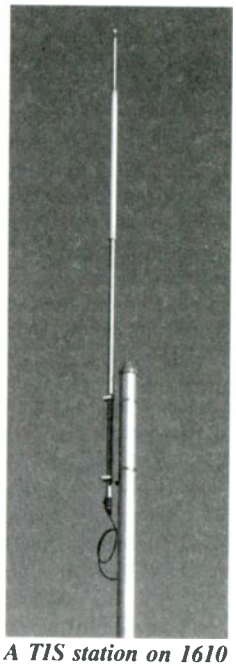
Apparently the FCC doesn't regard a station to be "operating" if it's operating from an unauthorized site... They ruled that since the station had not operated from authorized facilities in over a year, the Communications Act required that the KVEZ license be revoked.

Finally, there are now two stations authorized to operate on 87.9 MHz. This frequency is available to "Class D" FM stations under *very* limited circumstances. (So limited, in fact, that only one station – KSFH in California – had previously qualified for use of the frequency.) FM translator station K201DR, Sun Valley, Nevada, had been "bumped" from 88.1 by a nearby new station on 88.3. No other frequency was available without filing a "major change." Major changes are on freeze. If the Commission didn't lift the freeze within a year, the K201DR license would be revoked for inactivity. So K201DR asked for permission to use 87.9. And got it. They're now K200AA, the first FM translator authorized for this frequency.

◆ Bits and Pieces

Verifications: Patrick Griffith has received two more verifications for his extensive collection. KCSJ-590 can be confirmed via 106 West 24th Street, Pueblo CO 81003. CHWO-740 can be confirmed via the Ontario DX Association, P.O. Box 161, Station A, Willowdale ON M2N 5S8, Canada. CHWO is obviously a rather DXer-friendly station.

Distorted Picture: We've got another of Arnal Cook's central Indiana TIS photos this month. This station is located in Westfield, Indiana. The callsign is unknown, as the audio was so distorted Arnal couldn't make out any of the broadcast!



A TIS station on 1610 in Westfield, Indiana.

Canada Catch: Alberta is a tough catch for most DXers in the East. The province's high-powered stations are all directional the wrong way. It's not exactly close to the East Coast either... CHRB-1140 High River has been closing that gap. For some reason (probably technical problems with the antenna), this station is being heard *very well* in the East. I ran top-of-hour recordings on 1140 for just one night in February, and got two full IDs on CHRB. (I'm also quite sure it was the station with continuous music on several other recordings.) CHRB's programming is a mix of country and contemporary religious music. It's been heard all the way to New Jersey on simple equipment. Give it a try!

Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to *dougsmith@monitoringtimes.com*. Good DX!

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
georgezeller@monitoringtimes.com

FCC to Endorse Pirate Radio Interference?

For many years, the FCC has repeatedly claimed that pirate radio transmissions are dangerous because of their potential interference to aircraft in flight, ambulances, and other emergency services. Almost all of these FCC claims have proven to be bogus, since no ambulances use 6925 kHz, and this channel is not in use by other emergency services. This month we print your editor's own best pirate station QSL card, which came for an actual pirate radio broadcast made by the FCC on the occasion of their bust of **WHBH.** In the press release issued on the occasion of this pirate bust, the FCC makes its traditional claims about the dangers of unlicensed HF broadcasts in the pirate bands.

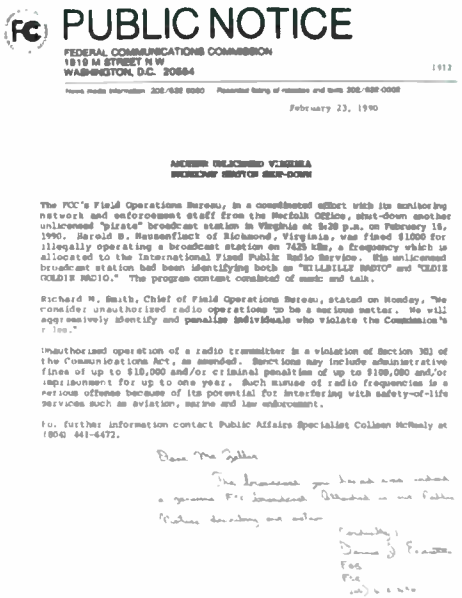
Astonishingly, the FCC may be in the process of reversing course on this major issue in the unlicensed broadcasting field. For more than a year it has been considering proposals to implement new internet services, called "Broadband over Power Line" transmissions. This new BPL system would transmit high speed DSL internet connections over the existing power line grid owned by electric utility companies in the USA.

Many in the radio monitoring hobby, including the Amateur Radio Relay League (ARRL) in Connecticut, have been monitoring tests of the proposed BPL systems. The ones currently under consideration are actually radio broadcasts that transmit unlicensed jamming signals. They deliver both internet connections to subscribers and also loud RF interference to anybody who tries to listen to radios in proximity to the power lines. Despite repeated protests by the ARRL and the amateur radio community, FCC Chairman Colin Powell, Jr. has been issuing statements indicating that the FCC may approve this radio jamming system for widespread use within the United States.

It is unclear if the FCC and Chairman Powell will take credit for interfering with aircraft in flight, ambulances, and other vital homeland security functions if they approve this unlicensed jamming by pirate radio operators at utility companies selling BPL services.

Your editor normally tries to avoid too much commentary in this column, but this time we have to say something about this outrageous abuse of the public trust on the part of the United States Federal Government and the FCC. For decades, the government and the FCC have told us that unlicensed broadcasting was dangerous. But now, under pressure from economically and politically powerful greedy interests at the utility companies, the FCC may be poised to authorize the biggest authorized radio jamming project in the history of the world. It would dwarf the old jamming efforts of the Soviet Union, and the occasional jamming of broadcasting that we still see from Cuba today.

Monitoring Times readers always have varied opinions about the legitimacy of pirate radio broadcasting, but it is certain that all readers of this magazine will be strongly opposed to the dangerous BPL jamming scheme of Colin Powell Jr. and the FCC. You should contact your congressman at once to complain bitterly about this potential abuse of governmental authority in a supposedly free country.



PUBLIC NOTICE

FEDERAL COMMUNICATIONS COMMISSION
1919 M STREET N W
WASHINGTON, D.C. 20554

1913

February 23, 1990

The FCC's Field Operations Bureau, in a coordinated effort with its monitoring network and enforcement staff from the Norfolk Office, shut-down another unlicensed "pirate" broadcast station in Virginia at 8:30 p.m. on February 18, 1990. Harold B. Hausenfluck of Richmond, Virginia, was fined $1000 for illegally operating a broadcast station on 7425 kHz, a frequency which is allocated to the International Fixed Public Radio Service. His unlicensed broadcast station had been identifying both as "HILLBILLY RADIO" and "OLDIE GOLDIE RADIO." The program content consisted of music and talk.

Richard H. Smith, Chief of Field Operations Bureau, stated on Monday, "We consider unauthorized radio operations to be a serious matter. We will aggressively identify and penalize individuals who violate the Commission's rules."

Unauthorized operation of a radio transmitter is a violation of Section 301 of the Communications Act, as amended. Sanctions may include administrative fines of up to $10,000 and/or criminal penalties of up to $100,000 and/or imprisonment for up to one year. Such misuse of radio frequencies is a serious offense because of its potential for interfering with safety-of-life services such as aviation, marine and law enforcement.

For further information contact Public Affairs Specialist Colleen McNealy at (804) 441-6472.

Dear Mr. Zeller

The broadcast you heard was indeed a genuine FCC broadcast. Attached is our Public Notice describing our action.

Sincerely,
Donna J. Fraser
FOB
FCC

◆ WKLU-FM

Thanks to Artie Bigley, who forwarded an article from the *Indianapolis Star,* we have happier pirate radio and FCC news this month. Bruce Quinn, the operator of some pirate radio stations in Indiana back in the late 1970s, was busted by the FCC in 1980 for one of his unlicensed operations. But, he worked out a very unusual collaboration with the FCC itself, through now retired FCC pirate buster George Sklom. With the assistance of Sklom, Quinn followed the normal FCC process for acquiring a broadcast license. Quinn owned some small FM stations in Indiana at first, but is currently the owner of **WKLU-FM**, which can be heard on 101.9 MHz in Indianapolis.

◆ What We Are Hearing

Our readers heard all of these North American pirate broadcasters this month, with apparently somewhat reduced volumes of shortwave pirate broadcasting lately. All pirates operate on a sporadic schedule, but shortwave pirate broadcasting increases noticeably on weekends, and during major holiday periods. You have to tune your dial up and down through the pirate radio band to find the stations, but the new main North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz is the place to scan for the pirates. The old 6955 and 6950 kHz frequencies are increasingly abandoned by pirates because of interference from licensed stations, but there are occasional broadcasts there.

Andino Radio Relay Service- This one is a South American pirate that has been relaying Europirates and other pirate stations, somewhat like what the North American Pirate Relay Service used to do. (Uses arssw@yahoo.com e-mail)

Big Thunder Radio- Their announcer "Sapphire" has been broadcasting rock music as transmitter adjustment tests, but even during regular programming the station mostly features rock and roll. (Uses bigthunderradio@yahoo.com e-mail)

Border Radio- Some of the recent comedy on this new one wos o porody of the old "Who's on First" routine, featuring George W. Bush and Condoleeza Rice. (None)

Cell Phone Radio- Somebody has been relaying old shows from "America's Most Illegal Pirate," where the programming consists of recorded cellular telephone conversations. (None current)

Death Radio International-The broadcasts on this new one have so far been entirely in Morse code CW mode. (Uses bohemian_the_great@hotmail.com e-mail)

Grassclutter Radio- Rock music, pirate radio discussions, and two way QSO conversations with other pirates is the subject matter on this one. (Uses grasscutterradio@yahoo.com e-mail)

KAOS- Somebody has been relaying old Joe Mama programming from this otherwise inactive comedy station. (None current)

Pink Puma Radio- This new one has not been widely heard yet, but they use the "Pink Panther" song os tneir theme. We know little about them so far. (None)

Radio Cochiguaz- The most active South Americon pirate continues irregular broadcasts, normally on the weekends. You have to pay attention to the identifications on this one, since sometimes it relays pirates from other locations in the world, particulorly Europe. They have been using 11435 kHz lately. (Santiago)

Radio Free Speech- Bill O. Rights has been back on the pirate bands more frequently lately, with a mix of comedy sketches and advocacy for individuol freedom. (Belfost)

Radic Pigmeat International- Despite the obviously clever station name on this pirate, their programming is mainly classic rock tunes. (Belfost)

continued on page 73

SATELLITE SERVICES

MT TRANSPONDER GUIDE *www.monitoringtimes.com/mtssg.html*

All Frequencies MHz

Robert Smathers
robertsmathers@monitoringtimes.com

Panamsat SBS-4

Ku-Band - 124.95 degrees West longitude
This satellite operates in an inclined orbit.

T01(H)	11725	Occasional video
T02(H)	11774	Occasional video
T03(H)	11823	Occasional video
T04(H)	11872	Occasional video
T05(H)	11921	Occasional video
T06(H)	11970	Occasional video
T07(H)	12019	Occasional video
T08(H)	12068	Occasional video
T09(H)	12117	Occasional video
T10(H)	12166	Occasional video

Panamsat Galaxy 5

C-Band - 125 degrees West longitude

1(H)	3720	Disney Channel – East (VC2+)
2(V)	3740	Bravo HDTV (digital)
3(H)	3760	Trinity Broadcasting Network (TBN) 5.58, 5.78 Trinity Broadcasting Network Radio 8.00 Trinity Broadcasting Network Spanish SAP
4(V)	3780	Sci-Fi Channel – East (VC2+)
5(H)	3800	Cable News Network (CNN) (VC2+) 7.58 CNN Radio News
6(V)	3820	Superstation TBS Atlanta (VC2+) 6.20 SAP/Descriptive Video channel
7(H)	3840	Superstation WGN Chicago (VC2+) 5.58, 6.12 WCPE-FM 89.7 Raleigh/Durham/Chapel Hill, classical music 6.30, 6.48 WFMT-FM 98.7 Chicago, IL – classical music format 6.80 Yesterday USA Radio
8(V)	3860	Home Box Office (HBO) – West (VC2+)
9(H)	3880	ESPN (VC2+) 5.80 ESPN natural sound channel
10(V)	3900	Data Transmissions
11(H)	3920	ABC Family – East (VC2+)
12(V)	3940	(none)
13(H)	3960	(none)
14(V)	3980	ESPN2 (VC2+)
15(H)	4000	Home Box Office (HBO) – East (VC2+)
16(V)	4020	Cinemax – West (VC2+)
17(H)	4040	Turner Network Television – East (VC2+) 6.20 SAP/Descriptive Video channel
18(V)	4060	Spike TV – East (VC2+)
19(H)	4080	USA Network – East (VC2+) 6.80 SAP/Descriptive Video channel
20(V)	4100	Black Entertainment TV (BET) (VC2+) / BET Test feeds (digital)
21(H)	4120	Lifetime Television – East (VC2+) 6.80 SAP/Descriptive Video channel
22(V)	4140	CNN Headline News (VC2+) 7.58 CNN Headline News Radio
23(H)	4160	A&E – East (VC2+)
24(V)	4180	Showtime – East (VC2+)

Panamsat Galaxy 13

C-Band - 127 degrees West longitude

1(V)	3720	Occasional video
2(H)	3740	Occasional video
3(V)	3760	HDNET (digital)
4(H)	3780	STARZ! – East (VC2+)
5(V)	3800	Caracol TV International, El Entertainment TV (digital)
6(H)	3820	Occasional video
7(V)	3840	STARZ! HDTV - West (digital)
8(H)	3860	STARZ! – West (VC2+)
9(V)	3880	STARZ! HDTV - East (digital)
10(H)	3900	HBO HDTV – East / HBO HDTV – West (digital)
11(V)	3920	Cinemax HDTV (digital)
12(H)	3940	STARZ! Theater – East (digital)
13(V)	3960	Charter Communications (digital)
14(H)	3980	Occasional video
15(V)	4000	Charter Communications (digital)
16(H)	4020	Encore – East (VC2+) 7.70 World Wide First Amendment Radio Network
17(V)	4040	Charter Communications (digital)
18(H)	4060	Occasional video
19(V)	4080	HDNET, HDNET Movies (digital)
20(H)	4100	Encore Westerns – East (VC2+) 7.70 Genesis Communication Radio Network
21(V)	4120	Occasional video
22(H)	4140	Occasional video
23(V)	4160	Occasional video
24(H)	4180	Data Transmissions

JSAT International Horizons-1

Ku-band - 127 degrees West longitude

1(V)	11720	Occasional video
2(H)	11740	Occasional video
3(V)	11760	Occasional video
4(H)	11780	Occasional video
5(V)	11800	Occasional video
6(H)	11820	Occasional video
7(V)	11840	Occasional video
8(H)	11860	Occasional video
9(V)	11880	Occasional video
10(H)	11900	Occasional video
11(V)	11920	Occasional video
12(H)	11940	Occasional video
13(V)	11960	Occasional video
14(H)	11980	Occasional video
15(V)	12000	Occasional video
16(H)	12020	Occasional video
17(V)	12040	Occasional video
18(H)	12060	Occasional video
19(V)	12080	Occasional video
20(H)	12100	Occasional video
21(V)	12120	Occasional video
22(H)	12140	Occasional video
23(V)	12160	Occasional video
24(H)	12180	Occasional video

Loral Skynet Telstar 7

C-band - 129 degrees West longitude

1(H)	3720	Television Espana (TVE) Internationa1 (digital) / TV Washington (digital) / Sportsman's Channel (digital)
2(V)	3740	In-Demand PPV (digital)
3(H)	3760	In-Demand PPV (digital)
4(V)	3780	In-Demand PPV (digital)
5(H)	3800	Playboy Entertainment Group (digital)
6(V)	3820	Occasional video
7(H)	3840	Occasional video
8(V)	3860	Occasional video
9(H)	3880	Data Transmissions
10(V)	3900	Occasional video
11(H)	3920	Occasional video
12(V)	3940	Data Transmissions
13(H)	3960	Occasional video
14(V)	3980	A&E Biography, Lifetime Television, Do-It-Yourself Network, CNBC World, Independent Film Channel, History Channel International (digital)
15(H)	4000	Playboy Entertainment Group, Playboy Enhanced, Tennis Channel, Si TV (digital)
16(V)	4020	Occasional video
17(H)	4040	Occasional video
18(V)	4060	Sorpresa TV, Soundtrack Channel, America One Television (digital)
19(H)	4080	Data Transmissions
20(V)	4100	Data Transmissions
21(H)	4120	Jewelry Television by ACN
22(V)	4140	Olympusat (digital) B-Mania Channel FamilyNet TBN Enlace TV Super Store
23(H)	4160	Data Transmissions
24(V)	4180	The Erotic Networks (TEN) (digital)

Loral Skynet Telstar 7

Ku-band - 129 degrees West longitude

1(V)	11720	Occasional video
2(H)	11740	Occasional video
3(V)	11760	Occasional video
4(H)	11780	Occasional video
5(V)	11800	Data Transmissions
6(H)	11820	Data Transmissions
7(V)	11840	Data Transmissians
8(H)	11860	Data Transmissions
9(V)	11880	Data Transmissians
10(H)	11900	Data Transmissians
11(V)	11920	Occasianal video
12(H)	11940	Occasianal video
13(V)	11960	Occasianal video
14(H)	11980	Data Transmissians
15(V)	12000	Occasianal video
16(H)	12020	Data Transmissians
17(V)	12040	Data Transmissians
18(H)	12060	Occasianal video
19(V)	12080	Data Transmissians
20(H)	12100	Occasianal video
21(V)	12120	Data Transmissians
22(H)	12140	Occasianal video
23(V)	12160	Data Transmissians
24(H)	12180	Occasianal video

SES Americom Satcom C3

C-Band - 131 degrees West longitude

1(V)	3720	ABC Family – West, Fax Sports Net Atlantic, Fax Sports Net Central, Fax Sports Net Pacific, National Geographic Channel, Speed Channel (digital)
2(H)	3740	The Learning Channel – East (VC2+)
3(V)	3760	In-Demand PPV (digital)
4(H)	3780	Lifetime Televisian – West, Lifetime Movie Network, Lifetime Real Women (digital)
5(V)	3800	Hallmark Channel – East, Hallmark Channel – West, Hallmark Movie Channel (digital)
6(H)	3820	CourtTV – East, Narthwest Cable News, CourtTV – West (digital)
7(V)	3840	C-SPAN 1 – House of Representatives 5.20 C-SPAN Radia
8(H)	3860	Style Channel – East, Style Channel – West, GSN, News World International, Bloomberg Business TV, Wisdom Television, Trio, El Entertainment TV – West, Hallmark Channel (digital)
9(V)	3880	Music Choice (digital)
10(H)	3900	America's Store (analog) / America's Store (digital)
11(V)	3920	Fax Cable Networks (digital)
12(H)	3940	History Channel – East (VC2+)
13(V)	3960	Weather Channel (VC2+)
14(H)	3980	New England Sports Network, Boston Cathalic TV (digital)
15(V)	4000	Viacom Networks (digital) MTV2, Nick Noggin / The N, MTV Jams, Nick Games and Sports, MTV Latino, NickToons TV, VH-1 Classic Rock, Nick Tao, VH-1 Soul, VH-1 Country, VH-1 Mega Hits, MTV Hits
16(H)	4020	Viacom Networks (digital) Showtime HDTV – East Showtime Next – East Showtime Family Zone – East Showtime Wamen – East
17(V)	4040	The Movie Channel – East (VC2+)
18(H)	4060	TV Land (digital)
19(V)	4080	Viacom Networks (digital) Showtime – East Showtime Too – East Showtime Showcase – East The Movie Channel – East Flix – East Sundance Channel – East The Movie Channel Xtra – East Showtime Beyond – East Showtime Extreme - East
20(H)	4100	Jones Space Segment (digital) Product Information Network Infomercials / Adhoc feeds Great American Country Mun2 – East Telemundo - East
21(V)	4120	Comedy Central – East (VC2+)
22(H)	4140	Discovery Communications Inc. (digital) Discovery Health Channel – East Discovery Kids The Science Channel Discovery Home Channel Discovery Times BBC America – East Discovery Wings Fit TV Discovery en Espanol
23(V)	4160	El Entertainment TV – East (VC2+)
24(H)	4180	Oxygen Television (VC2+)

Kevin Carey, WB2QMY
kevincarey@monitoringtimes.com

WWW Picks – Kevin's "Top 17"

When I began writing this column (1991), the Internet was virtually unknown to most people. Even those who knew about it probably couldn't have imagined it would become such a major part of our lives. Today, it's rare to find a column in any publication that does not make at least one mention of a web site or an e-mail address in every issue. The Internet has become an indispensable part of our activities, and it can be a useful tool for longwave DXers.

As useful as it is, the web can also contribute to "information overload." Where do you start when you're looking for a specific type of LF information? Sure, you can enter "longwave" in a search engine and spend time sifting through the returns, but this can be a frustrating and time consuming experience.

This month, I've assembled a "sampler" of websites that I believe are among the best for longwave enthusiasts. The list is not meant to be all-inclusive. If you have favorites that you feel should be listed, please drop me a line with the details. We'll do a follow-up column with reader favorites.

I need to make one "caveat" statement before getting to the listings. Please remember that websites are subject to frequent change – either in content or URL addresses. If a web address does not work, it is probably because the URL has changed or the site is down (temporarily or permanently). In these cases, I suggest doing a search that includes some key words for the data you are looking for.

2004 Listing of WWW Longwave Sites

http://www.lwca.org/
Longwave Club of America (LWCA). This is arguably the biggest, most complete LW site on the net. It contains a large pool of information on all aspects of longwave operation. A message board is included, as well as an online version of *The Art of NDB DXing*, a respected series by Sheldon Remington on maximizing weak signal reception. *This site is highly recommended.*

http://www.auroralchorus.com/natradio.htm
Stephen P. McGreevy's Natural Radio Site. This is the place on the web for information on Natural Radio. It contains sound samples, plans for building your own receiver, and numerous tips for getting the most from your NR experience. *This site is highly recommended.*

http://www.beaconworld.org.uk/beaconlinks.htm
The Beaconworld Website by Alan Gale. This UK-based site is chock full of useful tips and resources for the beacon enthusiast. The topics apply equally to European and North American NDB listeners. Also contains a downloadable version of the *Beacon Hunter's Handbook*, which contains a variety of tips and techniques for effective NDB reception. *This site is highly recommended.*

http://www.computerpro.com/~lyle/
Lyle Koehler's LF Experimental Page. An excellent source of technical information for those interested in the license-free "Lowfer" band (160-190 kHz). Includes plans for a simple LF transmitter, PC-based identifier and many other projects. Detailed discussion on transmitting antenna design and efficiency. *This site is highly recommended.*

http://www.highnoonfilm.com/xmgr/
The Noise Floor, by Les Rayburn, longtime Lowfer experimenter and digital mode enthusiast. The site contains details of "XMGR," a record-setting Lowfer beacon, and a database of active experimenters on LF and MF.

http://www.qsl.net/padan/argo/
This is the homepage for Argo QRSS software. QRSS is used by many Lowfers today for weak-signal communication. You can download the software here, free of charge, and tune in on the action.

http://members.rogers.com/wiecek6010/
Alex Wiecek's NDB page. It hasn't been updated in a while, but this site continues to be a rich source of information on NDBs, especially those based in Canada. It includes many pictures, sounds and loggings.

http://www.wunclub.com/
Worldwide Utility News (WUN) homepage. An extensive site with in-depth news and information on all types of Utility stations – LF through HF. Includes scores of related links.

http://www.dxtools.com/
Radio Plus+ DX Tools Website. This is a firm specializing in high performance receiving antennas and accessories.

http://www.lfengineering.com/
LF Engineering Co. Website. This firm is celebrating 20 years of serving the LF community.

http://www.navfltsm.addr.com/ndb-nav-history.htm
ADF History page. Where else can you read about the almost forgotten A/N Radio Range and other Navaid techniques? This site preserves an important part of LF radio history

http://www.airnav.com/navaids/
Useful "lookup" site for North American beacons. Be advised though, this site does not include listings for 2-letter "compass locator" beacons.

http://worldaerodata.com/
World Aeronautical Database. Here is an alternative "lookup" site for non-directional beacons and other navaids. *Pro:* This site includes listings for 2-letter "compass locator" beacons. *Con:* Navaid locations are given by latitude/longitude only, and not by city name. (There is a link to the associated airport, however.)

http://www.provcomm.net/pages/joe/
Joseph Cooper's (VE3FMQ) Homepage. Contains interesting articles written by Mr. Cooper on receiving antennas, AM DXing, and Beacon DXing. Also includes a discussion of Canadian Lowfer operation.

http://www.antiquewireless.org/index.htm
While not a longwave site per se, the Antique Wireless Association (AWA) is an excellent source of information for vintage radio topics and wireless history, much of which was played out on longwave. Be sure to check out information on the AWA's radio museum at Bloomfield, NY. You can even take a virtual photo tour!

http://www.xuser.com/~daled/navcids/
Dale's Beacon page. Provides an overview of commercial beacon systems, both LF and VHF. Includes pictures of actual installations.

http://members.aol.com/DJLBEACON1/beaconpg.html
Darwin Long's DJL Radiobeacon Page. Complete description of "DJL", Mr. Long's radiobeacon operating from Ventura County, CA. Includes photos of the transmitter, antenna system and coverage patterns.

Gone, but not Forgotten

From Bill Hepburn via the *Lowdown* journal, comes news of the following weather broadcasts that have been terminated. One of these listings – GNI/236 kHz – really stands out to me. This was one of the last "big gun" Transcribed Weather Broadcast (TWEB) stations left on longwave, and it was regularly heard in most parts of the U.S. According to Bill's report, GNI is being totally removed from the air.

The other stations, most of which are Automated Weather Observation Stations (AWOS), will continue with regular Morse code transmissions.

Table 1. Discontinued WX Broadcasts

FREQ.	ID	LOCATION
230	VYS	Peru, IL (AWOS)
236	GNI	Grand Isle, LA (TWEB)
303	MRT	Marysville, OH(AWOS)
329	AAA	Lincoln, IL (AWOS)
371	PUR	Marshal, MO (AWOS)
391	EEF	Sisters Island, AK (TWEB)

May traditionally kicks off the hamfest season. Who knows what treasures await you at your nearest event? You'll find an extensive list of hamfests online at: **http://www.arrl.org/hamfests.html**.

ON THE HAM BANDS

THE FUNDAMENTALS OF AMATEUR RADIO

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Over Ham Radio's Horizon

This issue of *MT* is very Amateur Radio related, with a focus on what I think is one of the neatest aspects of the radio hobby.

While everyone else is adding to the ham radio topic in other parts of the magazine this month, I'll take a look at what ham radio might be like in the not too distant future. I've climbed up on my soapbox about this before, but I've got some new ideas based upon some recent advances in radio technology.

In the 25 plus years I've been licensed, a lot of technologies have come to bear on radio and electronics technology. When I started playing radio, the *Phased Lock Loop* was just beginning to impact frequency control in both professional and amateur circles. (Anyone licensed after about 1980 never even heard of going down to the local ham store to make a swap at the *Crystal Bank).* Also, back then, the first reasonably priced *digital readouts* were beginning to show up on the market, a further improvement of frequency management and control. These little bugs called *integrated circuits* were replacing arrays of transistors and other components, having the same impact on this generation that the move from tubes to transistors did in the sixties.

Some technologies showed promise but never really went anywhere. *Narrow Band Voice Modulation* (NBVM) was once thought of as a technology that would replace SSB as the primary phone mode. Beyond a few experiments and one commercial attempt by Henry Radio nothing ever really came of it.

Current readers who were hams "back in the day" will remember when it was considered quite eccentric to make a *phone patch* from your car. In the late seventies, I had to travel to and from Grad School in Washington D.C. to my home in New Jersey on a weekly basis. On the return run I used to wait until I got to the top of the Delaware Memorial Bridge to get enough height above ground to run a patch back to my local repeater to call my XYL and tell her I'd be home in about an hour. Now, cellphones are so common that state legislatures find the need to pass laws concerning their use on the highways.

And, of course, in amongst the radio advances, computer technology changed the face of the way most people do most things. We are still finding new and important ways to advance radio through the use of computers. And there were quite a few false starts in the computer world as well. Anybody remember the *S100 buss, stringy floppies* and *bubble memory*?

But let's gaze into Uncle Skip's crusty crystal ball and see what we might see in our shacks someday soon.

❖ Ham Radio Will Never Die

Let's get the big one out of the way right now. You'll always be able to go into your shack after dinner and have a rag chew with someone somewhere in the world. How you do it, what band you do it on and the equipment you use will change, but the hobby will abide.

Amateur radio remains a significant and important resource. I fully expect to see changes in frequency allocations and even further changes in the current licensing system. When I look at the history of ham radio just in my lifetime, there have always been challenges to amateur radio from commercial and governmental entities. We've won far more than we've lost in that time. This will continue into the future. My grandchildren will probably be lobbying for more modulated gravity wave bandwidth for Extra Class hams.

As for the notion of shrinking pools of active hams... It may well be the case, but I still have trouble finding a clear frequency on 40 meters in the evening. But I'll tell you what *is* different from not all that long ago. I find the *quality* of the on-air activity to have vastly improved. I don't think ham radio was ever a casual hobby, but I get a sense from the folks I meet on the air that they are giving their all. I'm sure some of this is thanks to the efforts of the current bearer of the *Wouff-Hong* and the *Rettysnitch*, Riley Hollingsworth, K4DZH, Special Counsel for Enforcement in the Wireless Division of the FCC. With people like Riley keeping an eye on things, ham radio should be a pleasant place to play for many years to come.

New Modes

When I began playing ham radio in 1976, there was only one practical digital keyboard mode and that was RTTY, using *Baudot* as the encoding system. Old Model 50 teletypes were pressed into service by hams. The mode's popularity was essentially limited to those folks whose significant other could put up with the noise and smell of a fairly large mechanical beast in their abode.

Fast forward through the first 20 years or so of the personal computer revolution and you get to running RTTY and other digital modes by way of the PC, soundcard, and a simple interface that can be whipped out of any basic junk box. (By the way, if Model 50s ever come back, I think I still have some 88mh cokes for building the interface for one of those monsters.)We also have modes such as packet and PSK31 which take full advantage of bringing computers and radios into the same room.

There is no reason to believe that we will not see constant and continued growth in the development of digital modes of transmission. The hardware necessary for advancing the art in this area is in the shack of most hams. Digital signals will become more efficient in their use of bandwidth and data transfer rate will concurrently improve. Also, we have begun to see experimentation and even some commercial development of digital voice communication using the G4GUO protocol by AOR (**http://www.aorusa.com**).

Will this take off or slip into the box under the workbench like NBVM did? Only time will tell. But it just goes to show that innovation and experimentation are alive and well in amateur radio and shall continue so into the future.

Let's Get Small

I still have my first "portable" 2 meter rig in the shack – a Drake TR-33C. It weighs in at about 5 pounds. It slurped juice out of batteries about as fast as I could put them in the case. You carried the thing with a shoulder strap. It had 12 crystal-controlled channels. But at the time it was the hot set-up for the thoroughly modern ham.

Compare this to current handhelds such as the Yaesu VX-2R, about 2-in. x 3-in. and weighing in at less than a third of a pound. It uses efficient lithium-ion battery technology. It is also a full coverage dual-bander with a wide band receiver. When the prices of these two rigs are compared in equivalent dollar values for their times, the VX-2R comes with all its features for quite a bit less cost.

Modern surface mount components and automated manufacturing may make it hard for folks to *lift the lid* and play around with modifications and repairs, but there is no denying that we are getting way more bang for our buck when we buy radios today. Continued advances will probably shrink things even further. We are moving into a world where our main concern won't be a radio's capabilities, but if we will lose it on our desk top!

Software Defined Radios

Only a few years ago I was at a conference where Alan Johnson N4LUS said "I have seen the future and it is digital!" At the time he was referring to the Watkins-Johnson DSP receiver. (Just enough radio for anybody who can afford the $5000 price tag.) Since that time, DSP has become ubiquitous in even low-end receiving applications.

First we saw units that digitally altered the audio signal. The technology then moved to modifying the RF chain digitally. Now the envelope

has been pushed to where all aspects of frequency control, RF, AF and signal mode are controlled by way of computer input.

SDR technology really took off in the wake of the U.S. Military seeking to find ways to make it possible for all its branches to communicate with one another regardless of the tactical environment. This gave birth to rigs such as the Harris AN/PRC-117F(C) Joint Tactical Radio System. Without going into the technology too deeply, the basic idea is that what passes for a transceiver now is something whittled down to a very small number of components (less to break or go wrong). The software package does all the heavy lifting. For the ham this means that we'll probably do less modifying with our soldering irons and more with our PC keyboards – a whole new way of doing business.

The FlexRadio SDR-1000 is the first commercially available Amateur Band Software Defined Radio

And if you think that SDR is expensive, unobtainable technology exclusively in the hands of the upper echelons of the military industrial complex, think again. SDR applications have already begun to be explored in the ham radio community and a Software Defined Transceiver is now available for ham use from FlexRadio Systems (**http://www.flex-radio.com/**). This technology is going to place an enormous amount of capability in the hands of hams. Keep both eyes on this folks. It's going to rock your world! And it's going to be great.

❖ Aerial Dreams

Most of us don't give much thought to antenna technology beyond the dipole and the Yagi. After all, they get the signal out. What's to get excited about? Well, I shared that standard issue view my whole ham life until I read an article in the July 2003 issue of *Scientific American* (**http://www.sciam.com**) about Adaptive Antenna Arrays.

The basic concept stems from an understanding that we live in a world with a high amount of RF energy floating around, most of it essentially interference compared to the signal we are seeking to use. What if you could use an antenna system to resolve the interference issue? Adaptive Antenna Array technology uses a system of antennas that can track the position of a transceiver and maximize signal strength to that specific user while minimizing interference from other signals.

While this technology is currently being looked into for commercial applications such as cell phones, it could represent another new avenue of pursuit for dedicated amateur radio experimenters.

❖ What's Next?

For hams, even the sky isn't the limit. We've put up satellites and bounced signals off of the Moon. There's always something new around the corner. Even in the future we'll be having a lot of fun. And I'll still be listening for you on the bottom end of 40 Meters.

UNCLE SKIP'S CONTEST CORNER

Indiana QSO Party
May 1, 1500 UTC - May 2, 0300 UTC

New England QSO Party
May 1, 2000 UTC - May 2, 0500 UTC
and
May 2, 1300 UTC – May 2, 2400 UTC

Oregon QSO Party
May 8, 1400 UTC - May 9, 0200 UTC

FISTS Spring Sprint
May 8, 1700 UTC - May 8, 2100 UTC

CQ WW WPX Contest (CW)
May 29, 0000 UTC – May30, 2400 UTC

QRP ARCI Hoot Owl Sprint
May 30, 2000 - 2400 Local Time

MI QRP Memorial Day CW Sprint
May 31, 2300 UTC – June 1, 0300 UTC

Outer Limits continued from page 69

Ragnar Radio- This rocker still claims to send out the music from somewhere around the Great Lakes. (Uses rangarradio@yahoo.com e-mail)

Shadow Radio- This one normally features old time radio shows from "The Shadow" detective series, but sometimes it mixes in rock music. (Uses the_shadow6950@hotmail.com e-mail)

Sunshine Radio- Their young boy announcer with an odd southern accent usually features rock music. Pay close attention to his speech, so that you can catch the ID. (None, but some replies have resulted vio the grasscutterradio@yahoo.com e-mail address)

Take it Easy Radio- Their programming last month was classic rock as usual, with their namesake Eogles rock tune at sign-off. Occasionally they will also play country music. (Uses takeiteasyradio@yahoo.com e-mail)

Undercover Radio- Dr. Benway, who broadcasts "from the middle of nowhere," adds eclectic fare to his normal rock music. Several readers report that he is responsible for the slow scan TV transmissions near 6955 occasionally. Con anybody confirm this? (Merlin ond undercoverradio@mail.com e-mail)

Voice of Captain Ron Shortwave- Captain Ron's rock music remains a frequent occupont of the pirate band. Sometimes he can olso be heard in two way QSO conversations with other pirates. (Uses Captainron6955@hotmail.com e-mail)

WBST- This old timer used to broadcast primarily on Halloween, but this year they were heard during the winter, perhaps confusing the Groundhog. (Old address no longer valid)

WHYP- The James Brownyard memorial station still programs a mix of DX humor and rock music. On occasion they run a replay of a George Zeller speech at an old Monitoring Times convention. (Providence)

WMPR- The techno rock "dance party" music station is easy to spot. Unconfirmed rumors say that they could be responsible for various utility RTTY-like noises on the pirate bands lately, perhops using slow scan TV. (Still none)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 28413, Providence, RI 02908; PO Box 69, Elkhorn, NE 68022; and PO Box 109, Blue Ridge Summit, PA 17214 and Casilla 259, Santiago 14, Chile.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for submitting pirate loggings with a hope that pirates might QSL the logs remain *The ACE* ($2 US for sample copies via the Belfast address above) and the e-mailed Free Radio Weekly newsletter, still free to contributors via niel@ican.net. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at http://www.frn.net on the internet, and some pirates will QSL a report left on the FRN.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Artie Bigley, Columbus, OH; Cachito, Santiago, Chile; Harold Frodge, Midland, MI; Vince Havrilko, Kadena AB, Okinawa; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Martin Schoech, Merseburg, Germany; John Sedlacek, Omaha, NE; Arnaldo Slaen, Argentina; and Niel Wolfish, Toronto, Ontario.

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Visually-Friendly Receiving Antennas

Many of us live in apartments, condominiums, rental homes with antenna restrictions, or other places where visually-obvious antennas are either forbidden or not welcome from an esthetic perspective. For VHF and higher frequencies antennas are small, and appearance may not be a problem there. But, for HF and lower frequencies, popular antenna designs are usually fairly large and visible. So sometimes we may need a "visually-friendly antenna."

Never heard of a "visually friendly antenna?" Well that's my name for an antenna whose visual appearance doesn't bother anyone: landlords, neighbors, nor family members. Such an antenna is either not visible at all (completely hidden), isn't too noticeable, or looks like something else which is visually acceptable (flagpole, clothesline, etc).

The antennas discussed below are suggested for use as receiving antennas on HF or lower frequencies. However, some of the antennas discussed are useful for VHF or higher frequencies, and/or for transmitting also.

❖ Some Perspective

In the early decades of the 1900s the McMurdo Silver Company ran an advertisement showing one of their receivers as it received HF DX from the other side of the world. The remarkable thing about the ad was that the picture showed that receiver using only an ice pick 5 or 6 inches long for its antenna! And one of my readers assures me that he worked DX on the 10-meter ham band using an antenna made out of an uncoiled wire paper clip 2 or 3 inches long! Bob Grove's *Antenna Fact Book* tells us that "the U. S. Coast Guard found that a five ft antenna was adequate for reception 100% of the time!"

Let's hasten to add, however, that putting antennas high and in the clear often allows the capture of more signals. And antennas such as beams reduce off-beam noise which improves reception greatly at times. An antenna's radiation and reception patterns have dramatic effects on what the antenna can accomplish.

Most of the antennas discussed below are small, inefficient, and not high in the air. They can't be expected to capture as many signal as will most larger, higher and more efficient antennas. And their radiation and reception patterns most probably leave much to be desired for most applications.

Now, with all that said, the experience of many radio operators throughout the history of radio has proven that, in many instances, such less-than-optimal antennas can give satisfactory performance for some applications. And, they can be fun!

❖ Some Ready-Made Solutions

You may already have some visually-friendly antennas in the guise of a metal clothes line, single-wire fence, or wire dog-run cable (outdoor cable with a sliding dog-chain attached), or other common things around the home. I've had success using the cable of a dog-run for ham radio contacts. Radio operators have been known to use as antennas metal objects ranging from aluminum window frames or porch awnings, to metal rabbit cages, to a fire truck with its powered emergency ladder extended as a vertical antenna element!

There was even one fellow who parked two large automobiles bumper to bumper, almost touching. He connected a coax lead-in braid to one bumper, and the center conductor to the other. As I recall, he had decent success with this unusual dipole. Living trees have also been used as antennas. Connect the coax center conductor to a nail driven in a few feet up the trunk; connect the shield to a nail driven in the trunk at ground level.

Probably the most famous (or *infamous*, if you prefer), of all antennas made from objects that were never meant to become antennas are those used by the venerable Kurt N. Sturba. On occasion crusty ol' Kurt who writes the "Aerials" column for *Worldradio* magazine, has pressed such unlikely objects as lawn chairs and shopping carts into service as antennas. He used an antenna tuner to insure a good match between his transmitter and "antenna system," and he was able to work a pretty fair number of DX stations this way.

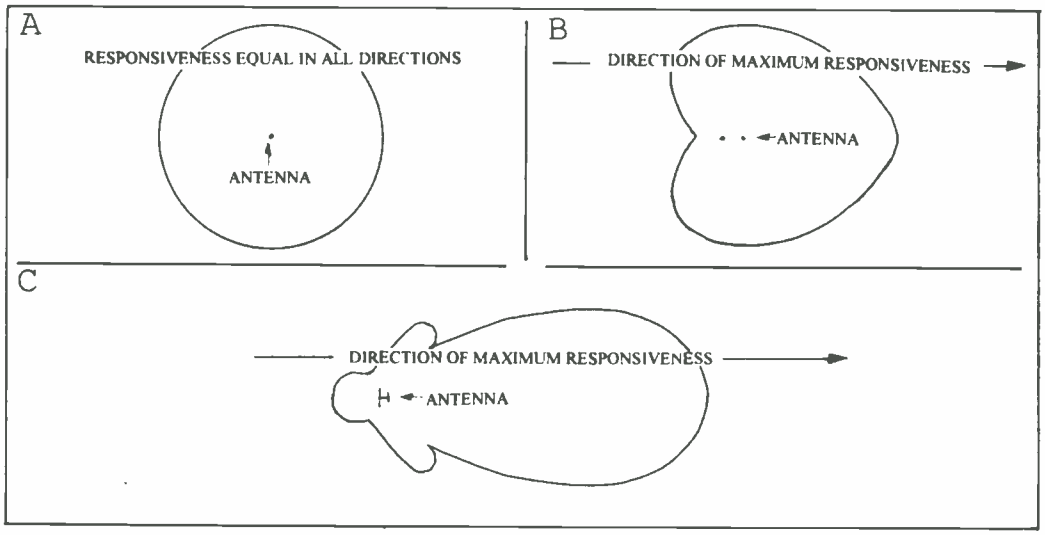

Fig. 1. Pattern of a completely non-directional antenna (A), and patterns of two types of antennas which have been designed for directional performance (B, & C).

❖ Some Home-Brew Solutions

Some of the easiest and most common visually-friendly antennas are simply a wire in the attic, or under the rug. I made a ham antenna once by nailing a wire to the ceiling of the basement where my rig was set up. I don't recall working any DX with it, but it performed well for talking with the local hams. Other antennas I buried an inch or so underground performed about the same.

Actually, I've read that underground and even underwater antennas can sometimes be desirable for their low-noise characteristics on medium and lower frequencies. Of course, you have to insulate these antennas well to prevent their shorting out to the earth or water.

This Month's Interesting Antenna-Related Web site:

A review of antenna types is found on: **http://www.ncjrs.org/pdffiles1/nij/185030b.pdf.**

◆ Making the Antenna Invisible

A wire strung under the eaves of your house can often be a decent antenna, and it can be difficult to see, if it is painted with some of the same paint that was used to paint the eaves.

One easy solution we might overlook is to make an antenna less obvious by using rather thin wire and very small insulators. Wire size is not usually of much importance for HF reception as long, as the wire is strong enough to resist breaking.

Keeping your antennas inside the building where you operate the radio is one way of keeping the antenna visually friendly. If the building is metal or reinforced concrete, then signals may be blocked out to some degree, and then indoor antennas will not be a good solution.

Many radios come equipped with whip antennas which function indoors as well as outdoors. If you have no whip, a short rod or wire will serve as well. And don't overlook the possibility of using an active antenna. These can often can be used indoors with good results. Table-top loop antennas are another obvious choice for indoor use.

Another often-mentioned solution is the use of a flagpole as an antenna. Some operators have used hard-tempered plastic or fiberglass pipe for the pole with a wire antenna inside. Others have opted for a metal pole insulated at the base. Some upper-story dwellers have mounted their flagpole antennas, complete with flag, on a balcony.

◆ Hooking Them Up

Most of the antennas mentioned above can be connected to the receiver by simply running a wire from the antenna to the center connector of your receiver's antenna connector. If you want to use a coax lead-in, you will probably need a ground connection for the coax shield at the antenna; connect the center conductor to the antenna.

Some of these antennas can be used for transmitting if a matching circuit is used between the transmitter and feed line. Use good judgment about which antennas to use for transmitting. Some obvious examples are – don't feed high-power to a tree antenna, don't leave the dog connected to the dog run, and don't leave the rabbit in the cage!

◆ Omissions

We haven't discussed tuning the above antennas, and we've said very little about matching them to their feed lines. For HF and lower-frequency *receiving* antennas we often don't worry about those factors as much as we do at VHF and higher frequencies. This is because, at HF and lower frequencies, simply increasing signal strength usually isn't a good way to improve reception. The reason for this is that it is the ratio of received signal to received noise, rather than absolute signal strength, which determines the quality of reception on these frequencies.

RADIO RIDDLES

Last Month:

I said: " ... antennas with more than average gain tend to be directional. Is this really true for practical antennas? If not why not, and if so, why?"

Well, the radiation and reception pattern of a completely non-directional antenna would be a sphere with the antenna at its center (fig 1A). To increase the antennas's gain that pattern is re-shaped so that more of its gain is directed in certain directions. When we do this the antenna's gain in some other directions must decrease in order to supply the added gain in the desired direction (figs 1B & 1C). So obtaining increased gain is a matter of re-shaping the antenna's radiation and reception pattern. It's kind of like taking a spherical balloon, and squeezing it to make a new shape - if you push it in at one place it will bulge out at another. The answer to the above question then is "yes, antennas with more than average gain do tend to be directional." Exceptions to this rule are antennas such as the Beverage, and small, table-top loops. They are quite directional yet have relatively-low gain in all directions. Their low gain is due to their mode of function which is different from that of most other antennas. They may appear to have higher gain due to their noise-reducing capabilities which make the signal more audible.

This Month:

Above I referred to Kurt N. Sturba's surprisingly-good results using relatively small, non-elevated metal objects (a lawn chair, and a shopping cart) as antennas. Do you suppose that he was trying to teach us something of value by demonstrating his good results with those puny antennas? Or was he just lucky, and wanting to brag about it?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Marc Ellis
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Finishing up the "All-American Five"

This is a project that began last February. I undertook it for a couple of reasons. For one thing, we had never worked with a true "All American Five" ac-dc radio – in other words, a set using a 12SA7 oscillator-mixer, 12SK7 i.f. amplifier, 12SQ7 detector-first audio amplifier, 50L6 power amplifier and 35Z5 rectifier.

For another, the project illustrates certain intangible benefits – beyond the fun of the restoration process itself – that one can enjoy from this hobby. These are the nostalgia factor, the exercise of serendipity (or the "art" of almost accidentally discovering needed items), and the detective work involved in identifying unmarked radio models and tracing manufacturer's circuit changes.

❖ What's Happened So Far

Several years ago I found the subject of this restoration hiding under a flea-market table – cabinetless, tubeless and filthy. My eye was drawn to it because it was the same model as the first radio that was entirely mine – a gift for my long-ago 12th birthday. Just last year I spotted what seemed to be the cabinet for it on another flea market table and later had the thrill of discovering that it was a perfect fit. I had more fun teasing out the actual model number and circuitry of the unmarked radio by consulting Riders' manuals and other reference books.

By the end of the March column, we had cleaned up the cabinet, ordered a replacement for its cracked and discolored dial window, replaced wiring compromised by crumbling insulation, found a set of tubes, and installed new capacitors.

On its first test, the little set turned out to be afflicted with odd, tunable, motorboating and squealing that was preventing any semblance of radio reception. Last month I took a vacation from the project because I hadn't been able to locate the cause.

❖ The Culprit: A Microphonic 12SK7

All signs were pointing to trouble in the 12SA7 oscillator/mixer stage because the odd artifacts disappeared when it was disconnected from the 12SK7 i.f. stage that followed. Furthermore, a modulated signal fed into the grid of the 12SK7 would be reproduced clearly in the speaker. Although I realized full well that these effects could have resulted simply from my having broken a feedback loop that was causing the troubles, I spent a lot of time troubleshooting the 12SA7 stage.

I could find nothing obviously wrong there, and began to wonder if the problem could be caused by a corroded tuning capacitor ground connection. I started tapping the connections, and that's when I first realized how sensitive the strange noises were to impact. Eventually, I began tapping tubes, and it soon became clear that the most sensitive spot of all was the top of the 12SK7. I found a replacement, swapped it in, and my troubles were over!

That tube had tested perfect for both shorts and quality when I first installed it – and again after I took it out. But apparently one or more of the elements was loose or misaligned. This seems to have caused "microphonic" effects (gain variations triggered by received audio), which caused variations in the a.v.c. voltage, which in turn varied the r.f. gain of the mixer section of the 12SA7, which introduced more variations in the signal passing through the 12SK7, and so on. I've never run into an effect quite like this before!

Now the radio was operating, but the sound was a little thin – caused in part by the rips in the very dried out and fragile speaker cone. Even worse, the dirt in the tuning capacitor was causing random static similar that caused in shortwave receivers by atmospheric disturbances. Besides this static, tuning the capacitor through certain spots in its range would cause a more rapid staccato type of noise which suggested that plates were shorting.

❖ Capacitor Cleaning

Removing a tuning capacitor is not one of my most favorite activities, so I first tried to clear the problem by spraying with "canned air" as is used to dust the innards of computers. But it was "no go." The noises were still there and the unit was obviously going to need a bath.

My usual method has been to swish the afflicted unit in gasoline. But this is a messy and possibly dangerous procedure and gas is tough on the skin. Reader Judy May (see April issue) had also commented that gasoline might well have damaging additives that would be left behind on the capacitor plates. She suggested automotive brake parts cleaner – which appealed to me because it comes in convenient aerosol cans.

The NAPA brake/electric motor cleaner aerosol spray proved to be a convenient and effective means for flushing out the tuning capacitor (see text).

I paid a visit to my local NAPA auto parts store to check this possibility out. Studying the offerings in the automotive solvents department, I discovered not only brake parts cleaner but also a spray meant to clean both brake parts and electric motors. An odd combination, but – hey – if it could be used without harm on electric motors it ought to be safe on variable caps! Interestingly enough, the plain brake part cleaner was marked with the caveat "Do not use on electric motors." They didn't say why.

I bought a can of the combination type (NAPA branded "Mac's 4700 Brake and Electric Motor Cleaner"). Cost was reasonable – about $2.60 for the 18-ounce can. The active ingredient is listed as tetrachloroethylene – and there are the usual warnings about breathing fumes or contact with eyes or skin. It may have carcinogenetic properties. Use indoors is discouraged.

I took the ailing capacitor out behind the garage and gave it a good spraying with the "Mac's 4700." After that, it sure looked a lot cleaner. Once it dried I took it inside to check for shorts.

❖ Clearing the Shorts

Back at the workbench, I hooked an ohmmeter across the tuning capacitor – one section at a time – to check for shorts. The oscillator section proved to be fine, but the r.f. input sec-

tion was kicking up the meter at certain points in its rotation. The plates were so closely spaced and the unit was so compactly built that it was virtually impossible to see where the trouble was occurring.

Remembering a technique that I had once read about, I found a hefty low-voltage transformer (about 20 volts) in my junk box and connected it across the offending section. With the transformer powered up, I rotated the cap though its range. This was supposed to burn out any loose particles that might be causing the shorts.

However, my problem was caused by plates touching each other – so the result was a shower of sparks, a very hot transformer, and a couple of capacitor plates temporarily welded together. After the dust settled, I broke the capacitor loose and tested for shorts again. As you might suspect, the problem was even worse than before. But the new problem I had created was a blessing in disguise. The discoloration and light pitting on the plates showed me exactly where they had been touching.

I was able to slip a piece of emery cloth between the plates and used it carefully to burnish the damaged spots. A subsequent check with the ohmmeter showed that the shorts were now gone! After another quick spray with the cleaner to remove any particles deposited by the polishing, I reinstalled the capacitor. The stations now tuned in and out smoothly and with no trace of static.

❖ Finishing Touches

If I were a repairman from the era when the radio was new, I'm sure I would have thrown the speaker out and ordered a new one. Not only were there a lot of rips and tears, but the cone was even separating from the speaker frame at several places around its periphery. However, it is now almost impossible to find a proper replacement for a dynamic speaker. This type of speaker is hard to find. Furthermore, the field coil resistance as well as the physical size must match those of the unit to be replaced – and many different values were in use.

An accepted restoration technique is to substitute a PM (permanent magnet – no field coil) speaker for the ailing dynamic unit, replacing the missing field coil with a power resistor of the correct value. But I hesitated to throw away a cute little dynamic speaker that was part of the set's original equipment and opted for fixing the tears.

By the time I got through, there was almost as much household cement as paper on the speaker cone. But I did close up all the tears and re-glue the cone edges to the speaker frame. The sound was a little better now, and I went on to tweak the set's alignment.

I've gone through the alignment process so many times in the recent past that I won't go into detail on it again right now. Suffice it to say that I used my Triplett 2432 to generate the required modulated signal and my RCA Junior VoltOhmyst – connected to the set's avc line – to indicate signal strength. Both of these units were restoration projects in previous *Radio Restorations* columns.

I was surprised to find that the i.f. transformer tuning wasn't too far off. It's more common, in sets this old and neglected, for retuning to result in dramatic increases in gain. As for dial calibration, the reading was about 30 kHz low at the high end of the band where the oscillator setting is checked. This was corrected with the oscillator trimmer and, per manufacturer's instructions, the mixer trimmer was then adjusted for maximum gain on a received signal at about 1300 kHz.

It was the work of just a few minutes to trim the edges of my replacement dial window to fit inside the cabinet, after which it slipped neatly into its opening. I anchored it with the original friction fasteners, fastened the radio chassis in place behind it, and I was good to go.

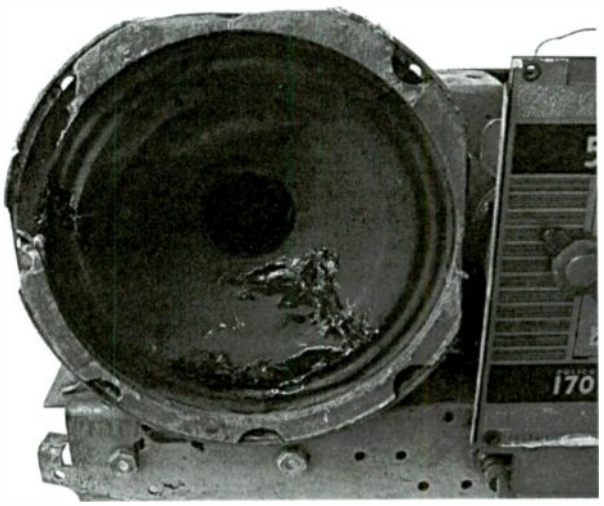
❖ Post Script

The sound was a lot more mellow – surprisingly so – with the chassis mounted inside the cabinet, and I spent a lot of time just tuning around and reliving the past. It was almost more fun than I had thought it would be to have the radio of my youth back to play with again. I even shut off the room lights so I could experience the dial glowing in the dark as it had looked when I listened after going to bed.

The dial design and graphics – the RCA "Little Nipper" logo and the look of the numbers – brought back such strong memories that I wouldn't have been at all surprised to find Boston stations at their old spots on the dial instead of the normal Chicago ones. There, at around 60 would have been WEEI; WHDH up around 85; WBZA and WBZA at about 110 (I can still hear the NBC chimes vibrating the speaker); WNAC a few kHz higher at about 1300 (home, as I recall of "The Shadow" and other shows with high kid interest); and somewhere up near the top of the dial was local station WMEX, which didn't carry much of interest to kids, but on which my father used to advertise his hardware store.

It's very nice indeed to have my old companion back again – and doubly so because I was personally responsible for rescuing it from the trash heap, finding the cabinet it needed and coaxing it back to life!

Nestled in a proper cabinet once more, the revitalized RCA chassis looks exactly like the companion of my youth.



Yes it's grubby and heavily patched with household cement, but the speaker still sounds surprisingly mellow!

Bob Parnass, AJ9S
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Uniden BC796D Scanner

The Uniden BC796D is a tabletop scanner which can follow conversations in conventional and several different types of digital and analog trunked systems. It is an upgraded version of the BC785D (June 2003 *MT*) and looks almost the same from the outside. An AC operated wall wart power supply is included. A fully lit keypad and mounting bracket make the BC796D well suited for mobile use, too.

The BC796D tunes a wide range of frequencies. It includes circuitry and firmware to detect APCO P-25 digital voice signals using either C4FM or CQPSK modulation schemes and tracks conversations in trunked systems with either 3600 or 9600 baud control channels.

The older BC785D doesn't support CQPSK modulation and detects C4FM modulation only when equipped with an optional BCi 25D card. It won't track trunked systems which employ 9600 baud control channels.

We recommend you download an electronic copy of the owner's manual from the Support section at **http://uniden.com** because there are more features than we have space to cover.

The BC796D's frequency coverage is the same as the earlier models: 25 - 512, 806 - 956 (minus cellular phone), and 1240 - 1300 MHz. There are frequency gaps at 512 - 806 and 956 - 1230 MHz.

The BC796D now includes a new 6.25 kHz step size. There are eight choices of step size plus an AUTO setting, the latter being determined by frequency.

Both radio-to-radio cloning and computer control are supported. A CDROM containing software is furnished with the radio, though not supplied with our early production radio. The software requires Microsoft Windows and may be downloaded from Uniden's web site if you lose the CDROM. The computer interface protocol is not documented in the owner's manual.

You can download updated firmware from the Uniden web site which you can then "flash" into the BC796D.

❖ Memory

The BC796D's 1000 memory channels are organized into 10 banks of 100 channels each. Each conventional channel may be programmed with: a frequency and mode (AM, FM, WFM, NFM), a 16 character label, step size, rescan delay on/off, lockout, attenuator on/off, CTCSS or DCS tone squelch, beep alert, and record on/off.

An alphanumeric label may be programmed for each memory bank, too.

❖ Trunked Systems

There are a wide variety of trunked systems in use and the BC785D is designed to track conversations in these systems: Motorola Types 1, 2 (VHF, 400, 800, and 900 MHz), hybrid, APCO 25 Phase 1 systems (3600 and 9600 baud control channels), EDACS (Wide band 9600 baud, Narrow 4800 baud, and SCAT), and LTR.

SCAT means Single Channel Autonomous Trunking and is an EDACS configuration in which a single frequency serves as both as a control and voice channel.

You can track up to 10 different trunked systems, one per bank. The BC796D offers memories for up to 100 talk groups per trunked system, in 10 subgroups of 10 IDs each. Talk group IDs may be programmed directly using the keypad or stored while receiving signals on the talk group of interest.

A descriptive label can be programmed for each talk group, as well.

As with the earlier Uniden models, EDACS and LTR frequencies must be programmed into memory channels in the proper sequence, which is not necessarily the same as frequency order.

Programming an LTR system into the BC796D requires detailed knowledge of that system ahead of time to enforce a correspondence between the system's channel numbering scheme and the radio's channel numbering. This takes a lot more work than programming an LTR system into the older Radio Shack GRE-made PRO-2067 and PRO-92.

The BC796D's digital demodulator will not decode encrypted (scrambled) transmissions, though ENC appears on the display when the radio is tuned to an APCO 25 encrypted signal.

❖ Searching

Ten pairs of frequencies may be programmed into the BC796D for limit searching. Limit search banks may be "chained" or linked together to search multiple ranges in succession. You can hunt for signals transmitted with a specific CTCSS or DCS code. On the other hand, you can instruct the BC796D to ignore signals transmitted with a given CTCSS or DCS. Up to 200 frequencies may be skipped during a limit search.

Auto Store permits unique, active frequencies found during a limit search to be stored automatically in a selected bank.

The Service Search feature looks for active signals in these classifications: weather, public safety, news, TV broadcast, ham radio, marine, air, CB radio, FRS and GMRS, racing, and special. The "special" category consists of low power, itinerant, and interstitial frequencies.

❖ Construction

The BC796D's liquid crystal display is a dot matrix. There are menu options for two brightness levels and off.

Like its predecessor, the BC785D's display is missing indicators for Data Skip, Tone Squelch, Attenuator, and Rescan Delay, so you cannot tell at a glance whether these options are enabled or disabled on a particular channel.

To view a channel's configuration, push and hold the Menu/Back key for a couple of seconds. You can then see the channel settings, but you must scroll through them because the screen shows only three settings at a time.

The keypad is backlit, which makes it easy to use the BC796D in a dark car.

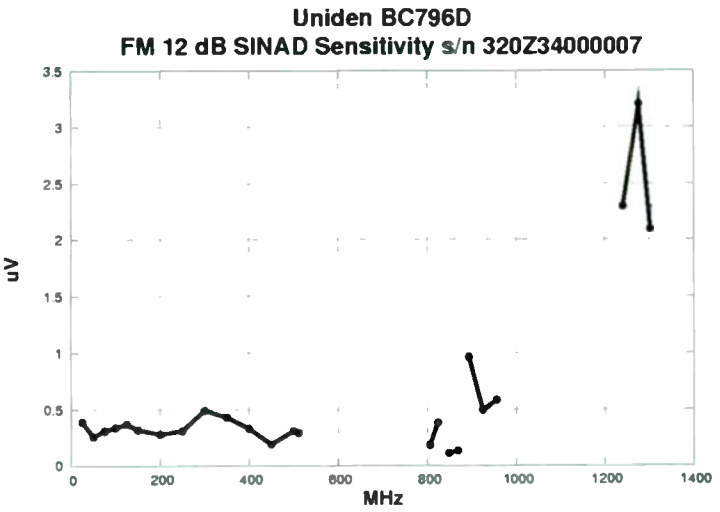
❖ Usability

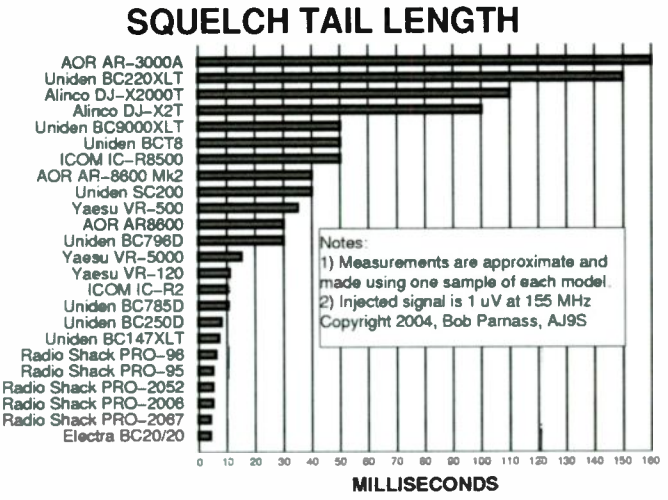
You can program conventional memory channel frequencies using one of two procedures: 1) By positioning to the desired channel, then typing in the frequency followed by pressing the E key, or 2) Navigating the menu system.

The simpler, direct method works, but only for frequencies which coincide with the default step size. For example, the default step size is 50 kHz in the 225 - 399.95 MHz military air band.

If you enter 335.525 MHz directly, the BC796D will coerce the frequency to 335.55. You can then use the menu system to "drill down" to the STEP submenu, change the step size to 25 kHz, then re-enter the 335.525 frequency. Now, the BC796D will accept the frequency without rounding.

You can program alphanumeric labels for individual memory channels, channel banks, limit banks, and talk groups. Like the handheld BC296D, the BC796D makes it easier to distinguish "new hits" from previously programmed talk groups. If a programmed talk group becomes active while searching for new talk groups, the





BC796D will display both the ID and the group label. This is an improvement over the earlier BC785D which would show the ID but not the label while searching. If the BC796D detects activity on a talk group not previously programmed, the word NEW is displayed.

The user manual is improved over the BC785D's manual and explains the BC796D's algorithm for multitracking in depth. When scanning or searching multiple trunked systems or a mixture of trunked systems and conventional frequencies, the BC796D will hunt for activity within a trunked system for up to 1 second, then proceed to the next trunked system or conventional frequency. This permits the radio to scan for traffic across more systems instead of dwelling for too long on any one system.

Measurements

Uniden BC796D Scanner, S/N 320Z34000007

Uniden America Corp.
4700 Amon Carter Blvd.
Fort Worth, TX 76155
tel. (800) 554-3988
http://www.uniden.com

Frequency coverage (MHz):
25 - 512
806 - 823.9875
849.0125 - 868.9875
894.0125 - 956
1240 - 1300

Step sizes (kHz):
5, 6.25 7.5, 10, 12.5, 25, 50, and 100, AUTO

Modes:
AM, WFM, FM, NFM, user selectable

NFM modulation acceptance: 12 kHz

Audio output power at external speaker jack:
1.9 watts @ 10% distortion

Attenuator:
0 dB @ 40 MHz
3 dB @ 155 MHz
23 dB @ 460 MHz
22 dB @ 860 MHz

IFs (approx., in MHz):
380/242, 45/10.8, 0.450

Squelch tail near threshhold
(1 uV @ 155 MHz): 30 ms.

Practical memory scan
speed: 28 ch/sec, but varies, depending on memory contents

◆ Performance

Our BC796D (s/n 320Z34000007) has ample audio. As expected, better fidelity may be obtained by using a good external speaker pointed at the user.

The intermod performance of our BC796D is similar to what we observed when testing a BC785D. We experienced some intermod on the VHF-high band where public safety transmissions are sometimes mixed with a 162.4 MHz NWR (National Weather Radio) transmission. The NWR transmitter interferes with many of our other scanners, except the "bulletproof" ICOM IC-R8500.

Television audio broke through on a few frequencies in the VHF-low band.

Like the BC785D, our BC796D's memory scan speed varies, depending on what's programmed in the memory channels. We programmed 25 channels with our usual variety of frequencies and (conventional) modes and measured a scan speed of about 28 ch/sec (Fig. 5). Program the memory channels within each bank in order of frequency if you want faster scanning.

Some of the earlier model Uniden scanners, e.g. BC895XLT and BC9000XLT, featured TurboScan, and sped up the scan rate by sorting the frequencies before scanning. The BC796D scans memory channels in channel number order and we didn't find a keystroke combination to scan them by frequency.

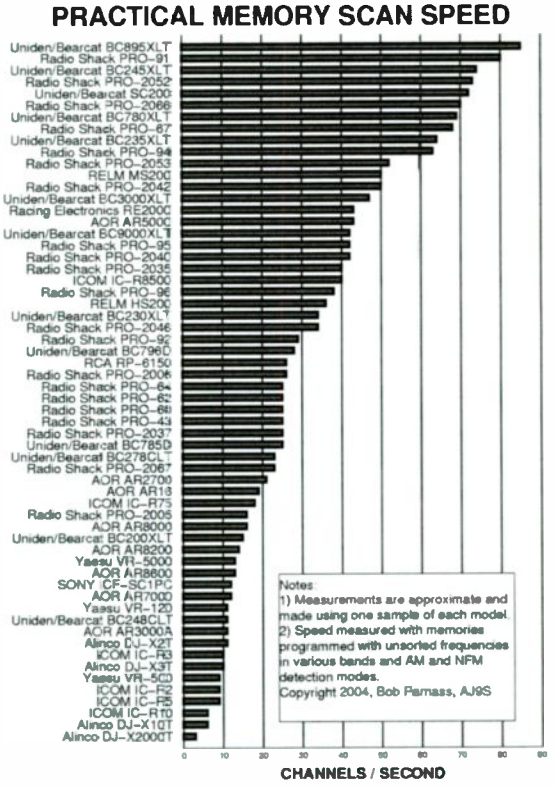
The squelch in our BC796D acts about the same as that in the BC785D we tested. The BC796D's squelch tail is shorter, though not nearly as short as the GRE-made scanners. There is a slight variation in squelch threshold with frequency and mode and the squelch exhibits more hysteresis ("play") than we like.

◆ Overall

Uniden is the only company offering a digital trunk tracking scanner in a tabletop/mobile configuration at this time.

We termed the earlier BC785D the "scanner enthusiast's scanner" due to the multiple system trunk tracking, digital demodulation capability, military air band coverage, CTCSS and digital tone squelch, alpha labels, and a computer control interface. The BC796D has all that plus CQPSK and 9600 baud capability, a 6.25 kHz step, and better talk group searching.

The Uniden BC796D is available from Grove Enterprises for $524.95 (1-800-438-8155 or visit http://www.grove-ent.com).



John Catalano, PhD
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Replay Radio - "A VCR for Internet Radio"?

A few months ago we looked at the RPR (Radio Program Recorder) that essentially utilized a Sony IC Recorder/Timer, and, of course, a radio, to provide automatic, unattended off-air recordings of radio programs. The RPR is a hardware approach to a need that has existed from the minute the first radio broadcast propagated the ether!

Well, this month we look at Replay Radio. This is a total software approach to unattended Internet radio recording. Gone is the all hardware – even the radio!

21st Century Radio

It should come as no surprise to anyone who has not been living in the deepest remote jungle that using audio streaming over the Internet we can listen to live radio stations all over the world. Of course, the station of interest must be streaming their audio. But the number of AM (medium wave), FM, shortwave and even scanner Internet broadcasts is large, diverse, and growing every day.

So now that we have all this Internet audio media at our disposal the challenge is to select which broadcasts we are interested in. Then either listen to them or record them for listening at a convenient time. Welcome to the 21st century where everything is available, except our free time.

Replay Radio is a nifty program that allows you to program what and when your Internet "radio" tunes. Then it lets you record the programs to your hard drive for later listening. Does it work? Since many of us have trouble programming our VCR the question must also be asked, "How difficult is it to use?" Let's give Replay Radio a try.

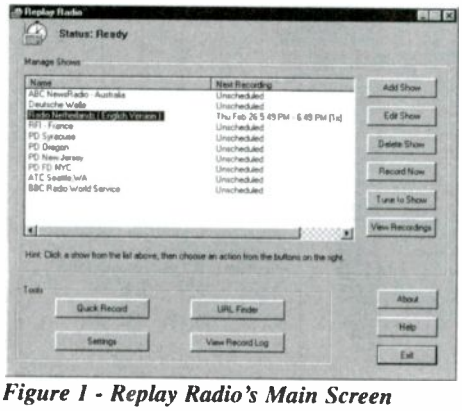


Figure 1 - Replay Radio's Main Screen

Getting and Loading Replay Radio

The requirements for Replay Radio version 4.05 as stated on their website are very modest: Pentium Computer, Windows 98 or newer, a sound card and 3 MB of hard drive space. Those are all the system requirements that I could find on their website. The program takes 3 MB. But you'll want a lot for your recordings. I ran it on a Pentium II 300 MHz computer with 64 Meg of RAM. State of the ark! Netscape 7.1 and a dial-up connection were used to access the Internet.

The program and an operation manual can be downloaded from the Replay Radio site at **http://www.replay-radio.com**. The program is around 3 MB so expect a wait if you are using a dial-up connection to the Internet.

Once downloaded, the program installs effortlessly. Figure 1 is the main screen of the program. Its very simple layout is a welcome sight.

Adding Library "Stations"

We can see in Figure 1 that I have added a few Internet "stations" familiar to shortwave listeners, such as BBC World Service and Radio Netherlands. Adding stations which are in the Replay Radio library is very simple. The process is started by clicking the "Add Show" button on the right side of the screen shown in Figure 1.

This takes you to a new screen which we will look at in detail in a moment in Figure 3. For now, let's just say that on the top right of the Figure 3 screen we are presented with a "Pick Station" button. Once pressed, a list of all the stations in the Replay Radio library is presented. See Figure 2. Choosing a station is as simple as highlighting the name of the desired station and clicking "OK" at the bottom. We'll choose Radio Netherlands (English Version) which is about at the center of the displayed list.

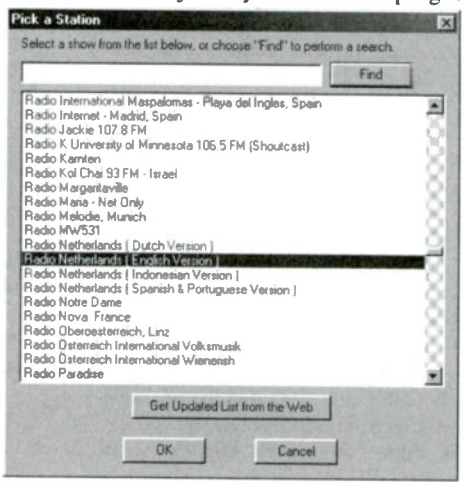


Figure 2 - Tuning Around - The Pick A Station Screen

Since stations are always being added, deleted, and their web addresses modified, I suggest you use the "Get Update from the Web" feature before your first use of Replay and at regular intervals thereafter.

A Slight Digression on Updates

Before we go any farther I suggest you also have installed the latest versions of Real Audio, Real Player V10 and/or Microsoft's Windows Media Player Series 9. Internet stations use streamed audio in various formats and these applications are required to recover the audio. Both are free and can be downloaded at **http://realaudio.com** and **http://www.microsoft.com/windows/windowsmedia**

The old versions of these applications, which I initially had on my computer, didn't like many of the stations' audio. After updating to the newest versions all the unreceivable stations did not go away. But the number of non-working stations dropped dramatically.

I also suggest you download all of the available codec plugins. Stations use different methods to encode the audio into digital information depending on audio quality desired and their hardware. Also you, as the listener, have the choice of what quality of audio recovery you desire. The codec is the program that does this audio processing. Codec downloads are relatively short in time, free and available on the above two sites.

Back to Replay Radio

Once we have chosen a station, Figure 3 is displayed. There is lots happening here! First we can see at the top that Radio Netherlands has been selected. The address or URL of Radio Netherlands has been automatically inserted into the appropriate box. Next comes the heart of Replay Radio.

Choosing a Listening Method

The next section of Figure 3 deals with the way you wish to perform your listening.

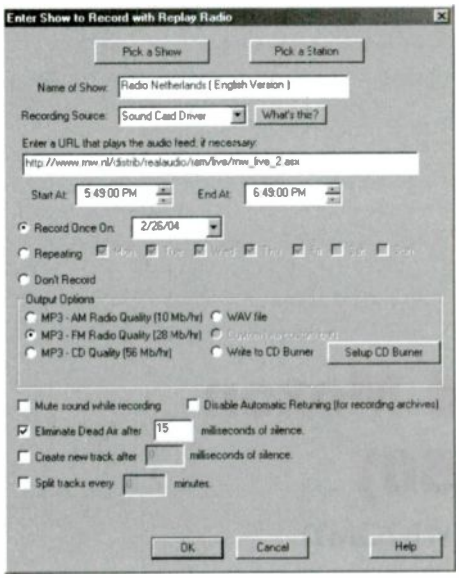


Figure 3 - The Heart of Replay Radio

If you wish to record Radio Netherlands on a specific day and time, for listening at your leisure, your wish has been answered. First enter the recording's start and stop times in the boxes. If this is a one-time recording on a given date, click "Record Once On:" and enter the date. Replay Radio will automatically "tune" to the station you have selected on the given date and time and record the program to your hard drive.

If you wish to repeatedly record a program at the same time on certain days of the week click "Repeat" and select the days you want it recorded. It really is very, very simple!

Alternatively, if you just wish to listen to the station now, without recording it, click "Don't Record." The station will be saved to your list of stations as seen back in Figure 1.

Before we go back to the options on Figure 1, let's finish with some very useful user options at the bottom of Figure 3.

Fidelity is Space

In the digital world if you want higher sound quality, you have to pay for it with memory space. From a listening perspective, the higher the sound quality the better. However, if you are planning on doing lots of unattended recording you better make sure you have a massive hard drive! Clearly, for musical programs you have little choice. But for talk show content, as in most shortwave broadcasts, Replay Radio allows the user to record at a lower sound quality, thereby allowing longer recording time for the same amount of disk space.

The "Output Options" allow the user to choose the quality and format of the resulting audio. I found that the "MP3 (format) - FM Radio Quality" gave a good compromise. Instead of an MP3 format you can choose to have the audio in a "WAV" file. And, lastly, the program will save the recording to your CD burner. This is a great selection of output choices which should make both the audiophiles and the shortwave listeners smile.

You don't have to be tied to your PC to play back the audio. Portable listening is easily done by either downloading the MP3 resulting files to a MP3 player or Pocket PC. Burning to a CD for use on a portable CD/MP3 player is another way to go. For these types of applications Replay Radio makes a bunch of useful programs, such as MP3 Magic and Replay Player that are worth a look at the Replay Radio website.

What about Scanner Folk?!

Don't worry. You have not been forgotten. As we said in the beginning, live fire, police and aircraft transmissions are streamed over the Internet. But as all of us scanner listeners know, most of the time you monitor dead air. Replay Radio has just the trick ... a Dead Air Eliminator. Just click it and set it for how many milliseconds of dead air you will allow before it kicks in and stops recording. It then waits until it detects audio before restarting the recording. Very nifty, and it works just as advertised! It condenses hours of monitoring to minutes.

Adding Scanner Stations

Live scanner transmission sites which are not in Replay Radio's library can be added if you know the site's URL address. Of course you can add any site streaming audio. Once you find a site that you would like to add to your list, just paste its address into the URL box as seen in Figure 3. You can then type your description of the station in the top "Name of Show" box.

Going back to Figure 1, you'll notice that I have added a number of scanner sites including an air traffic control site from Seattle, Washington, titled, ATC Seattle, WA. Its URL is **http://www.microvoltradio.com/seatac.ram.**

To find new Internet stations to add to your list, stick "live scanner transmissions" or "shortwave internet stations" into your search engines. Also check the radio over the internet libraries of Netscape, Real Audio and MSN.

Actually Monitoring

Returning our attention to Figure 1, we can see lots of manually controlled operations. If we highlight a station on our list and click "Tune To Show," a number a things happen automatically. First the station's website is accessed and a Netscape window opened. Then an audio player – for example Real Audio – is opened and displayed. And finally the streamed audio is heard. We can also start and stop recording of the audio manually from Replay Radio's main screen, Figure 1.

How Did It Work?

This is not the first Internet Radio program we have tried. Over the past years each one we used had problems. Most were so frustrating and unpredictable to use that I gave up on them after a few weeks. Replay Radio is refreshingly different!

As far as unattended recording, it performed exactly as advised. The program rightfully suggests to users to manually verify that the URL is still a working site. Once done I had no problems. All operations were smooth and as expected.

I experienced one hiccup in the manual mode of operation. Most times a different station could be tuned just by highlighting it on the main screen. However, occasionally when I tuned from one station to another, my computer would freeze, requiring a three finger salute (ctl-alt-del) reboot. Not pretty.

After a day or so I found a solution. If I manually closed the station's website window that I was listening to, before clicking "Tune .." to a different station, it worked fine. Using this method I had no further "freeze" problems.

I can only access the Internet via dial-up from my location since no broadband is available on my street. Talk about primitive! I wonder if the dial-up was the source of my problem. If anyone has had a similar problem please email me.

Overall

I loved Replay Radio. It's a product that right for the times. It brought back the feeling of my early days of shortwave listening. For recording scanner transmissions it was great.

I have a suspicion that my Pentium II was not quite up to the job. My feeling is that a faster Pentium with more RAM should be considered the minimum system requirements for best audio streaming results. Of course a DSL connection would also be really nice.

However, for the rest of us without the latest computer or broadband connection, Internet radio listening, IRL, is still a lot of fun. In fact for us it is more like listening to shortwave with its signal uncertainties.

Is Replay Radio like a VCR for your Internet radio? Better. Much better. It is much easier to use and program that any VCR I've seen. The full version of Replay Radio version 4.05 costs $29.95, not bad for all it does and it does a lot very well! Replay Radio is one of the best programs I have seen in a long time. A free trial version is available for downloading at **http:www.replay-radio.com**. Till next time.

MT REVIEW

PAR Electronics Stressed Moxon 6-Meter Beam (SM-50)

by Ken Alexander (VE3HLS) and Kevin Carey (WB2QMY)

First, a word about Moxon Rectangle antennas. The Moxon Rectangle was originally designed by Mr. L.A. Moxon, who modified an existing square design by VK2ABQ called the "VK2ABQ Square." Both designs essentially "shrank" a 2-element Yagi by bending the ends of the driven element and reflector so the ends were practically touching, as shown in Figure 1.

As it turned out, this considerably reduced the size and turning radius of the antenna, making it easier to erect and to rotate. It could also better withstand extreme weather. A Moxon Rectangle's forward gain is somewhat less than that of a full-size two-element Yagi, but its front-to-back ratio is better, providing a worthwhile tradeoff.

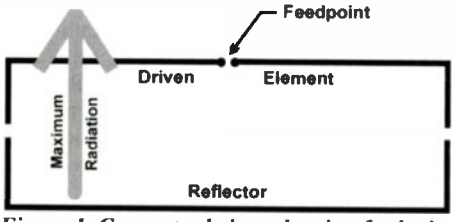


Figure 1. Conceptual view, showing feedpoint and directional characteristics

The PAR Electronics' Stressed Moxon (SM) is an ingenious variation on the Moxon Rectangle. The SM consists of three main components: A square aluminum driven element, a reflector element, and tubular end arms (see Figure 2).

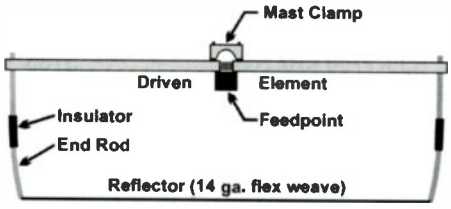


Figure 2. Stressed Moxon Antenna, top view

The driven element is divided into two sections and is separated by a sturdy solid fiberglass insulator. The mast clamp and antenna feed block also bolt onto this insulator. The ends of the driven element are drilled to provide a snug friction-fit for the end rods. Each end rod actually forms part of the driven element and part of the reflector. A plastic insulator in the center separates the two halves as shown in the figure.

The ends of the rods opposite the driven element are threaded to accept a small screw, which holds the reflector element in place. The reflector is made of insulated flex-weave copper wire with factory-installed lugs at each end.

But What About the Stress?

The stress of this antenna comes from the reflector wire, which is slightly shorter than the driven element. When the SM is assembled, the wire pulls on the ends of the end rods, locking them into place on the main element and putting stress on the entire antenna, as if it were an archer's bow.

The beauty of the PAR Electronics design is that as you move away from the feedpoint, each subsequent section of the antenna is made of thinner, lighter (but strong) material. This gives the SM a great capacity to flex and absorb punishment from the elements – whether they be high winds, snow or ice – while keeping weight to a minimum.

The SM accepts a standard PL-259 UHF connector. Adjustment for minimum SWR is made by varying how far the end rods pass through the square main element. A Moxon Rectangle's bandwidth is quite wide, more so than a Yagi, and the SM we tested worked fine with the end rods inserted just far enough to slide the provided plastic end caps into place.

Assembly and Performance

The SM-50 can be assembled from scratch in 20 minutes with only a screwdriver. The assembly method makes it a perfect antenna for "hill-topping," rover work, or emergency operations. It can be kept partly disassembled in the trunk of a car and can be put together without tools in less than 5 minutes. Its small size and light weight make for easy "Armstrong method" rotation, or you can use an inexpensive TV rotor to do the job.

To test a quickly erected portable setup, we clamped the SM-50 to an MFJ fiberglass telescoping mast by extending only the lower six sections. This provided a height above ground of about 18 feet (roughly one wavelength on the 6 meter band). On the air, local 6-meter propagation beacons that were S-9 off the front of the SM-50 were typically still audible but didn't move the S-Meter off the back of the antenna. This was an impressive testimony to the SM-50's front-to-back ratio, mentioned earlier.

During on-the-air contacts, we received excellent signal reports with the SM-50, and found that it compared favorably with a four-element Yagi installed at the same height. As you might expect, the Yagi had an edge in signal strength most of the time, but the difference was not extreme, and considering the easy assembly and portability of the SM-50, we believe this is an antenna well worth exploring for the VHF operator. We can all do with a little less stress in our lives, but just this once you'll be better off by adding a little!

The approximate cost of the SM-50 is $79.95 (U.S.). You can learn more about the antenna and other Par Electronics offerings by visiting the firm's website at **http://www.rf-filters.com**.

Table 1. PAR SM-50 Technical Specifications

Parameter	Specification
Polarity:	Horizontal
Gain:	5.8 dBi
F/B Ratio:	17 dB
Design Impedance:	50 Ohms
VSWR Bandwidth:	1.4 MHz between 1.5:1 points
Power Handling:	1000 Watts
Weight:	3 Pounds
Size:	Rectangular, 84" X 31"
Hardware:	Stainless Steel
Mounting:	Mast mounted. Supplied bracket accommodates 0.75" to 1.5" masts.

Communications continued from page 11

Voice over Internet Protocol (VoIP) and instant-messaging systems, eavesdropping methods like the FBI's Carnivore system (also called DCS1000) become less useful. VoIP calls travel along the Internet in tens of thousands of packets, each sometimes taking completely different routes.

Under the FBI's proposal, Internet companies would bear "sole financial responsibility for development and implementation of CALEA solutions" but would be authorized to raise prices to cover their costs.

MISCELLANY

US Brain Drain

College seniors who thought that majoring in science and technology would provide a door into the job market and security are dismayed to find that jobs in the technology are being drained away to China, India and other countries with cheaper labor costs. A recent study projected that as many as 3.3 million white collar tech jobs will have gone overseas by 2015.

The most likely employer for entry-level jobs in technology may lie within the US government itself, which is responsible for many tasks which cannot be exported outside the country. For example, the Nuclear Emergency Support Team. This program involves hundreds of federal nuclear scientists and technicians who stand ready to rush to any U.S. city in search of nuclear weapons.

But NEST and many other programs are suffering from a growing talent shortage – in the case of NEST, nuclear scientists that accompanied the downsizing of the nuclear weapons program after the Cold War are retiring. One person familiar with the emergency response programs said, "Without trained, equipped experts in the field, no level of funding will save lives in a radiological dispersal event."

Your Brain on a Cell Phone

If you aren't already convinced about the dangers of driving while talking on a cell phone, an article in *The Star* presented some interesting figures. People talking on mobile phones are four times more likely to have an accident. Six percent of auto accidents in the US are estimated to be caused by drivers talking on cell phones.

The UK has banned using cell phones without a hands-free set. Japan has banned use of cell phones entirely while driving. Japan's research indicated most of the accidents occurred while answering the ringing phone.

Any parent who has observed their normally level-headed youngster transform when connected to a telephone will not be surprised that drivers between the ages of 16 and 24 are involved in the most phone-related accidents, the majority of which are rear-end collisions.

California is considering a bill that would ban 16 and 17 year olds from using a cell phone at all while driving. The bill's sponsor, Sen. Debra Bowen, cited a 2003 Ford Motor Corporation study that shows teens talking on cell phones miss 54 percent of driver distractions, compared with a 14 percent error by adults. Adults not using cell phones missed just 3 percent.

Noise Annoys

A study conducted by Duane Button, a master's student at Memorial, concluded that loud noise inhibits the ability of the brain to perform physical tasks, and the ability to perform complex tasks requiring decision-making was doubly decreased. So will we be seeing a bill requiring decibel limiters on car speakers for teenagers?

Residents near the ritzy Time Warner towers near Central Park have complained about a high-pitched buzz that appeared after the towers were built. Noise expert Alan Fierstein found the hum violated the city's noise ordinance when measured from an apartment across the street. He believes it may emanate from an air-conditioning unit atop a building used by *Newsweek* and is reflected by the face of the towers. Hm-m-m, reminds me of the behavior of some radio waves around high-rise buildings...

"Communications" is compiled by MT editor Rachel Baughn from newsclippings submitted by our readers. Many thanks to this month's reporters: Anonymous, NY; Norman Hill, VA; Brian Rogers, MI; Richard Sklar, WA:. Via email: Anonymous, Tad Cook, Dan Hamilton, Maryanne Kehoe, Fred Moore, Sterling Marcher, Jeff Multer, Jerry None, Larry Van Horn, Ed Yeary, George Zeller, MRT Bulletin

How's That Thing Really Work, Anyway?

A "CW" Transmitter

By Carl Herbert, AA2JZ

In February, we looked at the basic workings of a receiver. This time we'll take a look at the principal circuits of the transmitter section. Receiving is half of the fun; now we want to generate a signal and "talk" with AB2AF on 80 Meters.

Previously, the block diagram showed a logical path through a typical receiver circuit, using mathematics to describe how sections function in relation with each other to produce an audio output. Similar techniques are used to generate a transmitter signal, amplify it and send it to the antenna.

This time, the receiver portion of the block diagram in Figure 1 has been shaded while the new transmitter section is unshaded. Some portions of the receiver section will be used for both transmit and receive – the VFO (variable frequency oscillator), audio amplifier and speaker – and they are marked with diagonal lines across them.

Using the control on the VFO (C), we have "tuned in" a signal to convert to audio for listening. In the receiving process, the VFO, and MIXER (B), used "up conversion" to mix the incoming signal with the VFO to produce a 10 MHz signal for the converting process.

Switching to Avoid Headaches

The receiver must be *muted* to avoid *over amplification*, and possible damage to the audio amplifier section.

The receive function continues until the Morse Code key contacts are closed and portions of the transmitter section are enabled. An RF (radio frequency) signal is generated for transmission, and DC (direct current) voltage circuits are added to portions of the receiver to disable the audio amplification process, (MUTE CIRCUIT)(P). At the same time, another DC voltage path is allowed to enable transmitter sections. This DC voltage being allowed to act upon the transmitter and receiver circuits is often called KEYED DC.

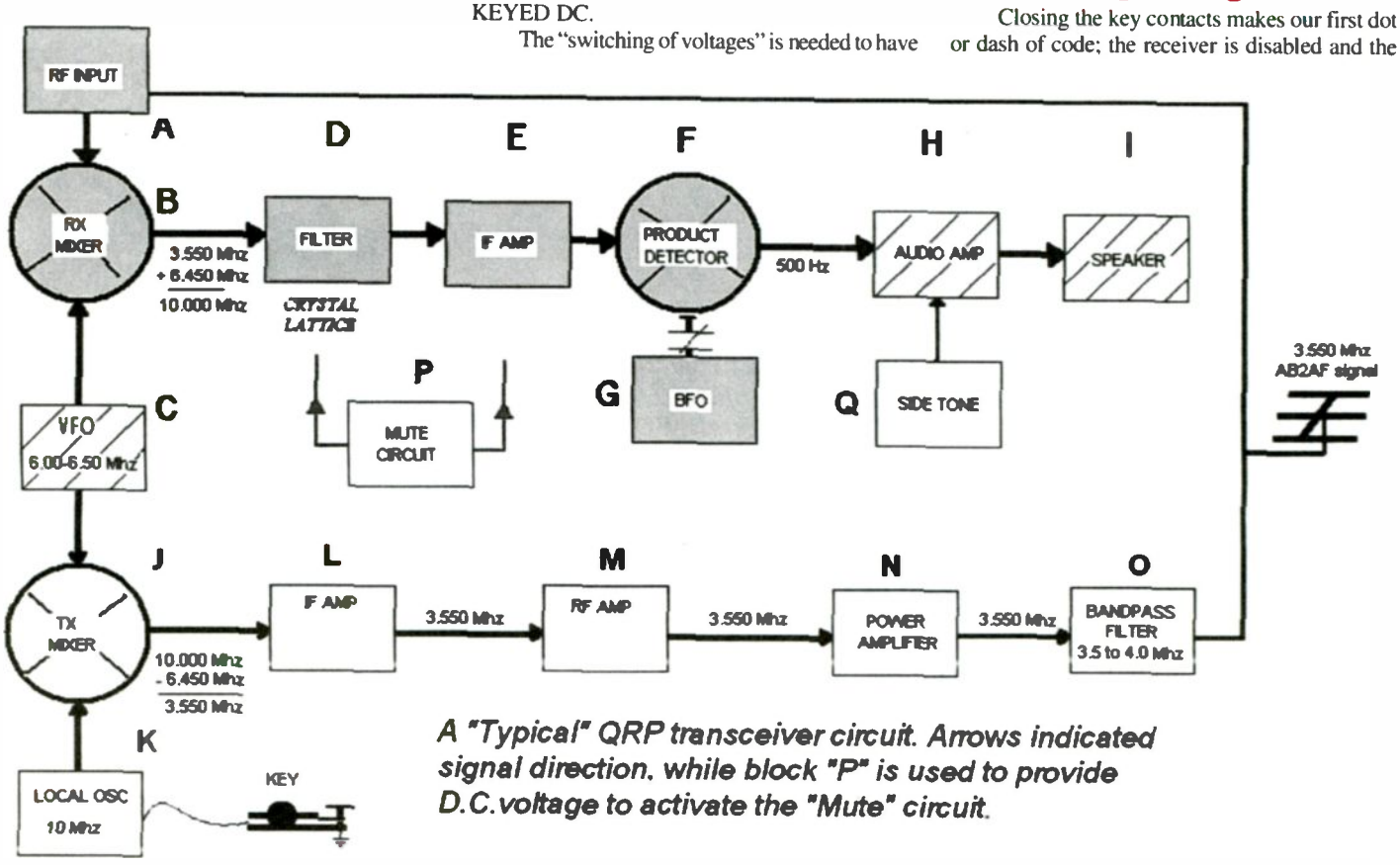
The "switching of voltages" is needed to have the transceiver function properly. Unless the receive portion becomes muted, the sections designed to process very low signal levels would attempt to amplify this already large signal and be erratic. Not to mention how our ears would handle the loud noise!

We have disabled only that portion of the receive section that is used to process the incoming signal. Another section has been enabled, SIDE TONE (Q), which will enable us to hear what we are sending. With the *front end* (blocks A,B, D, E, F & G) of the receiver section disabled, the side tone circuitry and audio output circuits function similarly to a *code practice oscillator*.

Sound confusing? Just follow along with the block diagram as you read, remembering that new circuits have been energized while others have been blocked, and the functions to be described should become apparent to you.

Processing the Signal

Closing the key contacts makes our first dot or dash of code; the receiver is disabled and the



A "Typical" QRP transceiver circuit. Arrows indicated signal direction, while block "P" is used to provide D.C. voltage to activate the "Mute" circuit.

signal from the VFO is now routed to the transmit mixer (J) for processing. We know from before that a mixer circuit processes two signals and produces a predetermined output. This second signal comes from the LOCAL OSCILLATOR (K), which has been activated by the closing of the key and activation of DC circuits.

So, what's the *difference ?*

The signal output from the LO is 10 MHz, but now we'll use the *difference* of the VFO and the LO to produce a signal on the 80 meter frequency. Previously, we changed the received signal by *adding* it to the VFO frequency to produce an *Intermediate Frequency (IF)* of 10 MHz.

Now the process is slightly altered to allow the VFO frequency to *subtract* from the LOCAL OSCILLATOR FREQUENCY to produce a signal on 80 Meters. This called the *difference* method of frequency generation, because the transmit mixer circuit is tuned to provide the difference between the VFO signal and the LOCAL OSCILLATOR signal, which will provide an output between 3.5 MHz and 4.0 MHz.

This weak RF signal is passed through tuned circuits to the IF AMPLIFIER (L) where it is amplified. How much amplification is required of the newly generated signal is a matter of design. QRP gear needs fewer stages of amplification than does a high powered QRO rig.

Sections M and N are RF AMPLIFIERS, and are there to "boost" the RF signal up to an acceptable level. Here we're talking basics, and because QRP is my desire, we will use only two stages of RF amplification to build the signal up to the 5 watt level for QRP operation.

Section O, the BAND PASS FILTER, has a special purpose. Its job is to pass only frequencies between 3.5 MHz and 4.0 MHz and eliminate all others. Inductors and capacitors are arranged to electrically form a filter designed to pass only frequencies in the 80 Meter band for this QRP rig. Using this filter at the end of the transmitter section, before the signal is allowed to go to the antenna, filters out harmonics, etc.

I hope this Block Diagram discussion of transmitter circuits helps you to understand the basic operating functions needed to generate a signal – understanding "why" circuits in your rig function is the beginning phase of understanding "how" they function. Knowing the basics of what the circuit is designed to accomplish breaks down each particular stage into a task having a beginning and an end.

This has been a very basic trip through a QRP transceiver's transmit section. There have been many schematics published for building equipment. Your having an understanding of what sections are required to accomplish a particular task will make your construction adventures more enjoyable.

Good luck ! And keep building !

Previously published in "73 Amateur Radio Today Magazine," May, 2003.

This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

Jock Elliott KB2GOM
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Olympus C-750 Ultra Zoom Has Long Reach

At the outset, I should probably 'fess-up that I am an unabashed fan of Olympus cameras. That's simply because I have used them both personally and professionally for a number of years, and they have always served me well.

A number of years ago, I purchased an Olympus IS-3, which is a 35mm single-lens reflex with a fixed 35-180 zoom lens. It worked well, and I still have it. Then, a couple of years ago, I bought an Olympus D-550 Zoom camera. It's a 3.0 megapixel camera with a very modest zoom lens (about 3x) and a very simple operating setup. In the trade, these are called point-and-shoot cameras because they do almost everything – like focus and exposure control – automatically. With that modest camera, I have taken literally dozens of photos that have been published in magazines. As a workhorse tool for a freelance writer, the D-550 has been simply outstanding.

So when Olympus announced the C-750 Ultra Zoom as "the world's smallest 4 megapixel 10X optical zoom digital camera," I decided it was worth a look.

Best of Both Worlds

The C-750 Ultra Zoom is the first Olympus Ultra Zoom to have a metal body, which is a good thing for maximum durability. Because it uses the miniature xD-Picture Card, the C-750 measures a mere 4.2" long x 2.6" high x 2.8" wide, and weighs just 10.4 ounces. The 4.0 megapixel CCD allows users to produce high quality prints as large as 11" x 14". The camera also can capture QuickTime™ video with sound so users can create short movies.

The more imager resolution you have (ie, more megapixels), the bigger the prints you can produce. Having said that, as a rule, most people can get all the resolution they need in the 1-2 megapixel range, and most of the time I don't use the highest resolution available on my 3.0 megapixel camera. Still, it's good to have more resolution available when you need it (such as shooting a possible cover photo for *Monitoring Times*).

The C-750 is a camera that basically offers the best of both worlds in terms of operator interface. In fully Programmed Auto mode, the camera offers basic point-and-shoot simplicity for picture taking in typical situations. The easy-to-use Scene Program on the mode dial on top of the camera provides fully automatic exposure adjustments in a wide variety of settings: Portrait, Self Portrait, Landscape-Portrait, Sports, Night Scene and Landscape photography. The special "My Mode" feature saves time by allowing the user to assign frequently used settings to the mode dial for quick access.

The C-750 Ultra Zoom's advanced settings include controls for aperture priority, shutter priority, and full manual operation and are ideal for experienced photographers who want to take control. Other controls include Digital ESP multi-pattern and spot metering; auto white balance; multiple flash settings and exposure compensation. The camera comes with a built-in flash that offers five settings, including slow synch, to provide a wide range of options.

Transferring images to the computer is easy with the supplied Auto-Connect USB feature that does not require software drivers for image downloads. Images may also be viewed on a television with a video cable that comes with the camera. A battery charger and four AA rechargeable Ni-Cad batteries are also supplied with the camera. I particularly like the use of AA batteries – as opposed to a proprietary battery – because you can always carry some spare AAs in a coat pocket or buy them almost anywhere.

When shooting with the C-750 Ultra Zoom, you can see exactly what the camera will capture through the Electronic Viewfinder (EVF) or the 1.5" color liquid crystal display on the back of the camera.

Taking the Long View

But what really sets the Olympus C-750 apart is its 10X zoom lens, which is the equivalent of 38mm-380mm in 35mm photography. That's a honking long lens in anybody's book, and it has the reach to prove it. Take a look at photo A. It shows the top of my neighbor's radio tower barely visible above the trees. Photo B, taken from the exact same spot, shows the same view at maximum zoom. This kind of capability could be extremely useful, not just for general picture taking, but also for disaster responders who would find it useful to capture close-in images without getting in harm's way. Photos could be downloaded to a wireless-capable laptop and emailed to whoever needs to see them.

The C-750 gets my Seal of Approval. It delivers a whole lot of capability – including that amazing zoom lens – in a small, attractive, durable package. Street price of the C-750 is likely to be around $500. For more information, visit a local Olympus dealer or check out **http://www.olympusamerica.com**.

G3 WiNRADiO g303i

Introducing a breakthrough

Just when you thought that there is nothing new in radios, along comes the new WiNRADiO G303i software-defined shortwave receiver!

This new, low-cost receiver inaugurates the third generation of wide-band, PC-based receiving equipment from WiNRADiO. It is the first commercially-available receiver where the final IF stage, as well as the all-mode demodulator, are entirely executed in software, controlled by your personal computer.

While the Standard Demodulator of the G303i provides the level of performance of a quality shortwave receiver--including synchronous AM demodulation and a real-time spectrum scope--the optional Professional Demodulator of the G303i-P offers continuous IF filter bandwidth adjustment, interactive block diagrams, two additional audio spectrum scopes, and even inbuilt THD and SINAD measurement facilities. Additional software upgrades, including a Digital Radio Mondiale (DRM) demodulator, will be available soon!

What's included?

The standard WR-G303i package includes:
WR-G303i receiver card
Application software
Comprehensive user's manual
Start-up antenna
Audio lead
BNC-to-SMA adapter

Technical Specifications

Frequency range	9 kHz to 30 MHz
Tuning resolution	1 Hz
Modes	AM, AMN, AMS, LSB, USB, CW, FM3, FM6, FMN *(The optional Professional Demodulator also includes DSB and ISB modes.)*
Antenna	50 ohm (SMA connector)
Dynamic range	95 dB
IP3	+8 dBm

Selectivity

AM	6 kHz
AMN, AMS	4 kHz
LSB, USB	2.3 kHz
CW	0.5 kHz
FM3	3 kHz
FM6	6 kHz
FMN	12 kHz

Sensitivity

AM	1 uV
LSB, USB	0.3 uV
CW	0.18 uV
FM	0.4 uV

Notes

1. Selectivity values are at -6dB. These values apply only to the *Standard Demodulator*. The optional *Professional Demodulator* has IF bandwidth continuously adjustable from 1 Hz to 15 kHz.

2. Sensitivity is shown for 1.8 to 30 MHz, 10dB S/N.

3. Specifications are subject to change without notice.

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What's NEW

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WiNRADiO WR-G313i

The WiNRADiO WR-G313i receiver is a software-defined high-performance HF receiver (9 kHz to 30 MHz, optionally extendable to 180 MHz) on a PCI card. The card plugs into an available slot of an IBM-compatible PC. No cables or power supplies are needed – no clutter on your desk. The flexibility, sensitivity, and options available for the G303i make this receiver as suitable for government, military, surveillance, and broadcast monitoring, as for high-end consumer applications.

The hardware and software package consists of the receiver card, Windows-based software, a start-up antenna and a user's manual. Several receivers (as many as there are free PCI slots available) can be controlled by a single PC – an ideal solution for high-performance multi-channel automatic monitoring systems.

There is a single SMA antenna connector and an output line audio jack which can be used to connect the receiver output directly to a sound card line-input or an amplified speaker. However, the receiver has its own on-board DSP, and does not rely on the PC sound card for its performance. As the DSP performs the final stage IF filtering and all demodulation, this receiver is entirely software-defined, which means that additional demodulation or decoding modes can be easily added by a mere software change.

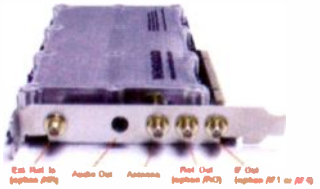
AM, AMS, LSB, USB, DSB, ISB, CW, FM modes are supplied as standard. It provides variable IF bandwidth 1 Hz to 15 kHz (with 1 Hz step size), a 20 kHz wide real-time spectrum scope with 16 Hz resolution, noise blanker and notch filter. The built-in recorder can record demodulated audio as well as the IF signal, which means that it is possible to "re-receive" the same signal again and again with different IF filter bandwidths, notch filter, noise blanking or demodulator settings, to arrive at the best possible reception of a weak or interference-prone signal.

There is also an additional wide-band "sweeping" Spectrum Scope which makes it possible to observe variations in received spectra over time, search for peaks, save and print spectra, etc.

The receiver is extremely sensitive, yet features a very respectable dynamic range making the receiver resistant to strong signal overload. The fully calibrated S-meter shows the received signal levels in dBm, µV or S-units, down to -140 dBm.

Extensive support is provided for software developers wishing to write their own applications code for this WiNRADiO receiver. A DSP application development kit is also available to assist the development of customer-specific DSP applications.

For technical specifications and a list of available options which expand the tuning range, provide optional output, etc., visit **http://www.grove-ent.com/G313IOPTIONS.htm** or **http://www.winradio.com/home/g313i-options.htm**. In the US, the WiNRADiO is expected to be available in mid-April from Grove Enterprises for $949.95 (Call 1-800-438-8155 or visit website for shipping charge or more information on options and availability.)



Tivoli Sirius Receiver

It's appropriate that a radio based on audio pioneer Henry Kloss's design for elegant, compact radios should continue to evolve and innovate. At the recent CES 2004 conference, Tivoli Audio and Sirius Satellite Radio announced a Model Sirius prototype, which will be the first table-top satellite radio.

The Model Sirius is the digital counterpart of the Model Three by Tom DeVesto, using the Kloss designs for tuner, amplifier and speakers. Unlike earlier Kloss radios, the Sirius has a large display that shows the satellite station to which the radio is tuned, its format and the performer and work being heard. The radio has presets for favorite stations as well as provisions for searching by artist, song or format.

The Model Sirius features the same great sound and functional, elegant design that Tivoli products are known for. It features an easy to use digital interface, AM/FM analog tuner, Sirius Satellite Radio and an alarm clock. The Model Sirius is expected to be available late summer or early fall and will retail for around $300.

QRP from Icom

Sometimes less is more. Building on the popularity of the Icom IC-706MKIIG, Icom is designing a QRP (low power) unit for reliable performance in spartan conditions. The new IC-703 model is being designed as a portable HF transceiver that utilizes the design excellence and body of the IC-706 series, and will be similar to an IC-706MKIIG without the VHF and UHF bands. However, it is a model in a new genre that has an automatic antenna tuner built-in, low consumption circuit design and large external battery for field use as a portable HF QRP unit.

The IC-703 will appeal to ham users who require a convenient, portable HF unit, and will be an ideal long distance communications device for sparsely populated territories where set-up of normal communication infrastructure is expensive and impractical. Its versatility makes it ideal for the home or shack, mobile DXing in your car, and as a field unit in the outdoors

Frequency coverage for US models includes transmission on all amateur bands from 1.80 to 29.70 MHz, and continuous receive from 0.50 to 29.99 MHz. Features include:

- Type antenna tuner unit built-in, 1.9-30MHz coverage (For 50ohm load antenna. Does not match to a wire antenna)
- New low current consumption circuit design to obtain longer battery life
- Large capacity external battery pack and antenna suitable for field operation, will be options
- Quick power set function to make QRP operation efficient
- DSP built-in for auto-notch and noise reduction functions (DSP functions are equivalent toUT-106)
- Modes USB/LSB/CW/RTTY/AM/FM
- Max 10W output. Adjustable in 10/5/1/0.5/0.1W steps (5W when using 9.6V batteries)
- Memory keyer function built-in

Grove Super Stealth Mobile Antenna

The Grove Stealth antenna has been popular for low-visibility mobile scanning. Now their improved Super Stealth is ideal for transmitting in the 144-174, 406-512 and 806-

What's NEW

Tell them you saw it in Monitoring Times

960 MHz spectrum, and is an excellent, general-purpose receiving antenna from 100-1300 MHz (below 100 MHz with reduced performance). Applications include multiband amateur radio, public safety, scanning, cellular, two-way VHF/UHF, and Nextel.

Measuring only 13-1/2" tall, and sturdily mounted on a rare-earth magnetic base, it is equipped with 9 feet of RG-174/U coax terminated in a standard BNC connector. Thin-element construction and less than 2 ounces weight mean low wind load at high road speeds.

Check out the Grove Stealth antenna for economical, high performance, wide-frequency-coverage mobile communications. $19.95 from Grove Enterprises (800-438-8155 or **http://www.grove-ent.com**).

C. Crane AM Antenna

Simple but effective is this new innovative AM antenna from C Crane. The C. Crane AM Antenna with Twin Coil Ferrite claims it will double daytime reception and dramatically reduce nighttime fade out. Its design allows great versatility in placement and, like the Select-A-Tenna, it works on any radio.

The AM Antenna comes with an antenna element, tuning control, and five feet of cable to go between the antenna element and the tuning control. Also included is a ferrite patch cord for radios without antenna connectors, and a plain wire patch cord for radios with antenna connectors. The cable allows you to place the antenna element in a window for better reception in stucco, metal or brick buildings, or buildings with internal electrical noise and interference.

If five feet is not adequate to reach a window, or if it is necessary to place the antenna outside for best reception, optional 25 ft or 50 ft cables are available.

The tuner can be powered by the AC adapter (included) or one optional 9 volt battery. The antenna element has an earth ground lug, which may also help to reduce radio noise in some circumstances.

C. Crane AM Antenna Tuning Control and Ferrite Patch Cord shown with CCRadioplus.

The C Crane AM Antenna with Twin Coil Ferrite is $99.95 from C Crane. 800-522-8863; **http://www.ccrane.com**.

New Radio Column

"The Other Side Of The Control Room Glass" is an interesting new column featured on the **http://www.HalEisner.com** website. Amateur Radio Newsline's President and Producer, Bill Pasternak, WA6ITF, tells the stories of famous and not-so-famous people in the broadcast profession who share a common interest in the Amateur Radio service and the way in which being a ham has affected their careers.

The column began Sunday, February 22nd with the first of a 4-part tribute to the late Roy Neal, K6DUE, that included a retrospective on his efforts to put a manned Amateur Radio station into space, and documented the birth of the SAREX (Shuttle Amateur Radio Experiment) and ARISS (Amateur Radio on the International Space Station) programs which Neal created. All segments were available on line at press time.

Update for BCT8

The latest firmware update for the BCT8 has been released on the Uniden America Corporation Product Support web site http://www.uniden.com/productsupport_downloads.cfm/. This firmware update corrects a problem with early versions of the scanner that could cause it to mute all channels. To apply the update, the customer downloads the provided file, connects their scanner to their PC using a standard RS232 cable, and follows the on-screen instructions provided with the download.

Mediumwave in Chile

A new DX program by Saul Vergara and Hernan Carrasco is airing on mediumwave in Chile, but is also broadcast in Spanish on the Internet in Real Audio. Radio Primera runs the DX program for about 2 hours from 2100-2300 UTC on 107.3 MHz, the third Monday of the month.

Check out the website at **http://www.radioprimera.cl**. Enquiries about availability of tapes of local mediumwave stations and other offerings can be made to: Saul Vergara Valenzuela, Calle Santa Adela 0516, El Salto Recoleta, Santiago, Chile, South America.

Medium Wave Worldwide

Are you interested in Medium Wave radio, listening, or broadcasting, technology? Are you keen to improve your radio equipment and skills? Then the Medium Wave Circle is THE CLUB for you.

The Medium Wave Circle brings together radio enthusiasts located all around the world and it acts as a hub for members to share their experience, knowledge, news, views and ideas. For nearly 50 years the Medium Wave Circle has provided an invaluable link between novice and experienced enthusiasts and between people separated by national boundaries and thousands of miles.

The club is now offering an Associate Membership. Associate Members receive an electronic version of *Medium Wave News*. Also, Associate Members can use MWC's exclusive spam-free electronic news service free of charge and take advantage of other Circle services and activities. The cost for all this is just US$10 or 10 Euros per year.

If you are interested, but not fully convinced, download the latest issue of *Medium Wave News* for free! Just go to: **http://users.pandora.be/hermanb/circle/e-mwn/e-mwn02-2004.htm** and follow the instructions. You'll need the password "snowdonia".

For more information, please visit the web site **http://www.mwcircle.org** where you will find full details - Clive Rooms, *contact@mwcircle.org*

Books and equipment for announcement or review should be sent to " What's New?" c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com

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A Transmitter for Every Purpose

Satellites have rarely provided just one downlink transmission signal since the early Sputniks. NOAA weather satellites (WXSATs) carry so much equipment that engineers and end-users have many parameters to monitor, and they use a different downlink frequency for each purpose.

The various downlinks include:

VHF-band TIP: 137.35, 137.77 MHz
TIP (Tiros Information Processor) – this VHF transmission can be received on a general purpose scanner, preferably with the receive antenna outside the building. The signal includes "housekeeping" telemetry (for instance, temperatures and voltages) and payload data from all onboard meteorological instruments except the AVHRR scanner (the radiometer – see later) and AMSU (see later).

S-band HRPT: 1698.0 or 1707 MHz
High Resolution Picture Telemetry – the full resolution image data produced by the AVHRR radiometer. Being (normally) of the highest quality, the signal requires a suitable tracking S-band dish and receiver for good quality reception.

VHF-band APT: 137.50 or 137.62 MHz
Automatic Picture Transmission – a reduced resolution, geometrically-corrected analog signal produced from two of the five (or six) AVHRR channels. The actual APT channels are selected by command. Note that APT is really a reduced resolution version of HRPT, designed to allow the simplified image format (APT) to be received at a much lower frequency.

GAC Playback: 1702.5 MHz and either 1698 or 1707 MHz
GAC (Global Area Coverage) is a type of transmission during which reduced resolution HRPT image data from the AVHRR radiometer is downloaded on command from a *Command and Data Acquisition* station. Data is continuously stored on digital tape-recorders onboard the satellite in normal operation. The process permits timely global coverage of weather systems at higher resolution that that available from geostationary WXSATs. Users with Internet access can obtain this data from NOAA's CLASS web site – see figure 1.

LAC Playback: 1702.5 MHz and either 1698 or 1707 MHz
LAC (Local Area Coverage) is full resolution AVHRR data that is also recorded onboard NOAA WXSATs, together with GAC data, but – because of its large memory storage requirement – only covers selected regions of particular interest. A list of regions chosen for future LAC recording is published on the Internet.

Other downlinks are also provided; I shall look at these in a future column. A brief look at the main onboard equipment follows:

AVHRR (Advanced Very High Resolution Radiometer)
This equipment is carried onboard all the Polar-orbiting Operational Environmental Satellites (POES), including TIROS-N, NOAA-6, 8 and 10. The AVHRR radiometer sensor measures in four spectral bands. Later satellites in the series - NOAA-7, 9, 11, 12 and 14, carried an enhanced radiometer that measures in five bands. The AVHRR/3 sensor on NOAA-15, 16 and 17 measures in six bands though only five are transmitted to the ground at any time.

AMSUA (Advanced Microwave Sounding Unit-A)
Although it is the real-time (live) imaging from the AVHRR radiometer that we receive with our equipment, there is a considerable amount of other data – such as atmospheric soundings – included with the signal. Additional decoding equipment is normally required to process these data. The Advanced Microwave Sounding Unit AMSU-A determines atmospheric temperatures, the Advanced Microwave Sounding Unit-B (AMSU-B) measures atmospheric humidity, and the High Resolution Infrared Radiation Sounder/3 (HIRS/3) makes atmospheric sounding in cloud-free regions.

❖ GOES Users' Conference – May 10-13

With so many changes planned for the three constellations of weather imaging satellites, the National Oceanic and Atmospheric Administration (NOAA) is holding another conference this year – between 10 and 13 May – this time to discuss the geostationary (GOES) satellites. The conference for GOES data users will be held in Broomfield, Colorado, near Boulder, and will provide users with the status of the future GOES satellite constellation, instruments, and operations.

Fig 1: GAC playback of NOAA-16 1334UTC March 3, courtesy OSEI
Image shows airborne Sahara dust sweeping off the African coast towards the Canary Islands. Note that I also received this image in realtime from NOAA-16, but the OSEI team have produced a nicer result!

NOAA is seeking ways to help users prepare for future GOES satellites by providing an opportunity for feedback. They are also keen to identify possible new applications for data from GOES-R. The conference will enable two-way discussion between NOAA's National Environmental Satellite, Data and Information Service (NESDIS), and the user community.

The new GOES-R is scheduled for launch in 2012, and will scan the Earth nearly five times faster than current GOES WXSATs. It will carry an advanced imager, a hyperspectral sounder, coastal water sensor, lightning mapper, solar imager and space environment monitor. The new satellites will provide the user community with about 100 times the amount of data currently provided.

The conference is sponsored by NOAA, in cooperation with NASA and many national bodies, the Technology Society, and the World Meteorological Organization.

Visit: **http://www.osd.noaa.gov/announcement/index.htm** for further details.

❖ Snow in Carolina

A "surprisingly good image" from NOAA-14 came one Saturday morning during a near overhead at Patrick Prokop's location in Savannah. Figure 2 is part of the pass showing the snow on the ground in North and South Carolina. In some places, up to a foot fell during the week. Patrick notes that the picture shows many of the rivers and lakes that are near or above flood stage from the abundant recent rains. The mountains are also seen. Patrick uses a Timestep receiving station with a 1.50m dish to receive the 1700 MHz band image, and Dave Taylor's *HRPT Reader* to decode, and Photoshop 5.5 to colorize the image using channels 1,2 and 4.

The satellite's synchronization failed south of Patrick's location, so most of his imaging area was in the 'good' section for a change!

Fig 2 - NOAA-14 snow cover image February 28 from Patrick Prokop

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Closing Comments

Amateur Radio License Restructuring – A Tradition

By Larry Van Horn, N5FPW

In the March 2004 *Communications* column we reported that the ARRL has proposed to the FCC for another round of restructuring of the amateur radio service license structure. Since the January 19 announcement on the ARRL website, a firestorm has erupted on the internet and on the air over the new license proposals (see the eHam.net website at http://www.eham.net/articles/7475 for the best and worst of this debate).

After spending several hours reviewing hundreds of comments on the League proposal on various internet boards, I discovered a distinctly familiar ring to what I was reading. This is not the first time that the amateur radio service has been restructured, and in each instance the arguments made by both sides have pretty much fallen along the same lines as those we see today.

With the help of Bill Continelli, W2XOY, and his *Outline of Amateur Radio History* presented at http://www.qsl.net/vu2kyp/history.html, we can look back at some of the changes that have initiated fiery debate within the ham community over license restructuring through the years.

1933-1934	The Communications Act of 1934 creates the Federal Communications Commission, and amateur licenses are reorganized into Class A, Class B and Class C.
1951	The FCC completely reorganizes the amateur license system. The Class A, B and C licenses are replaced by the Advanced, General and Conditional Class respectively. Three new license classes are created – Novice, Technician and Amateur Extra.
1952	The Advanced Class is withdrawn from new applicants, although holders could continue to renew, and the "exclusive" 20/75-meter phone bands were opened to Generals and Conditionals. Everyone, Conditional and above, had the same privileges.
1963	The ARRL, responding to some complaints about Generals being allowed on 20/75 and 20-meter phone, proposed an "incentive licensing" system. Under the ARRL proposal, Generals and Conditionals would lose 15, 20, 40 and 75-meter phone privileges over a two year period.
1965	The FCC came out with their own incentive licensing proposal. General/Conditional Class operators would lose 50 percent of the 15 to 75-meter phone bands. A new "Amateur First Class License," with a 16 wpm code speed, would be the stepping stone between the General and the Extra. Advanced Class amateurs would not be "grandfathered" into the First Class, rather, they would be bumped down to General upon renewal.
1967	The FCC announced their new Incentive Licensing rules. Over a two year period, General and Conditional operators would lose 50 percent of their 15 to 75-meter phone bands, the "First Class" idea was dropped, the Advanced Class was reopened to new applicants, Extra and Advanced Class operators got exclusive subbands on 15 to 80 and 6-meters; the Novice license term is doubled to two years, but Novices lost their 2-meter phone privileges.
1969	The FCC removes the ability for a Technician to hold a Novice license at the same time. The ARRL announces they now consider Technicians to be communicators and petition the FCC to give them full VHF privileges, a 10-meter segment from 29.5-29.7 MHz, and Novice CW subbands.
1974	The FCC proposed a "Dual Ladder" license structure which would take privileges away from Generals and Technicians (again) and would create a new code free "Communicator" license. Both proposals were eventually scrapped.
1975-1976	The "mail order" Technician license is eliminated. Applicants must appear at a FCC examination site. The Conditional class is abolished.
1983	Another "Code Free" license idea pops up. Amateurs are overwhelmingly opposed and the proposal is dropped.
1987	Novices and Technicians get 10-meter SSB privileges from 28.3-28.5 MHz. Novices also get phone operation on portions of 220 and 1296 MHz. The Element 3 written exam is broken into two segments – 3A (Technician) and 3B (General). Technicians who passed their exam prior to March 1987 get permanent credit towards the General written exam.
1989	Amid growing calls for a code free license, the ARRL comes out in favor of one. (The ARRL's version does not include voice privileges on 2-meters).
1991	Amateur Radio gets its first code free license – the "No Code Technician." Technicians who had passed a code test are renamed "Technician Plus."
2000	Reduction of the number of license classes from six to three and eliminating the 20 and 13 wpm code tests.

And that leads us to the current crop of restructuring proposals before the FCC which you can view at http://www.arrl.org/news/stories/2004/03/24/2/?nc=1. The debate has centered around the following points:

1. The ARRL did not consult with the membership prior to making this proposal.

After talking to several League officials, examining League email newsletters and *QST*, I would argue that this is not a valid point. I have observed that the major points of the League proposal have been discussed in a variety of venues since the last ITU World Radio Conference including ongoing discussion of Novice bands refarming.

2. This is just another dumbing down of ham radio that will lead to anarchy in the HF bands and overcrowding.

As far back as you can look in *QST* this has always been the case. Hiram Percy Maxim (W1AW) himself wrote editorials about lousy operating (rotten QRM). Letters about dumbing down and easy testing have appeared almost since there has been a correspondence section in the magazine. In fact, on a QSL in the collection of former ARRL Vice President N5NW is this comment, penned in 1956: "Operating right now is at its lowest point ever."

3. This is not we want. We believe in the Know Code principle.

The "appliance operator" moniker actually began in the early '30s, but the uproar over give-away licenses began in earnest in the early '50s with the creation of the Novice and Technician class which required only a 5 wpm code test. To use a quote from K3UD on eHam: "Nothing we are seeing posted here, or hearing on the bands is new. It has all been said before almost since the beginning of ham radio."

So hundreds of hours of effort have been invested in reading, writing and speaking out on this issue. Unfortunately, most of the rhetoric has turned into demonizing individuals for expressing their opinions either pro or con.

Now just suppose all of those hours had gone instead into recruiting new hams toward any kind of license, or teaching new hams how to be valuable members of our great community by learning the correct way to communicate on the ham bands, or promoting ham radio in such a way that would contribute to a positive image of our avocation.

But I guess the real question we in the ham community have to ask ourselves is this – will these new proposals provide an incentive to anyone to get on the air who is not already interested in the hobby? Only time – and our attitude – will tell.

This page is open to thoughtful opinions on radio-related topics. Views expressed on this page do not necessarily reflect the opinion of Monitoring Times or Grove Enterprises.

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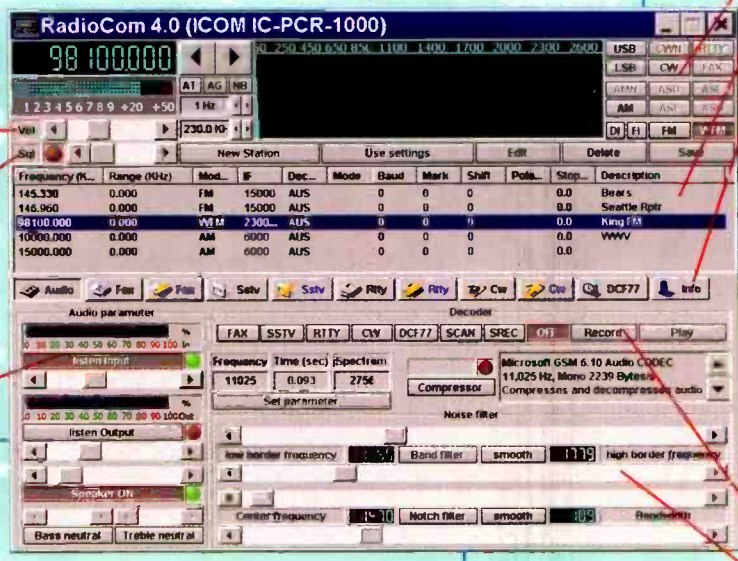

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