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

Monitoring Times

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Grab Great DX on a Radio Expedition

Also in this issue:

- MT reviews Icom's IC-T90A and C Crane's CCRadio plus
- TV Rovers and Their Radios
- Monitoring the German Military
- Seattle Scanning

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AR8600 Mark II

Competitors Could Not Surpass the AR8600 – So We Did!

AOR is proud to introduce the AR8600 Mark II. It's hard to believe there could be a better wide-range receiver than the original AR8600 but here's what we've done:

We added more coverage, now receiving from 100 KHz ~ 3 GHz*. ***We improved the front end, and added improved receive audio response.*** We also added display illumination control and we're working on an optional NTSC video module.

From the improved ultra-stable TCXO to the availability of Collins® Mechanical Filters and optional card slots, the AR 8600 Mark II sets new performance standards for wide-range receivers. Our relentless pursuit of excellence is what makes AOR *the Serious Choice in Advanced Technology Receivers.™*

- Improved ultra-stable Temperature Compensated Crystal Oscillator (TCXO)
- Expanded tuning range: 100 KHz ~ 3 GHz *
- Receive Modes: WFM, NFM, SFM,WAM, NAM, USB, LSB, CW. Optional NTSC Video card available soon.
- New front end RF stages for superior sensitivity and selectivity.
- 2 VFOs (A/B)
- 1000 memory channels (20 banks X 50 memories/bank)
- 40 search banks
- Up to 37 channels/second search rate
- Five expansion slots, use up to 3 optional slot cards at one time. Available cards include: Tone Eliminator, CTCSS, Recording, External Memory.
- Accommodation for Collins® Mechanical Filters
- RS-232C port
- Download free control software from www.aorusa.com
- 10.7 MHz IF output (can be used with SDU 5500 Spectrum Display Unit or for secondary signal processing.)
- 12 VDC operation
- BNC antenna connection

Cellular blocked. Unblocked version available to authorized users, documentation required. Specifications subject to change without notice or obligation.

It's a new world we now monitor.

It's no wonder that many professionals, including government, newsrooms, laboratories, military users and more rely upon AOR, the ***Authority On Radio™.***

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Authority On Radio

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20655 S. Western Ave., Suite 112, Torrance, CA 90501, USA
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info@aorusa.com • www.aorusa.com

Finally, it's here!

The new WiNRADiO G303i receiver is shipping.

The exciting WiNRADiO G303i Software-Defined Shortwave Receiver is now available.

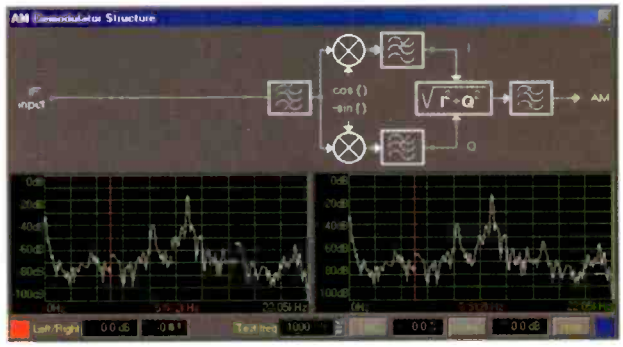
Why is it *Software-Defined*? Because the entire last intermediate frequency stage and all-mode demodulator are implemented entirely in signal-processing software running on a personal computer. This brings about significant advantages: performance, flexibility, configurability, reliability and convenience. There is also reduced risk of obsolescence, as new demodulators for new types of modulation are as easy to add as inserting a CD ROM into a PC drive.

The receiver comes on a PCI card and installs in minutes. Just plug the card in, connect its output to your PC sound card, install the supplied software, and let the world's most innovative shortwave receiver surprise you with its performance and amazing new features.

In addition to the flexible and friendly user interface with numerous functions and facilities not normally available on a conventional receiver, the WiNRADiO G303i Software-Defined Shortwave Receiver excels particularly with the ability of its demodulators: While the Standard Demodulator provides the performance of a highly respectable shortwave receiver, including synchronous AM demodulation and a real-time spectrum scope, the optional Professional Demodulator offers even more: continuous selectivity setting (in 1 Hz increments), interactive block diagrams with additional real-time audio spectrum scopes, built-in performance test facilities, user adjustable filters, and many other features. Additional demodulator types are planned as further options, including a DRM (digital radio) demodulator.

Just when you thought that there is nothing in shortwave that can surprise you anymore, here comes the new WiNRADiO G303i. It ***will*** impress you. We guarantee it.

The G303i control panel includes many exciting features such as numerous tuning and scanning options, spectrum scope and others. *(Professional Demodulator shown.)*



The Professional Demodulator contains an interactive block diagram for each modulation mode, two real-time spectrum displays and test facilities. A great tool to get familiar with *software radio* concepts.

Specifications

- Frequency range: 9 kHz to 30 MHz
- Tuning resolution: 1Hz
- Modes: AM, AMN, AMS, LSB, USB, ISB*, DSB*, CW, FM3, FM6, FMN
- Antenna: 50ohm (SMA)
- Dynamic range: 95dB
- IP3: +8dBm

*Professional Demodulator Option only

System Requirements

- IBM PC compatible (CPU 500MHz or higher, PCI slot)
- Sound Blaster 16 (or compatible sound card)
- Windows 98/ME/NT/2000/XP

WiNRADiO®

For more details, please visit our website or email us:

www.winradio.com

info@winradio.com

SPECIAL INTRODUCTORY OFFER

Place your order now to take advantage of a special introductory offer: If purchased together with the receiver, the Professional Demodulator is included at half the price!

Monitoring Times

Vol. 22, No. 2 February 2003

Lead Story

The Why and How of DXpeditions

By Jacques d'Avignon

"A good and well-organized DXpedition in a quiet RF environment is what the doctor ordered to keep you happy in the hobby," says Jacques d'Avignon. He should know: he's helped organize some of the most successful radio expeditions of the past few years. But anyone can do it, especially with Jacques' advice on how to avoid the most common pitfalls. Story on page 10.

The Miscou 2002 DXpedition not only produced unexpectedly great DX, but a spectacular aurora borealis display as well, as evidenced in our cover photo by Ken Alexander.

CONTENTS

A listening post from the DXpedition (photo by Jacques d'Avignon)

MONITORING TIMES
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Reviews:

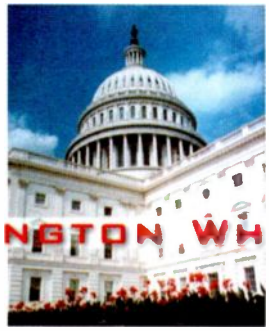
Jock Elliott's found a radio that replaces a whole kit of emergency communications equipment – the **Icom IC-T90A**. It's a scanning receiver, a ham transceiver, and a weather alert radio, and it even includes mediumwave and TV audio channels – all for a very reasonable price (p.86).

Ken Reitz says that in this day and age you gotta admire a company that is willing to invest in a radio dedicated to the AM band. C Crane seems to be on the right track with its ***CCRadio plus,*** which has earned considerable respect in the marketplace (p.82).

Targeting the same talk radio audience as CCRadio, RPR Products has put together a mobile package dubbed "VCR for Radio," to receive, record, process or play back AM/FM programming. The **RPR-X340** is an innovative use of several components, especially the Sony ICD-BP150 Recorder (p. 80).

Bob Parrass continues to improve computer control of sophisticated receivers by writing control programs compatible with non-Microsoft sytems. This month he outlines his latest open source Tk2 software for the Icom radios – IC-R2, IC-R3, and IC-Q7 (p.78).

Table Of Contents



SMS: Text Messaging Over Cell Phones

The United States is usually the largest market for electronics and innovative technology. But there is one wireless service that is enjoying explosive growth overseas and is hardly known here. It is called SMS ...an abbreviation for the wireless Short Messaging Service. Today, over 30 billion SMS messages are sent globally each month – practically all of it by overseas cellphone users.

Most of the telcos in the United States now offer SMS today, but customers aren't buying into it. One reason is that Americans pay per-minute charges for cell phone services, whether they make or receive a cell phone call or send or receive a text message. But cellular phone services in Europe and Asia are cheaper because carriers charge for the number of messages sent and not per-minute costs.

Cellular carriers, who expected wireless Internet access to be the next big thing, were surprised in the early 1990s when the relatively low-tech alphanumeric text messaging became wildly popular in Europe and Asia. SMS became fashionable because it is cheap, quick to type, and fun to receive.

◆ What is SMS ?

In a nutshell, SMS is a way of delivering short text format messages over a digital cellular network. Like e-mail, it is based on a "store and forward" concept. A Short Message Service Center (SMSC) relays, stores and forwards short messages to the intended recipient's cell phone much like e-mail from an ISP.

SMS messages are sent to-and-from digital cell phones, e-mail addresses and public SMS messaging gateways on the Internet. They are typically limited to 160 alphanumeric characters and you can't attach files. A message of this size takes up as much time as a one-second voice call.

SMS was created as part of the GSM Phase I standard. GSM (Global System for Mobile Communications) is not the dominant standard in the United States, which has hindered the growth of mobile text messaging in America. GSM uses a variation of TDMA (Time Division Multiple Access) technology, which allows eight multiplexed calls on the same radio frequency. GSM is now the de facto standard in Europe and Asia where mobile-phone penetration runs close to 75 percent compared with 45 percent in the United States. GSM has over 120 million users worldwide and is available in 120 countries. It is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA) ... but not it the United States.

Digital cellular systems in the U.S. primarily use CDMA (Code-Division Multiple Access) spread-spectrum technology. Unlike narrowband TDMA, CDMA does not assign a specific frequency to each call. Instead, every channel uses the full available (1.23 MHz wide) spectrum with small pieces of each conversation overlaid on each other using a different digital sequence code.

◆ SMS in North America

In the United States, SMS remains an overlooked and seldom-used service. Most major cellular providers (including Nextel, Cingular, Verizon, Sprint PCS, AT&T Wireless, VoiceStream, and US Cellular) have recently opened up their networks to messages from competing cellular carriers and digital technologies and are now offering either one-way or two-way SMS to their subscribers. They solved the interoperability problem by requiring users to type in phone numbers.

With one-way service, you can receive messages; while with two-way service, you can both receive and send messages. Features and costs vary widely from carrier-to-carrier. Some questions you should consider when comparing carriers include:

- How long are messages held by the carrier for delivery when your phone is offline?
- How many messages can be stored in the inbox?
- Is one-way messaging (receive), or two-way messaging (send and receive) available in your service area, and while roaming?
- Which features are provided through your carrier's public SMS gateway?
- Are SMS alerts (news, sports scores, etc.) available?

In general, cellular carriers offer messaging free of charge as part of select service plans, for a per message (2¢ to 10¢) fee, or for a monthly fee, which includes a set number of messages. If you cannot get free SMS with the service plan you've chosen and you plan to send or receive many messages, a monthly plan is generally more cost effective than a per message plan.

Users of SMS communicate in an abbreviated lingo all their own. The idea is to be able to send as much text as possible within the allotted number of characters and to do it quicker. For example: AFAIK translates to "As far as I know," HAND = "Have a nice day," PCM = "Please call me," CUL8R = "See you later," ILBL8 = "I'll be late," RUOK = "Are you okay" ...and so forth.

There are several SMS dictionaries on the Web that list common abbreviations. There is even a translating service – at **http://www.transl8it.com** – that translates SMS lingo into English, or English into SMS. And TransL8it! counts your characters as you type so you'll know that your message fits within the character limit.

Cellular service providers who offer SMS also offer public SMS gateways, which allow you to compose and send messages from the service provider's Web site. A number of independently operated message gateways also exist on the Internet. If you don't have access to your e-mail account or an SMS-equipped phone, a public gateway (available from any computer with Internet access) is a convenient way keep in contact.

The main SMS consumer applications are:

- **Simple person-to-person messaging – usually originated from the mobile phone keypad.**
- **Voice and FAX notifications – advising mobile phone users that they have new voice or fax mail messages waiting.**
- **Internet e-mail alerts – notifying users whenever a new email is received.**
- **Ringtones – tunes that the phone plays when someone calls it.**
- **Chatting – communicating back and forth in text.**
- **Information services – share prices, sports scores, weather, flight information, news headlines, lottery results, jokes, horoscopes, etc.**
- **Dispatching – notifying drivers of the next stop or pickup.**
- **Vehicle positioning – integrating GPS positioning systems with SMS to tell people where you are.**

GRUNDIG SHORTWAVE

Leaders in Their Class

"Outstanding Performance... Unbeatable Audio Quality... Unbeatable Price..."

Lawrence Magne, Editor in Chief, Passport to World Band Radio.

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

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

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

The Tuning Controls

- For the traditionalist: a smooth, precise tuning knob produces no audio muting during use. Ultra fine-tuning of 50Hz on LSB/USB, 100Hz in SW, AM and Aircraft Band and 20 KHz in FM.
- For Fixed-step Tuning: Big, responsive Up/Down tuning buttons.
- For direct frequency entry: a responsive, intuitive numeric keypad.

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

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

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

Size: 20.5" L x 9" H x 8" W **Weight:** 14.50 lbs.

Satellit 800

Yacht Boy 300PE AM/FM/SW Radio

Yacht Boy 400PE AM/FM/SW Radio

Power and Performance with Affordability

Designed for the traveller, the titanium look digital AM/FM/SW radio provides incredible power and performance for an incredibly low price! Packed with features, including 3 AA batteries, AC adapter, earphones, supplementary Antenna and carrying case!

State of-the-art features include:
Digital tuning with 24 user-programmable memory presets, 13 SW Bands (2.30-7.80 MHz; 9.10-25.10 MHz), Illuminated multi-function LCD display screen, AM/FM stereo via earphones, Clock, alarm and 10 to 90 minute sleep timer, Digital tuning display, Direct frequency entry, DX/ local selector, Titanium look finish, External antenna jack, Dynamic micro speaker, Earphone jack, Telescopic antenna.

Size: 5.75" L x 3.5" H x 1.25" W **Weight:** 9.92 oz.

Most powerful and compact portable

The Big Breakthrough! Power, performance, and design have reached new heights! The Grundig 400 Professional Edition with its sleek titanium look is packed with features like no other compact radio in the world. **Pinpoint Accuracy!** The Grundig 400PE does it all: pulls in AM, FM, FM-Stereo, every shortwave band (even aviation and ship-to-shore)-all with lock-on digital precision. **Ultimate Features!** Auto tuning! The Grundig 400PE has auto tuning on shortwave that stops at every signal and lets you listen. With the exceptional sensitivity of the 400PE, you can use the auto tune to catch even the weakest of signals. Incredible timing features! The Grundig 400PE can send you to sleep listening to your favorite music. You can set the alarm to wake up to music or the morning traffic report, then switch to BBC shortwave for the world news. The choice is yours! **Powerful Memory!** Described as a smart radio with 40 memory positions, the Grundig 400PE remembers your favorites-even if you don't!

Size: 7.75" L x 4.5" H x 1.5" W **Weight:** 1 lb. 5 oz.

GRUNDIG

for the traveler in you!

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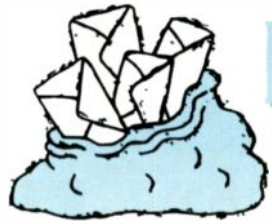


LETTERS TO THE EDITOR

RDFing the Old Way

"I really enjoyed Joe Moell's article in the December issue. It brought back some memories from the 1960s when I was a young EE. As a nights and weekend sideline I designed, built, and sold transmitters, receivers, and antennas for wildlife tracking that was very much in its infancy. We made antennas almost exactly like the ones Joe describes as still the prevalent type, a phased dipole or Yagi array.

"Receivers and transmitters were another matter. 150 MHz was the dominant frequency then, also. For the receiver we built a rugged, phase-locked loop superhet, fully transistorized, running very low current so that it could be transported through rough terrain without losing power or being too heavy, bulky or hard to tune.

"Transmitters were the interesting part. Without ICs we built one and two transistor units that typically used the transmitter tank as a loop antenna. We had to imbed copper-coated steel bands in leather collars to keep bear and deer from chewing them off each other. For snakes the one transistor unit had to be small enough to be force-fed into the snake and large enough that it could not be 'passed.' (Probably created one mean snake!)

"Because the beaver's head was smaller than its neck, the transmitter was mounted with a screw that went through a hole bored in the gristle of its tail with the loop following the perimeter of the tail with a couple more gristle borings (for animal lovers, the beaver does not have nerve endings in this gristle according to the wildlife biologists of that time). The beaver slaps his tail pretty hard and it gets very wet, so the environmental challenge was interesting, but fairly easily met even in the '60s.

"The two most unusual situations I had were for quail and the abominable snowman, which I will explain. In the case of the quail, the single transistor loop was strapped on its back with loops around the wings. One of my customers called and told me the transmitters had made the females unattractive to the males, and they would no longer mate, asking what he should do. I could not help but tell him that I was not even aware of how quails 'did it' so I was at a loss in beautifying the females!

"Another man who claimed to be leading an expedition in the Oregon-Washington area for the abominable snowman called and asked me to build a powerful transmitter for it as well as furnishing the receiver and antenna. He wanted this done on a contingency basis. It would be given him on loan for free, but if he found the creature he would pay me and give me recognition in his reports. I had to refuse – I had a vision of the explorer returning with the transmitter around his neck with the antenna stored in a correspondingly unpleasant locale. Who knows, maybe it would have lured the creature out of hiding and we might have opened some new 'wildlife tracking' vistas!"

– Al Sheppard, Ph.D., W4ZSC

Joe Moell said he was delighted with the presentation of his wildlife tracking article, and several *MT* readers sent him enquiries. New projects are constantly being added, such as four Northern Saw-whet owls tagged in Pennsylvania in December. Since tags are active only six weeks or so, it's too late for those, but check **http://www.homingin.com** for current tags.

Jurgy's Listening Post

"I put in a pix of my listening post, sort of the lazy man's setup!

"Of course it is right beside the La-Z-Boy facing the DVD and TV. On top, cordless phone and AM loop antenna. FM intercom, FRS transceiver, Sony 2010, Radio Shack 400 channel scanner, Icom R-75 (from Grove, of course). Below, Birdview satellite receiver. A retired science teacher, Jurgy spends many hours listening to many bands."

– Wayne Jurgensen (Jurgy), long time subscriber from Gays Mills, WI

KIMF?

In August, George Glotzbach visited the site of a new shortwave broadcast transmitter, described in the FCC database as being at the "intersection Spring Mesa Rd and State Rd 506, 1.5 miles SW Pinon, NM." Station KIMF is licensed to the International Fellowship of Churches/IMF World Missions in Cucamonga, CA, with the intention of broadcasting on 5835 kHz at 50 kW power.

Here's the picture (below) George sent to *MT*. His only comment: "The tiny white spot you see just below the horizon beyond the end of the road does not look like SW station KIMF to me. Piñon, NM, is a lonely, lonely place!"

– George Glotzbach, Santa Fe, NM

Emergency Kit Scanner

"I have come to the conclusion that, alongside a weather radio, flashlight and batteries, first aid kit, spare tire, etc., there is one more piece of essential equipment – a scanner.

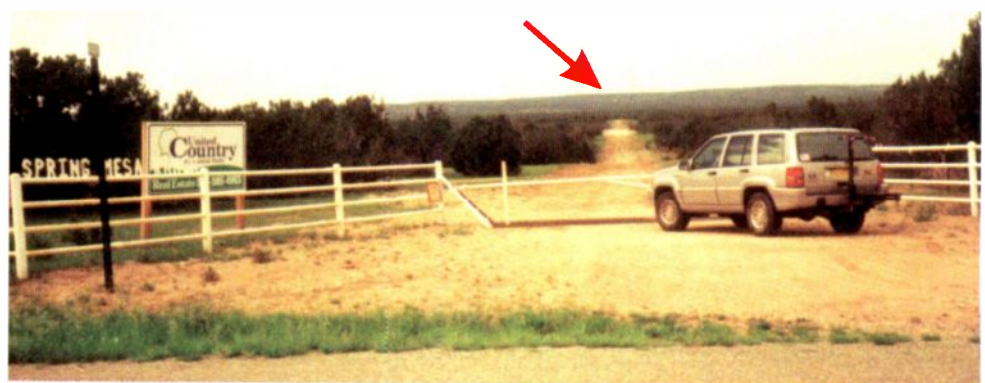
"In early October, Hurricane/Tropical Storm *Lili* barreled into Louisiana. Because there was the possibility that *Lili* might cross central Louisiana, I brought my weather radio to work with me at the local Wal-Mart.

"In the late afternoon a Code Black (severe weather alert) was issued as the eye of *Lili* passed overhead. It was reassuring to my coworkers that I had a weather radio by my side. However, I suspected that the NWS transmitter would be knocked off the air during the storm; Sure enough, it was – for five days.

"I determined from then that I need a scanner. It would have been helpful to keep informed of the latest developments by way of our local law enforcement agencies.

"In addition, for other civil emergencies, for road closures, bolo's [be on the lookout], etc., a scanner is an absolute must-have item."

– William K. Seamans, Pineville, LA



KTMF from a distance

"Of all the magazines I get, I particularly enjoy *M.T.* cover to cover."
- Dale Parfitt, Par Enterprises, Inc.

Memories of China

"I really enjoy the feature articles and the referenced web sights. In your November issue I was intrigued by the ...Bamboo Curtain ... article. Between 1967 and 1970 I was an US Airforce intercept operator with primary responsibilities involving some ChiComm Morse code networks.

"In those days they were using Morse for many military communication networks and were not very good at concealing the information. I'm sure they are more sophisticated today.

"By the way, with all the hype over the Orion P3 aircraft [see Nov issue], until you actually see one go through its paces at an airshow it is difficult to appreciate just how strong and significant it is."

– Sage Viehe

HF Digital Radio Debut

John Figliozzi wrote the following in response to Deutsche Welle's announcement of the official launch of digital shortwave radio (DRM) (see p.37 for more).

"Curious that they would introduce DRM broadcasts to NA last--and then only after determining that "market conditions allow"! The first receivers are likely to be quite expensive and it would seem that NA consumers (apart from Europeans) would be in the best financial position to spend that capital.

"Looks to me like another case of an international broadcaster misreading the potential of the NA market and misconstruing a saturation of channels with a panoply of perspectives and ideas. (Hint: we have the former, but lack the latter.)"

- John Figliozzi

Winter SWLfest

"The project to sponsor Arnie Coro's trip to speak at the 2003 SWLfest got a nice mention in the November issue of *Monitoring Times* magazine. Rachel Baughn, *MT*'s editor who attended [the 2002] SWLfest, graciously granted my request to print something about it in her column. A link to Tom Sundstrom's excellent website, which details this project, was also printed: **http://swlfest.com/coro.html**

"So far $447.03 has been raised from 7 contributors, which is about half the estimated amount needed to pay for Arnie Coro's airfare and accommodations. With luck, this extra publicity will move us closer to that goal.

"Thanks again for your help with this project."

– Ed Cummings

Thanks, Ed. I strongly encourage any *MT* readers who miss the old *MT* conventions or who never got to attend one to attend the SWLfest (also called Winterfest). It's the only similar event on the East Coast, it's a lot of fun as well as being educational, and what else is there to do in early March?! This year's dates are March 7-8. See p. 8 or visit http://www.swlfest.com for more details.

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

Radio Honor Roll

Courageous Railfan

Bill Shaffer is a train buff. One Saturday afternoon, he took a quick trip to Crossroads Park in downtown Dreshler, Ohio, where train tracks from each direction intersect. Suddenly he heard the train crew calling "Emergency. Emergency. Emergency."

"Being an amateur radio operator, I have all kinds of equipment," said Bill. "I heard the train crew on the scanner say they had just hit a car." And then he did something he has never done before – he jumped in his car and headed to the emergency scene about two miles away.

When he arrived at the scene, smoke and flames from the car made it difficult for bystanders to see the driver – a 17-year-old girl. "By the time we got her [out of the car], the whole inside of the car was on fire," said Shaffer. The girl was listed in critical condition.

Bill Shaffer said the curve is a particularly dangerous one, and he just acted on instinct.

Savvy Dispatcher

Georgetown, Massachusetts, police dispatcher Lucille Manning was listening to her scanner at home when she overheard a suspicious conversation plotting a nighttime break-in. She reported it to officers at the station who went out to investigate. As one officer passed the Dunkin' Donuts parking lot, one voice was heard to say over the scanner, "Don't worry, that's just his normal rounds." The clue led the police to the suspect's van in the parking lot. Police used the two-way radios found in the van to trick the final member into revealing his location.

MT reader Bill Mullowney says the Georgetown PD dispatch is on 484.2625, and, subtracting double the Bearcat IF frequency of 10.85 kHz, guesses the suspects were using Family Radio Service radios on 462.5625 MHz.

LA Fire Dept

A list of safety items suggested by the Los Angeles Fire Department as "Christmas presents which keep on giving," included this entry: "* Scanner Radio to listen to the LAFD in Action." Thanks, guys!

DC Public Safety System

The District of Columbia Office of Chief Technology Officer has cut three major elements out of its approved bid with Motorola, Inc. The intention is to put the components up for separate competitive bidding in hopes of cutting costs.

Cut from the contract were about 1,200 portable radios for the Metropolitan Police Department, a backup microwave antenna system, and automatic diagnostic and alarm systems for failing transmitters and antennas. Critics have said the cuts did not save money because the components still have to be bought, and mixing equipment from different manufacturers may create problems in compatibility and service as well as in accountability when problems arise.

The move may also add more delays to the already lagging public safety radio system and risk losing some of the $46 million it has received in federal homeland security funds to upgrade the system by Sept. 30.

Meanwhile, firefighters continue to use a system riddled with dozens of dead spots and police officers use a different system that is so old that replacement parts are no longer available.

Michigan Mess

Michigan State Police banked on funding their new Motorola ASTRO system in part by sharing it with as many as 16,000 local government agencies. Trouble is, the locals aren't buying into it. Complaints are that the system is poorly constructed, expensive, and doesn't have the range of mobile coverage needed by police patrols. It's also three years behind schedule and $54 million over budget.

One potential partner, Macomb County, has chosen instead to go with the M/A Com digital "Open Sky" system (the same system Pennsylvania is trying to get up and running). Neighboring Macomb County has also chosen the Open Sky system, but is looking for alternative solutions, since taxpayers voted down the funding.

Meanwhile, it sounds as though, even when upgraded, Detroit and its suburbs will continue to operate with at least three incompatible radio systems, and State Police have refused tower space to competing systems. The only thing everyone agrees on is that the 20-30 year old equipment has to go.

Frequency Matters

A 22-passenger helicopter flying from Long Beach, California, to Santa Barbara ended up in heavy cloud cover. The pilot became disoriented and tuned his radio to a frequency that called for navigation help. When the pilot flew below the cloud cover he located Oxnard airport and landed safely, but he wondered about the large number of police cars on the runway. "I thought the president was in Texas," he quipped. Turned out that, instead of the frequency for navigation help, he had called on a frequency that indicates there is a hijacker aboard.

Commando Solo Back in Action

Leaflets in Arabic and English are being dropped on Iraq as they were on Afghanistan, advising that "Information Radio" is on the air from 1500-2000GMT on five separate frequencies in the FM, medium-wave and short-wave bands. The broadcasts come from Commando Solo aircraft operated by the 193rd Special Operations Wing, a US psy-ops unit.

The EC-130E Commando Solo is a modified four-engine Hercules transport aircraft that can broadcast simultaneous high-power medium-wave, short-wave, FM and TV signals. The planes can also jam or override local transmissions, in an effort to persuade listeners to tune to the propaganda frequencies.

As well as the airborne broadcasts, the US uses ground transmitters in Kuwait and elsewhere in the Gulf to beam anti-Saddam programs to the Iraqi people.

Meshing the Military

In one incident during the Gulf War, ground troops moving into Kuwait got ahead of their communications system capabilities. In Grenada, troops had to call for air cover using a public pay phone! The military has been working on mobile, flexible communications for combat – systems that can't be disabled by taking out a tower or base station. Besides, "The military doesn't like to haul towers around with them," said one spokesman.

A couple of solutions have emerged using "mesh networks," in which any network radio can act as a "repeater" to relay digital voice messages, imagery, maps, or text. "They parachute 50 guys into Afghanistan and they turn their radios on, and they've got an instant network," said Rick Rotondo, the vice president of marketing at MeshNetworks.

Mesh-networking capabilities are incorporated into the military's latest battlefield radio, Raytheon Co.'s Enhanced Position Location Reporting System. U.S. Army units training in Kuwait are also using a mobile command-and-control computer known as the FBCB2, which is

BULLETIN BOARD

February 1: Negaunee, MI

The Hiawatha Amateur Radio Association 24th annual Swap and Shop, 10 am - 3 pm at the Negaunee Township Hall, 43, M-35, Negaunee Michigan. Door prizes, food and raffle. Talk-in 147.27. Contact Bob Serfas, N8PKN, at 906-226-9782 or e-mail at: *n8pkn@aol.com.*

February 2: DX Test

WBMJ-1190, San Juan, PR, and WIVV-1370, Vieques, PR, DX test 12:00-2:00 am AST (11:00pm-1am EST). At 11:59 pm AST, the stations will come out of a youth program and run a minute of DX information, including Morse code IDs. Then they'll return to regular programming from Moody Broadcasting Network. The tests will be repeated at 12:59 am AST and 1:59 am AST. WBMJ will be broadcasting at 5 kW; WIVV at 1 kW.

Reception reports (with return postage) to: Bert Johnson, Operations Manager, WBMJ Radio/WIVV Radio, P.O. Box 367000, San Juan, PR 00936-7000; E-MAIL: bjohnson@cem-wbmj.org (Arranged for the IRCA CPC)

February 23: Hicksville, NY

Long Island Mobile Amateur Radio Club (LIMARC) annual Indoor Winter Hamfest 9am-1pm at Levittown Hall, 201 Levittown Parkway, Hicksville, NY. Admission $6. VE session, vendors. For more information visit http://www.limarc.org or call 24-hour info line at: 516-520-9311

March 7-8: Kulpsville, PA

16th Annual Winter SWL Fest at Best Western–The Inn at Towamencin, Sumneytown Pike. Registration info at http://swlfest.com or write SWL Winterfest, PO Box 4153, Clifton Park, NY 12065.

capable of operating on mesh networks but currently uses satellites, said Timothy Rider, a spokesman for the Army Communications-Electronics Command.

The command is also overseeing ITT Industries' development of the Soldier Level Integrated Communications Environment (SLICE), a mobile computer with a headset display and microphone for foot soldiers. SLICE is supposed to create mesh networks that handle voice communications while mapping whereabouts of soldiers and their companions.

RFE/RL: New Location Found

Following last year's terrorist attacks on the US, strict security measures were introduced around the RFE/RL headquarters in the very center of Prague. Concern for civilians has led the Czech Republic and the US to search for a more isolated location for the Radio Free Europe/Radio Liberty (RFE/RL) headquarters, which is a potential terrorist target. BBC Monitoring reported that a new site has been found, but not named.

Rebels Shut Independent Radio Station

The Congolese Rally for Democracy – Congolese rebels, who have set up their own administration in North and South Kivu provinces – closed one of four private radio stations radio stations December 9th. Radio Maendeleo was taken off the air in the eastern Congo town of Bukavu for violating the terms of its license, which restricts the station to promoting the operations of aid groups.

Rebels raided the station and arrested its director and its programming chief for airing a program in which residents and community leaders criticized the rebels' introduction of new number plates for vehicles. "They shall be taken to court very soon and charged with defamation," Kisanga said by telephone from rebel headquarters in Goma. "We want to restore order in the broadcasting sector."

Reporters Sans Frontieres Issues Freedom Index

This first worldwide index of press freedom has some surprises for Western democracies. The United States ranks below Costa Rica and Italy scores lower than Benin. The five countries with least press freedom are North Korea, China, Burma, Turkmenistan and Bhutan.

The index was drawn up by asking journalists, researchers and legal experts to answer 50 questions about the whole range of press freedom violations (such as murders or arrests of journalists, censorship, pressure, state monopolies in various fields, punishment of press law offences and regulation of the media). The final list includes 139 countries. The others were not included in the absence of reliable information. (AIB)

Recycle Your Cellphone

Last month we mentioned a couple of groups which are recycling old cellular phones for worthy causes. A list of these programs can be found on Ann Arbor based ReCellular Inc. (http://www.recellular.com). ReCellular buys unwanted, old phones that have been donated to a number of charities and reconditions them to sell to developing countries like Argentina, Madagascar, or Russia. They process more than 2 million phones annually, about 200, 000 per month. ReCellular offers not only an environmental-friendly solution, but an economical step for countries at a lesser advantage. They also buy used two-way systems.

Now if they could come up with a way to recycle old AOL CDs... !

"Communications" is compiled by editor Rachel Baughn from news clippings sent or emailed by our readers. Thanks to all those who contributed this past month: Anonymous, Albany, New York; Ed Cummings, Elizabeth Dabbett, Bob Grove, Alan Henney, Maryanne Kehoe, Rick Kissell, Allen Lutins, Sterling Marcher, La Mirada, CA; Bill Mullowney, Everett, MA; Jerry None, Michael Reynolds, Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI; Richard Sklar, Seattle, WA; Matthew Stanley; Larry Van Horn, Peter Vieth, Barry Williams, Association of International Broadcasters

The Why and How of DXpeditions

By Jacques d'Avignon

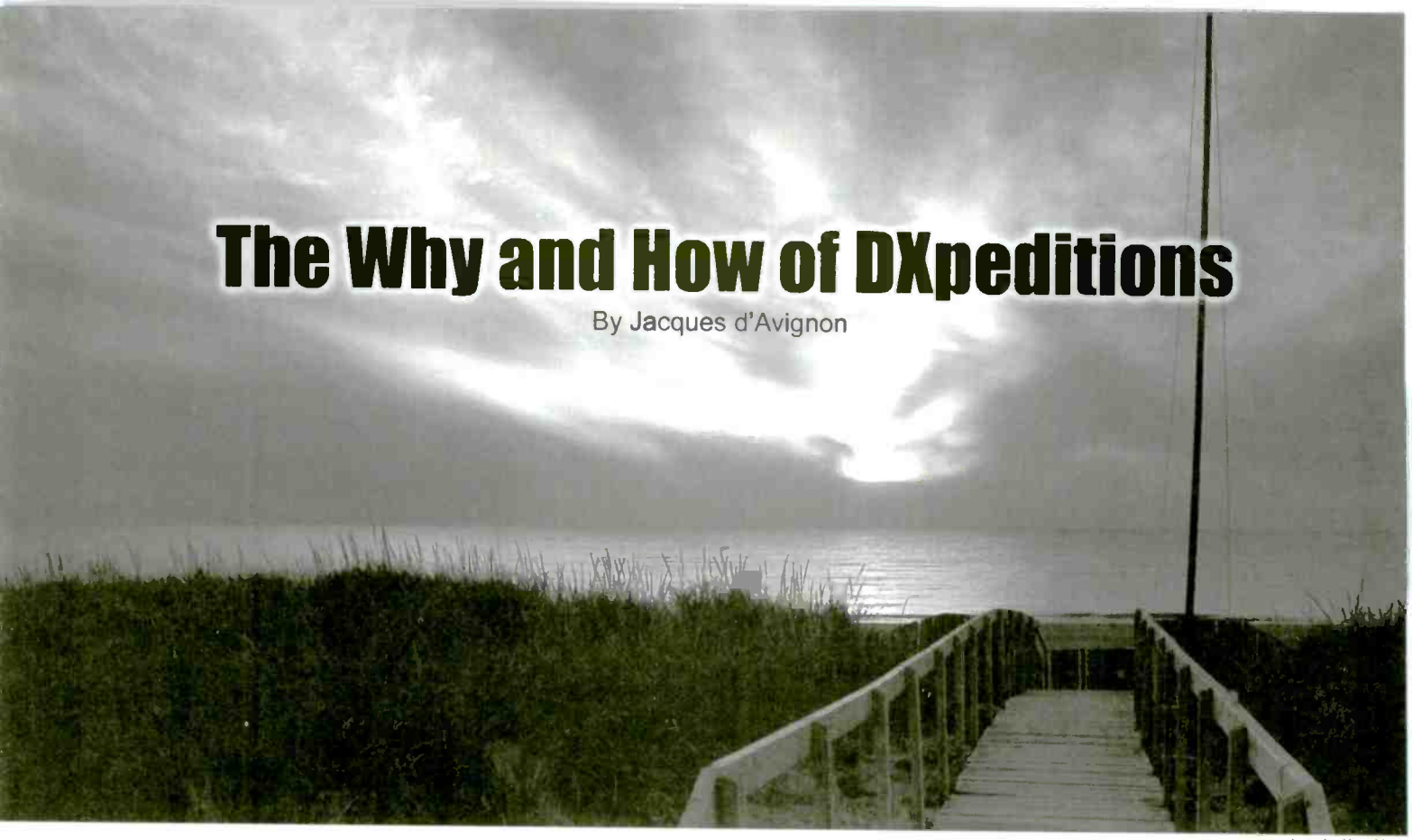


photo by Ken Alexa

Over the past few years, the noise floor across the full radio spectrum has continued to increase at an alarming rate, especially in the urban setting. (Certain individuals that have the opportunity of living and working in mountainous areas like Brasstown should count their blessings!)

How can you combat this noise scourge? Move to the mountains, give up the hobby or find some locations where you can enjoy your hobby for at least a few days a month, or for a full week once or twice a year. The latter solution is the most rational (if rationality has anything to do with listening to radio)!

For over four years, I have attended many three-day winter DXpeditions in a very secluded and RF quiet location north of Toronto. We could easily lay down long wire antennas over 1000ft long and build large loops of over 75ft in diameter, all in snow up to your waist! The reception was excellent at this site; as a matter of fact, I logged my first Greenland NDB (nondirectional beacon) from this site.

But over the last few years the noise floor has risen significantly there also. Reasons? More retirees moving in and becoming year-round residents with TV, microwave oven, intrusion alarms, etc. all creating noise. There was also an unexplained increase in the radiation level of the Power Line Controls (PLC) in the 100 to 300 kHz range used by the power companies to control their power dams and power line switching stations. In addition to the normal PLC tones, the power generating company was also using the PLC system to carry telephone conversations.

The Perfect DX Site

In 2001, during one of these dark winter DXpeditions, Ken Alexander and I talked at length about finding a very quiet East Coast seaside location for a full week of night and day DXing. When you live in Central Canada, the seaside is a minimum of two days of travel away, so before you commit to a specific DXpedition site, you make sure that you will find the necessary amenities: lodging, food stores, electronics stores etc., and hopefully the noise floor will be low, in fact very much lower than where you live.

If you look at the map of Eastern North America, many interesting sites on the East Coast of Canada become prime candidates for such a DXpedition. It helped greatly in the planning exercise to produce polar-equidistant maps for each site being considered. These maps allowed us to visualize clearly what landmasses were between the Europe/North Africa/Middle East and the various East Coast sites contemplated for our weeklong DXpedition. Another important factor that also needed to be considered was the travel time required to reach each site from Ontario.

The DXers (photo by Ken Alexander)

Three sites were chosen as serious contenders: Natashquan QC (50d11mN 61d47mW) on the North Shore of the St Lawrence River, St Anthony (51d23mN 56d05mW) at the Northern tip of the island of Newfoundland, and the island of Miscou (48d00mN 64d32mW) in New Brunswick.

For each site, I undertook a full evaluation looking at the following: radio related factors, travel time required and travel cost for reaching the chosen site.

The best site emerging from the short list was by far St Anthony NL; this site is the closest to Europe with no landmass interfering with a direct view to Europe. It is also removed from the vicinity of the main East Coast LORAN C transmitters, but the travel time by car required to reach this site from central Canada was approximately 5 days each way and included a very costly ferry portion of the trip. This site is still being seriously considered for a weeklong DXpedition in the spring of 2003, but by flying in. Maybe some sponsors will appear on the horizon!

The second site considered was Natashquan. This site is moderately easy to access by road: still, three days of driving each way would be required and the antennas would be properly grounded with great difficulty due to the poor soil quality

and minimal depth of the topsoil. We have found in the last two years that grounding the far end of our long wire antennas is a great part of our success.

This elimination process left us with only one possible site: Miscou Island. Miscou is accessible by road in less than two traveling days; in 2002 we drove the full distance in one 14-hour day. This site also has a fairly clear boresight to Europe/Africa/Middle East/South America with little or no close major landmass interference along the paths.

In mid-May 2001, Ken Alexander and I decided to visit the Miscou Island site. We had a good look at the possible accommodation and found out that we would be constrained as to the date of the DXpedition due to the lack of winterized cottages that we found available for rent.

The cottages we found are located on a beach having a perfect North-South true orientation; the possibility of having a Beverage antenna looking directly over the North Polar Region was surely intriguing.

At mid-day, Ken and I installed two Wellbrook ALA 1530 loops on the ground of the parking lot at the cottages and powered up our AR7030+ to do a band scan: Ken did a band scan on the broadcast band and I listened to the long wave section of the spectrum. It was so quiet that we thought for a few long minutes that our receivers had been damaged in transit! This site has to be the quietest SWL site that I have encountered in my over half-century of SWL. I was able to hear my first Trans Atlantic NDB: FLO 270 kHz in the Azores from Miscou.

The Miscou 01 DXpedition, attended by Ken Alexander, Kevin Carey and myself, was held in late September early October 2001, and we were very pleased with the results: no noise, nineteen countries logged on Long Wave (LW) and twenty countries on MW (Medium Wave)! During the DXpedition week the A index hovered in the 20 to 30 range and the K index was roving in the 3 to 6 range – not the best for shortwave listening: some days we could not even hear WWV.

Hard at work (photo by Ken Alexander)

We never expected to get much better results when we started talking about Miscou 02.

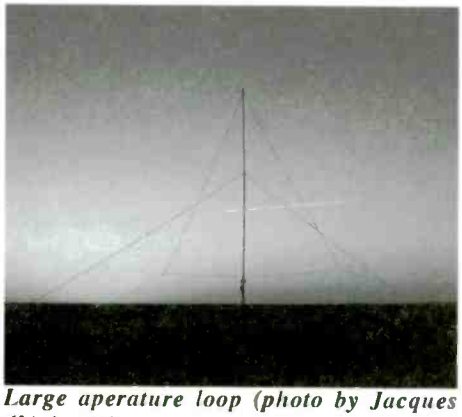
Miscou 02 was held for one week, again in early October 2002, with four participants – the same group as during Miscou 01 plus Neil Wolfish who was able to stay only for a few days at the beginning. Weather conditions were similar as last year: cool but this time windy (70mph at times), the A and K indices values were very similar and we had the most stunning displays of northern lights for three nights in succession. (See the cover of this issue of *Monitoring Times*.) This did not affect the LW and the MW reception. Yes, we did hear the auroral flutter, but it did not seem to cause any unusual absorption or blackout in the range of 50 kHz to 2 MHz.

During the week we logged 31 countries on LW and 32 on MW, not bad for a very disturbed ionosphere. On LW we logged most of the Greenland NDBs and logged one NDB as far south as Brazil; most of the NDBs located on the islands off the coast of Europe and Africa i.e. Azores, Cape Verde, Ascension, were also logged. On MW, stations were logged as far east as Iran, as far south as Mauritania, Argentina and Brazil. (For a full report on our success on LW, I refer you to Kevin Carey's column "Below 500 kHz" in *MT* December 2002.)

Getting Equipped

Right now I can hear the questions: "What type of antenna, what receiver to use, what else is needed to get these high numbers of intercepts in one week?" and "How do you prepare a DXpedition?"

The listening post (photo by Jacques d'Avignon)



Large aperature loop (photo by Jacques d'Avignon).

Both in 2001 and 2002 we used two or three terminated 1000ft Beverage antennas simply laid out on the ground. There is no tree or shrub on which to hang any antenna. For the purists that will accuse me of using the term Beverage to describe these antennas, they are very long wires and definitely are unidirectional. If they are not Beverage, I have no other name for this type of antenna.

During Miscou 01 and 02 we also used a Large Aperture Loop: 30 ft diameter in 2001and 60ft diameter in 2002 connected to special loop electronics built by Wellbrook in the UK. The loops were very directive and the 2002 loop was very quiet in comparison to the long wires during the auroral disturbances.

With all these antennas and multiple participants it is necessary to have splitters. We used four Wellbrook antenna/amplifier splitters; these units have a very high isolation of over 25dB between each output port with a gain of 8dB from 100 kHz to 3 MHz; above 3 MHz there is no gain supplied by these splitters. These splitters allow each participant to use any antenna as required without causing interference to the other users.

A fairly normal arsenal of receivers included the AOR AR7030+, Drake R8B and Sony 2010. Some participants have also used a DSP filter, phasing units and other filtering units.

The Key to Success: Planning

If you are interested in organizing a DXpedition there are a few steps that you should consider carefully.

For the original DXpedition, Miscou 01, organizing work was spread out over a period of over nine months; during this time I devoted many hours of phone calls, letter writing, compiling supply lists and simply planning all aspects of this exercise: plan "A", plan "B", etc.

If you decide to try a faraway DXpedition, make sure that the site chosen is RF quiet. It is imperative you make a visit to the site to ascertain this fact. There is no use planning a DXpedition only to find out when you arrive on site that there is a noisy power line right over the site or an electric welding shop next door! It is also necessary that you ascertain that you will find all the logistic support needed: available rental cottage, sources of food supply, (in Miscou the closest full food store was located about 20 miles away), source of electronic supply and other necessary amenities. Look into the possible cell phone coverage if no phone is supplied in the rental accommodation.

If you are renting a cottage, inquire what is included with the rental: bedding, coffee maker (very important tool during a DXpedition), pots and pans, etc. Some DXers have been using bed and breakfast sites for DXpeditions, but be aware that you might have to put up with other guests that will turn on the TV or other similar noisemaker, and you will not have any recourse.

The size and setup of the living accommodations and the number of beds found on site, will dictate the number of participants that can be invited to join. A very important item to consider is the size of the table used to set up the receiving station; we have found that a normal dining room table will accommodate a maximum of four listeners with all the receivers and a minimum of other technical "stuff" such as coffee mug, reference books and other tools of the trade.

Judge your travel time carefully; you do not want to spend more time on the road than you have to. If you want to drive a long distance in one day, do not start in the evening, start the trip after a good night's sleep. Been there, done it both ways!

How many days for a DXpedition? One full week seems a good length of time for a DXpedition excluding the travel time. You will need about one day to set up antennas and equipment, and a similar length of time to retrieve everything. Hopefully it will not rain on those two days!

While you are organizing this trip, make a list of *everything* that you might need to operate your DXpedition station: not only what you will need, but everything that will be needed by all the participants. How many coax cable leadins will you need to reach your antennas and how long? What type of antennas do you intend to use? How much antenna wire should you bring? (A lot!)

What type of connectors do you have on all the equipment: BNC, PL259, N, etc. Make sure that you have adapters for all possible situations. When you are 30 miles away from electronics and other stores you do not want to find out that you do not have a connector or an adapter to plug in your receiver or an important unit of your set-up. Before you leave, buy all kinds of adapters, and then go back to the store and buy more! Go through a mock set-up and see what you need, and then pack everything.

If you intend to use a mast, bring your own collapsible one; you never know if you will find a tree to hang your antenna. Look at all your equipment and check what type of fuses you will need; bring a good number of spare fuses for each piece of equipment.

Let's remember you will want to go as far as possible from a town to avoid the noise, but in so doing you are cutting yourself off from stores, so plan ahead for everything and check the noise compatibility of equipment. Before we left for Miscou 01, we found that our main 12V power supply was radiating intolerable RFI, and 12V was essential to power all our antenna splitters and loops. We resorted to using a small lead acid battery. Fortunately, we had found the problem before we left so it was not a crisis when we set up; we had the battery and a small charger ready to use.

Think ahead, way ahead! I am not saying to plan for the worst case scenario, but plan to be totally self sufficient in technical matters. Food and drink are secondary during such a campaign; you will always find food, but you might not find the unusual fuse or the weird adapter for your coax in the small settlement nearby.

A good and well-organized DXpedition in a quiet RF environment is what the doctor ordered to keep you happy in the hobby. You blood pressure will drop and you will be relaxed when you return. Enjoy!

No QRM here (photo by Jacques d'Avignon)

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Italian radio relay service

In the fall of 1988, a new shortwave radio station took to the airwaves of Europe. It started as a vision only six months before, and was operational in record time, thanks to the enthusiasm of its founders and a measure of good luck. This was a private station, with an independent, eclectic, experimental message – something distinctly different from the classic international broadcasters of the Cold War era. It's a story of broadcasting success against all odds, and how what started out as a gamble has made European broadcasting history. Bob Zanotti, formerly of Swiss Radio International, was a co-founder of the station, and has now decided to tell the story.

Welcome to NEXUS – IRRS

By Bob Zanotti, HB9ASQ / WA2UPQ

Part 2

Last month, Bob Zanotti, formerly of Swiss Radio International, reviewed the history of the Italian Radio Relay Service IRRS, of which he was a co-founder. He described the inception of the idea of providing Europe with an independent shortwave relay facility, and shared the excitement of installing the transmitting facilities and the first experimental transmissions. In part two, Bob looks back on the start of regular broadcasts, and takes us to the present and future of what became NEXUS-International Broadcasting Association.

Regular Operations Begin

The 3.944 / 3.945 MHz test transmissions on November 19 and 20, 1988, proved that all the engineering theory worked in practice. We were especially happy that our pioneering use of A3A reduced-carrier SSB had brought the results we hoped for: a 10 kW signal that produced the same communications power as an ordinary 30 kW AM transmitter! We had received many spontaneous reports from all over the Continent, especially from Germany, Sweden, and Britain – key audiences. We had made a big splash with a commercially-viable signal. IRRS was making headline news in the DX press and major SW communication shows. We had to move, and move fast, to keep up the momentum.

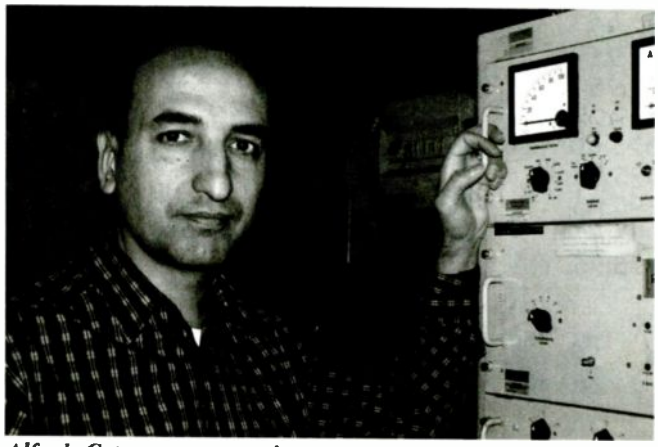
The following Friday night, November 25, there was a pea soup fog driving to the transmitter west of Milan. It was dark when I arrived at the farm, and the eerie scene was something out of a horror movie. Visibility was not more than 10 feet, and the solitary, hi-intensity, halogen light in the courtyard conjured up visions of the supernatural, a la the movie "The Fog." It was clammy-cold. I would spend the night in the control room again, as I had the weekend before. The portable radiator went on, full blast. Before another test transmission that night, I decided to break for dinner, and went to a very warm and cozy pizzeria in the village to unwind from the long trip.

It must have been about 9:00 when I got back to the transmitter. The transmitter's low voltage circuits had been switched on earlier to stabilize the frequency synthesizer, so that everything would be ready when I returned. I threw the "operation" switch, and waited for TX 19 to go through its tune-up routine. Just as the week before, the high voltage circuit switched in after about 60 seconds. And then, that familiar "clunk", indicating that the auto-tune mode had kicked in, with the usual spectacle of SWR bridge meter-needles dancing up and down, as the antenna tuner went through its paces. In three seconds flat, there was another clunk, and we were on-air with a full 10 kW PEP in A3A mode. Because of the heavy fog, the SWR on the antenna was 1.5:1. But after a few minutes, the moisture and frost that had accumulated in the antenna feeder box and on the antenna wires burned off from the RF thermal effect, and we settled down to a comfortable 1.1:1.

That evening's test was very much a repeat of the week before: lots of Italian music, interspersed with IDs and invitations to call in reception reports to the office in Milan, where Alfredo Cotroneo was waiting to take them. Remember, there were no cell phones at that time, and there was also no telephone line at the transmitter. It had been arranged that Alfredo would come by later that evening, so that we could touch base and take turns at the controls.

It must have been nearly 11:00 when I heard the big, squeaky, iron gate open, and a car drive up to the transmitter building. It was Alfredo. And yes, there had been even more reports tonight than the week before, and they were still coming in.

We agreed that there should be one more weekend of test broadcasts before starting a regular schedule on Saturday, December 3. We recorded new announcements to that effect, and played them frequently that weekend.



Alfredo Cotroneo at transmitter.

Antenna Icing

It was now 6:30 Saturday morning, November 26. It was still dark outside. Our next test transmission was to begin in half-an-hour, and I was running a little late. I threw on my clothes and went to the transmitter room. I had to go outside to get there, and it was freezing cold – quite literally, as I was about to find out. I switched on TX 19's low-voltage circuits, and went back to the control room to prepare audio cassettes.

It was about 6:40, time to fire up the transmitter and get it on the air prior to the 6:58 sign-on announcement. Once

again, the "operation" switch was thrown, and once again, there was a clunk after 60 seconds, meaning the 8.5 kV power supply was on. Then came that second clunk, indicating automatic tune-up in progress. But this time, TX 19 made three unsuccessful attempts to get itself on the air, then automatically disabled the HV circuit, and went into alarm mode. Now, that's what I call a wake-up call! What could it possibly be? I restarted the sequence. This time, I watched the meters very carefully and spotted the problem. During automatic antenna tuning, there was a very high SWR of nearly 2:1, which the automatic tuning circuitry would not accept. The maximum permitted was 1.5:1.

I went out into the foggy, morning gray for a look at the antenna. The dipoles were covered with ice. This had changed the resonance characteristic of the system! After trying several tricks that didn't work, the solution to the problem was to disable auto tune-up and adjust the final amplifier circuit manually. Then, I applied a low power (500 watt) carrier to the antenna. It worked! As the RF thermal effect set in and the ice thawed, the SWR fell rapidly, and the RF output power could gradually be increased. After about 15 minutes of this, I switched autotune back in, and lo and behold, TX 19 got on the air by itself, and with full power.

It was agreed that I would operate the morning test schedule, and Alfredo would take over in the afternoon. We had dinner together Saturday evening, where it was decided that I would get the station on the air early Sunday morning, then be relieved by Alfredo, so I could drive back to Switzerland.

Frequency Changes

During the dry run tests that weekend, monitors reported that we were being QRM'd by a utility station on 3.944, sometimes heavily. At one point, the mystery station transmitted an RTTY loop – a sure sign that we were being "invited" in no uncertain terms to leave that frequency.

On a point of legalistic order, the rules of the International Telecommunication Union allow for broadcasting on frequencies assigned primarily to utility services, provided no complaint is received. Our frequency consultant in the UK had been monitoring 3.944 for months, and heard nothing. We never found out who the utility station was, although I still suspect it was military. Whatever, we decided to change frequency. Since we had antennas for 75, 41 and 31 meters, we opted for 7.160 MHz in the morning, and 9.860 MHz in the afternoon, to follow propagation changes.

Paul Stettler at work doing repairs

IRRS Becomes an Institution

Our first regular broadcasts on the 3rd and 4th of December, 1988, began without a hitch. From that first weekend onwards, we strove to maintain a reliable and professional sound and on air presence. For the first five years, operation was manual, with Alfredo and I, and later others, doing alternate weekend transmission stints at the farm. It was often a hardship for all of us. In my case, it meant a 225-mile trip on Friday evenings after regular work and in all weather, and back again on Sunday night. This also meant little or no time for my two younger daughters in their formative period, when their father's presence would have been so important. That is one aspect of the adventure that I very deeply regret.

Thanks to Alfredo's Globe Radio FM experience, he had contacts with United Nations Radio and UNESCO Radio, which became our main shortwave relay clients. Jeff White, a cofounder of the old Radio Earth project, and founder of Radio Miami International WRMI, also used our relay service. But there lots of holes in our eight-hour broadcast day, which were filled with all kinds of music, as well as old time radio shows. We played and did what we pleased, and that was a lot of fun in itself.

Probably our most popular of all shows was "Hello There," which Alfredo Cotroneo produced on a weekly basis for several years. It was the IRRS listener contact program, acknowledging reception reports and program comments, presented in a relaxed and friendly manner that the audience loved. In fact, it was the only program that we produced ourselves. As an indication of its popularity, "Hello There" even drew mail from East Germany, which at the time was under a repressive regime. Listeners there took risks to contact us, and to tell us how they appreciated the station. Unfortunately, it eventually got too much for Alfredo, who had his own young family to care for, as well as other pressures. So, the program was reluctantly dropped, causing a listener outcry.

IRRS was never a money-making proposition, but bills still had to be paid. Just the cost of rent and power usage was enormous. This reality led to the major program policy decision to open our facilities to religious broadcasters. Each candidate was carefully reviewed, to assure that there was no content in violation of Italian or EU laws or regulations. Some candidates were flatly refused on those grounds. But by and large, the majority of religious programmers were reasonable and acceptable to us.

By now, we were part of the European broadcasting scene. One German DX publication described IRRS this way: "About the only private shortwave station on the air from Italy that can be called professional, distinguished by its signal strength, technical quality and reliability".

Early computer automation and audio processing circa 1995

Automation Takes Over

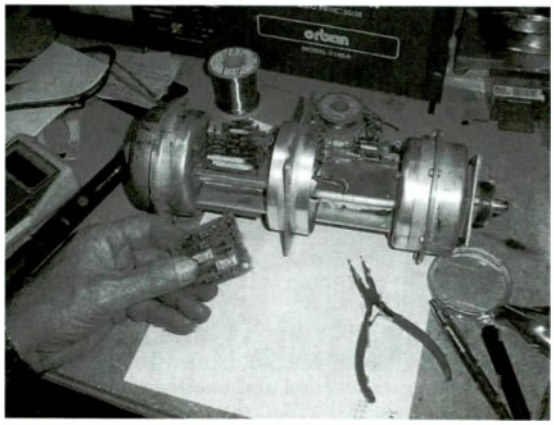
The long trek to Milan and back was getting too much for me, and the family was suffering. Alfredo also had a growing young family that needed his attention. We both agreed that the time had come to automate the operation. Alfredo was a software engineer, and computers were his bread and butter. In 1993, he applied his knowledge and creativity to IRRS by writing very sophisticated and innovative programs, and installing hardware and software that took over all operations, which by now, were daily, with a schedule that was something like 18 hours long at its peak. All audio was moved to hard disk, and all transmitter operations were assumed by computers – even transmitter switching and frequency changes. A totally hands-off operation.

IRRS Gives Way to NEXUS-IBA

All good things come to an end. And so it was with Italy's ultra-liberal broadcasting scene. In 1990, the Italian parliament passed legislation that called for strict licensing of all broadcast stations. Skipping over the complex legal issues, on the bottom line this meant that IRRS had to give up its status as a commercial enterprise, and become a non-profit, non-commercial "association."

Alfredo immediately got to work with the lawyer. A charter had to be written, and a formal organizational structure had to be set up. The governing body had to consist of citizens of the European Union. This is where my formal involvement and presence in the adventure had to disappear into the shadows of the past (I didn't qualify as either a US or a Swiss citizen.) But before that happened, it was my turn to suggest a name for the new organization. I suggested "nexus," the Latin word for connection or link. Alfredo liked it, but added a twist of his own: "NEXUS – International Broadcasting Association."

The NEXUS board of directors elected Alfredo as President. So legally and also in practical terms, it was mostly Alfredo's show now. I did continue to help out with public relations work and in translating documents, like the



Close-up of an SWR bridge

NEXUS charter, that are still featured on the NEXUS website **http://www.nexus.org**. And then, there were technical issues, and in particular, the problem of transmitter maintenance and repair that were to keep me very much "connected."

Power Surges and Lightning Strikes

Automation of the station was, indeed, a liberation for all concerned, although it still fell on Alfredo to make the 45-minute trip to the transmitter once a week to keep the computer fed with fresh programming. Later on, an ISDN line was installed, making it possible to upload audio material from town. Even the transmitter could be operated remotely. But automation and an 18-hour daily schedule meant that all the equipment at the station was permanently connected to power lines and the antenna. This was to cause problems we hadn't bargained for.

The Po Valley is subject to frequent and very violent thunderstorms, especially in the summer. But the Italian power company, ENEL, gave this rural area a low priority in terms of power line stability and security. There was no surge protection (which we didn't know at first), and we even had to supply our own grounding system. Maybe Alfredo kept book, but I personally lost track of how many times nearby lightning strikes and high voltage induction through the antenna and commercial power lines took us off the air, and burned out key circuits in the transmitter.

One morning, I tuned into our new 41 meter frequency, 7.120 MHz, to find nothing but dead air. I called Alfredo, and he told me there had been severe thunderstorms the night before. He didn't hear the station, either, but had assumed it was just propagation. He then tried sending commands to the station, but without success. A check of the ISDN modem indicated that it was not operating either. The situation looked bad. Alfredo went out to the farm, and confirmed that we had been hit, and that the transmitter's vital circuits were inoperative. Could I organize an emergency repair mission – fast?

Enter our old friend and "father" of TX 19, Paul Stettler. Nobody knew those 10 kW Siemens transmitters like he did. I contacted Paul, and after a lot of persuasion, he agreed to accompany me down to Milan. But he could only make it the following the weekend. Until then, we were off the air – but good.

I don't have the space to go into the complete chronology of all the damage and repairs. But suffice it to say that it was a "memorable" and very frustrating weekend for us. Repairs took two intense, 14-hour days to complete. It was really major transmitter "surgery." What's worse, there would be several more similar episodes like that each season, until we decided to spend a lot of money the Association really didn't have to install expensive surge protection equipment, both on the AC power lines and on the antenna feeder. Major improvements also had to be made to the grounding system. Since that was done, there have been no further problems. As they say, experience is the best, but most expensive teacher!

A close-up of the transmitter final section

In view of the lost airtime and the important issue of reliability, it was also decided to buy the sister transmitter to TX 19, "TX 20", which Swiss Telecom was selling off. This was an even newer model, and proved very useful as a standby, taking over from TX 19 when maintenance had to be done.

NEXUS Goes Multimedia

I have always had an emotional attachment to shortwave. And I still sincerely believe that there's life in it yet. But there's no denying that today, it's no longer the only way to reach a mass audience. As a computer specialist and Internet provider, Alfredo Cotroneo saw it coming. One of the major features that he built into the new NEXUS-IBA philosophy was the flexibility to use the Association to provide multimedia services. In 1994, NEXUS became an Internet content provider, offering a mix of outlets to its members. It was also the very first European broadcaster to offer audio streaming.

"Legalizing" the Pirates

In cooperation with IPAR, International Public Access Radio, another of Alfredo's innovative ideas was to give the many European pirate broadcasters a legal SW outlet. For several years now, NEXUS, together with "DJ" Stevie Willers of Radio 510 International **http://www.radio510.org** (previously Shortwave Radio Switzerland), has offered the many individual European free radio producers airtime for a symbolic rate. This very successful audio service is also available at **http://mp3.nexus.org**. Offering inexpensive airtime to minority or financially disadvantaged program makers was an idea originated by Globe Radio FM back in 1979.

The Future

NEXUS-IRRS continues its shortwave broadcasting activities, albeit at a reduced level. As part of a shortwave-specific Italian law introduced in 1995, a heavy and discriminatory $10,000 license fee was slapped on NEXUS. There is no doubt in anyone's mind that the fee is disproportionate and prohibitive, and was intended to kill private shortwave broadcasting in Italy.

We're now looking back on 14 years of evolution and development, since Alfredo Cotroneo and I first discussed the IRRS idea back in 1988. And it's 23 years since Alfredo pioneered his non-commercial, community-style Globe Radio FM project in Milan.

In the past couple of years, I have been Alfredo's guest at his weekend cottage in the Italian mountains near the Swiss border. He often said that he had given up shortwave for dead. But lately, he's noticed a new resurgence in the medium on the part of specific programmers, some of whom are even at the governmental and intergovernmental level.

Today, NEXUS-IBA offers an extensive media mix that remains up to date and innovative. It's true that times and technology change. But we've also witnessed a lot of empty promises about the Internet and satellite "revolutions" that turned out to be just a lot of marketing propaganda or wishful thinking.

If Alfredo's own multimedia observations and experience are anything to go by, shortwave could, indeed, be with us for some time to come. And NEXUS-IBA intends to be there too.

It's been an exciting 14 years, and the NEXUS-IBA story continues to be written.

Current broadcast schedule:

Mon-Fri from 0630-0730 UTC and Sat & Sun from 0900-1300 UTC on 13,840 kHz to Europe, N Africa, the Middle East

Monitoring Times Guide to APCO P-25 Systems, Part 3

By Dan Veeneman

MINNESOTA

HENNEPIN COUNTY

Call Sign WPKH277, Granted 04/04/2002.
MINNEAPOLIS (HENNEPIN COUNTY), MINNESOTA
866.0875, 866.2125, 866.5375, 866.6125, 866.7875, 867.1125, 867.1625, 867.2875, 867.3625, 867.7375, 867.8375, 867.9625, 868.2625, 868.4375, 868.5375, 868.6125, 868.8375 MHz
FORT SNELLING (HENNEPIN COUNTY), MINNESOTA
866.0875, 866.2125, 866.5375, 866.6125, 866.7875, 867.1125, 867.1625, 867.2875, 867.3625, 867.7375, 867.8375, 867.9625, 868.2625, 868.4375, 868.5375, 868.6125, 868.8375 MHz
BLOOMINGTON (HENNEPIN COUNTY), MINNESOTA
866.0875, 866.2125, 866.5375, 866.6125, 866.7875, 867.1125, 867.1625, 867.2875, 867.3625, 867.7375, 867.8375, 867.9625, 868.2625, 868.4375, 868.5375, 868.6125, 868.8375 MHz
BROOKLYN PARK (HENNEPIN COUNTY), MINNESOTA
866.0875, 866.2125, 866.5375, 866.6125, 866.7875, 867.1125, 867.1625, 867.2875, 867.3625, 867.7375, 867.8375, 867.9625, 868.2625, 868.4375, 868.5375, 868.6125, 868.8375 MHz
GOLDEN VALLEY (HENNEPIN COUNTY), MINNESOTA
866.0875, 866.2125, 866.5375, 866.6125, 866.7875, 867.1125, 867.1625, 867.2875, 867.3625, 867.7375, 867.8375, 867.9625, 868.2625, 868.4375, 868.5375, 868.6125, 868.8375 MHz
MINNEAPOLIS (HENNEPIN COUNTY), MINNESOTA
866.0875, 866.2125, 866.5375, 866.6125, 866.7875, 867.1125, 867.1625, 867.2875, 867.3625, 867.7375, 867.8375, 867.9625, 868.2625, 868.4375, 868.5375, 868.6125, 868.8375 MHz
Call Sign WPKK355, Granted 04/04/2002.
ANOKA (ANOKA COUNTY), MINNESOTA
866.9625, 867.2625, 867.6125, 867.8625, 868.6375, 868.8875 MHz
ROGERS (HENNEPIN COUNTY), MINNESOTA
866.9625, 867.2625, 867.6125, 867.8625, 868.6375, 868.8875 MHz
CORCORAN (HENNEPIN COUNTY), MINNESOTA
866.9625, 867.2625, 867.6125, 867.8625, 868.6375, 868.8875 MHz
MEDINA (HENNEPIN COUNTY), MINNESOTA
866.9625, 867.2625, 867.6125, 867.8625, 868.6375, 868.8875 MHz
MAPLE PLAIN (HENNEPIN COUNTY), MINNESOTA
866.9625, 867.2625, 867.6125, 867.8625, 868.6375, 868.8875 MHz
MINNETRISTA (HENNEPIN COUNTY), MINNESOTA
866.9625, 867.2625, 867.6125, 867.8625, 868.6375, 868.8875 MHz
Call Sign WPUD820, Granted 02/12/2002.
GOLDEN VALLEY (HENNEPIN COUNTY), MINNESOTA
868.0125 MHz
PLYMOUTH (HENNEPIN COUNTY), MINNESOTA
868.0125 MHz

MINNESOTA, STATE

Call Sign WPER943, Granted 04/20/1999.
MINNEAPOLIS (HENNEPIN COUNTY), MINNESOTA
856.2375, 856.2625, 856.7625, 856.9375, 857.2375, 857.2625, 857.7625, 857.9375, 858.2375, 858.2625, 858.4375, 858.7375, 858.7625, 858.9375, 859.2375, 859.2625, 859.4375, 859.7375, 859.7625, 859.9375, 860.2375, 860.2625, 860.4375, 860.9375, 860.9875 MHz
SAINT PAUL (RAMSEY COUNTY), MINNESOTA
856.2375, 856.2625, 856.7625, 856.9375, 857.2375, 857.2625, 857.7625, 857.9375, 858.2375, 858.2625, 858.4375, 858.7375, 858.7625, 858.9375, 859.2375, 859.2625, 859.4375, 859.7375, 859.7625, 859.9375, 860.2375, 860.2625, 860.4375, 860.9375, 860.9875 MHz
MINNEAPOLIS (HENNEPIN COUNTY), MINNESOTA
856.2375, 856.2625, 856.7625, 856.9375, 857.2375, 857.2625, 857.7625, 857.9375, 858.2375, 858.2625, 858.4375, 858.7375, 858.7625, 858.9375, 859.2375, 859.2625, 859.4375, 859.7375, 859.7625, 859.9375, 860.2375, 860.2625, 860.4375, 860.9375, 860.9875 MHz
Call Sign WPKG241, Granted 02/25/2002.
SHAKOPEE (SCOTT COUNTY), MINNESOTA
866.4375, 866.8875, 867.0750, 867.4375, 867.7000, 867.9375, 868.2250, 868.4625, 868.7875 MHz
NORWOOD (CARVER COUNTY), MINNESOTA
866.4375, 866.8875, 867.0750, 867.4375, 867.7000, 867.9375, 868.2250, 868.4625, 868.7875 MHz
JORDON (SCOTT COUNTY), MINNESOTA
866.4375, 866.8875, 867.0750, 867.4375, 867.7000, 867.9375, 868.2250, 868.4625, 868.7875 MHz
MAYER (CARVER COUNTY), MINNESOTA
866.4375, 866.8875, 867.0750, 867.4375, 867.7000, 867.9375, 868.2250, 868.4625, 868.7875 MHz
MINNETRISTA (HENNEPIN COUNTY), MINNESOTA
866.4375, 866.8875, 867.0750, 867.4375, 867.7000, 867.9375, 868.2250, 868.4625, 868.7875 MHz
Call Sign WPKG310, Granted 02/25/2002.
ROSEMOUNT (DAKOTA COUNTY), MINNESOTA
866.1625, 866.8375, 867.1875, 867.5875, 868.0625, 868.3125, 868.3375, 868.5625, 868.8625 MHz
Call Sign WPKG322, Granted 02/11/1997.
SPRING LAKE (SCOTT COUNTY), MINNESOTA
855.9875, 866.1250, 866.7000, 867.5375, 867.8000 MHz
Call Sign WPKG350, Granted 02/12/1997.
ANOKA (ANOKA COUNTY), MINNESOTA
866.1375, 866.3125, 866.6875, 867.0625, 867.2125, 867.8125, 868.0875, 868.1375, 868.6875, 868.9125 MHz
Call Sign WPKG353, Granted 02/12/1997.
FALCON HEIGHTS (RAMSEY COUNTY), MINNESOTA
866.1875, 866.2625, 866.5875, 866.6625, 866.8125, 867.0875, 867.6875, 867.7125, 868.2125, 868.2375, 868.3625, 868.7125, 868.7625 MHz
Call Sign WPKG358, Granted 02/12/1997.
FALCON HEIGHTS (RAMSEY COUNTY), MINNESOTA
860.9375, 866.2875, 866.5625, 866.7625, 867.3125, 867.6625, 868.1125, 868.2875 MHz
Call Sign WPKG359, Granted 02/25/2002.
BAYPORT (WASHINGTON COUNTY), MINNESOTA
866.1125, 866.3625, 866.7125, 867.7875, 868.1875, 868.7375 MHz

MISSOURI

City Utilities Of Springfield

Call Sign WPMH498, Granted 07/28/1998.
Fair Grove (GREENE COUNTY), MISSOURI
854.9875, 855.4625, 855.7375, 856.2125, 856.4375, 856.7125, 856.9625, 857.2125, 857.4375, 857.7125, 857.9625, 858.2125, 858.4375, 858.7125, 858.9625, 859.2125, 859.4375, 859.7125, 859.7625, 859.9625, 860.2125, 860.4375, 860.7125, 860.7625, 860.9625 MHz
Springfield (GREENE COUNTY), MISSOURI
854.9875, 855.4625, 855.7375, 856.2125, 856.4375, 856.7125, 856.9625, 857.2125, 857.4375, 857.7125, 857.9625, 858.2125, 858.4375, 858.7125, 858.9625, 859.2125, 859.4375, 859.7125, 859.7625, 859.9625, 860.2125, 860.4375, 860.7125, 860.7625, 860.9625 MHz
Springfield (GREENE COUNTY), MISSOURI
854.9875, 855.4625, 855.7375, 856.2125, 856.4375, 856.7125, 856.9625, 857.2125, 857.4375, 857.7125, 857.9625, 858.2125, 858.4375, 858.7125, 858.9625, 859.2125, 859.4375, 859.7125, 859.7625, 859.9625, 860.2125, 860.4375, 860.7125, 860.7625, 860.9625 MHz
Ash Grove (GREENE COUNTY), MISSOURI
854.9875, 855.4625, 855.7375, 856.2125, 856.4375, 856.7125, 856.9625, 857.2125, 857.4375, 857.7125, 857.9625, 858.2125, 858.4375, 858.7125, 858.9625, 859.2125, 859.4375, 859.7125, 859.7625, 859.9625, 860.2125, 860.4375, 860.7125, 860.7625, 860.9625 MHz

NEW HAMPSHIRE

NASHUA

Call Sign WPPF224, Granted 11/18/1999.
NASHUA (HILLSBOROUGH COUNTY), NEW HAMPSHIRE
866.0125, 866.0500, 866.5125, 866.6000, 866.7750, 866.9750, 867.0125, 867.3625, 867.5125, 867.5500, 867.7500, 868.0125, 868.2625, 868.4500, 868.5125 MHz
NASHUA (HILLSBOROUGH COUNTY), NEW HAMPSHIRE
866.0500, 866.6000, 866.7750, 866.9750, 867.3625, 867.5500, 867.7500, 868.2625, 868.4500, 868.5125 MHz
NASHUA (HILLSBOROUGH COUNTY), NEW HAMPSHIRE
866.0500, 866.6000, 866.7750, 866.9750, 867.3625, 867.5500, 867.7500, 868.2625, 868.4500, 868.5125 MHz

NEW JERSEY

ATLANTIC CITY

Call Sign WPRS952, Granted 01/18/2001.
ATLANTIC CITY (ATLANTIC COUNTY), NEW JERSEY
856.7625, 857.7625, 858.7625, 859.7625, 860.7625 MHz
Call Sign WPSS243, Granted 07/20/2001.
TOMS RIVER (OCEAN COUNTY), NEW JERSEY
470.6500, 471.4750, 471.6750, 471.8750, 471.9250, 471.9500, 472.2500, 472.6750 MHz
TOMS RIVER (OCEAN COUNTY), NEW JERSEY
470.6500, 471.4750, 471.6750, 471.8750, 471.9250, 471.9500, 472.2500, 472.6750 MHz

NEW YORK

TOMPKINS COUNTY

Call Sign WPNQ294, Granted 04/30/1999.
ENFIELD (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz
DANBY (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz
NEWFIELD (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz
LANSING (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz
Call Sign WPOY919, Granted 09/08/1999.
ITHACA (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz
NORTH LANSING (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz
GROTON (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz
DRYDEN (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz
DRYDEN (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz
CAROLINE (TOMPKINS COUNTY), NEW YORK
851.0125, 851.3125, 852.3125, 853.3125, 853.4875, 854.0125, 854.3125, 854.4875, 855.0125, 855.3125 MHz

NORTH CAROLINA

GREENSBORO

Call Sign WPGH956, Granted 03/15/2000.
GREENSBORO (GUILFORD COUNTY), NORTH CAROLINA
851.1375, 852.1875, 852.9375, 853.4875, 854.2625 MHz
Call Sign WPKE469, Granted 04/18/2002.
GREENSBORO (GUILFORD COUNTY), NORTH CAROLINA
866.7875, 867.8375, 867.8500, 867.9375, 868.1000, 868.2375, 868.6250, 868.7375 MHz
HIGH POINT (GUILFORD COUNTY), NORTH CAROLINA
866.7875, 867.8375, 867.8500, 867.9375, 868.1000, 868.2375, 868.6250, 868.7375 MHz
MCLEANSVILLE (GUILFORD COUNTY), NORTH CAROLINA
866.7875, 867.8375, 867.8500, 867.9375, 868.1000, 868.2375, 868.6250, 868.7375 MHz
SUMMERFIELD (GUILFORD COUNTY), NORTH CAROLINA
866.7875, 867.1000, 867.2375, 867.6250, 867.7375, 867.8375, 867.8500, 867.9375 MHz
BURLINGTON (ALAMANCE COUNTY), NORTH CAROLINA
867.9375, 868.1000 MHz
Call Sign WPKF479, Granted 01/23/2002.
GREENSBORO (GUILFORD COUNTY), NORTH CAROLINA
866.1500, 866.2625, 866.4000, 866.4375, 866.6500, 866.7625, 866.8000, 866.9125, 867.1000, 867.1500, 867.2625, 867.4375, 867.6875, 867.7625, 868.2625, 868.5375, 868.6250, 868.7625 MHz
HIGH POINT (GUILFORD COUNTY), NORTH CAROLINA
866.1500, 866.2625, 866.4000, 866.4375, 866.6500, 866.7625, 866.8000, 866.9125, 867.1000, 867.1500, 867.2625, 867.4375, 867.6875, 867.7625, 868.2625, 868.5375, 868.6250, 868.7625 MHz
MCLEANSVILLE (GUILFORD COUNTY), NORTH CAROLINA
866.1500, 866.2625, 866.4000, 866.4375, 866.6500, 866.7625, 866.8000, 866.9125, 867.1000, 867.1500, 867.2625, 867.4375, 867.6875, 867.7625, 868.2625, 868.5375, 868.6250, 868.7625 MHz
SUMMERFIELD (GUILFORD COUNTY), NORTH CAROLINA
866.1500, 866.2625, 866.4000, 866.4375, 866.6500, 866.7625, 866.8000, 866.9125, 867.1000, 867.1500, 867.2625, 867.4375, 867.6875, 867.7625, 868.2625, 868.5375, 868.6250, 868.7625 MHz
BURLINGTON (ALAMANCE COUNTY), NORTH CAROLINA
866.1500, 866.2625, 866.4000, 866.4375, 866.6500, 866.7625, 866.8000, 866.9125, 867.1000, 867.1500, 867.2625, 867.4375, 867.6875, 867.7625, 868.2625, 868.5375, 868.6250, 868.7625, 868.9125 MHz
Call Sign WPRG262, Granted 09/08/2000.

GREENSBORO (GUILFORD COUNTY), NORTH CAROLINA
855 9625 MHz
HIGH POINT (GUILFORD COUNTY), NORTH CAROLINA
855.9625 MHz
MC LEANSVILLE (GUILFORD COUNTY), NORTH CAROLINA
855.9625 MHz
SUMMERFIELD (GUILFORD COUNTY), NORTH CAROLINA
855 9625 MHz
BURLINGTON (ALAMANCE COUNTY), NORTH CAROLINA
855.9625 MHz

KERNERSVILLE
Call Sign WPQF382, Granted 06/21/2000.
KERNERSVILLE (FORSYTH COUNTY), NORTH CAROLINA
866.1375, 866.6375, 866.8750, 867.2500, 867.7000, 867.7500, 867.8750, 868.1375, 868.3375, 868.4250 MHz

MECKLENBURG COUNTY
Call Sign WPUV635, Granted 05/10/2002.
CORNELIUS (MECKLENBURG COUNTY), NORTH CAROLINA
866 2375, 866.3125, 866.7375, 866.7625, 867.0875, 867.2375, 867.5875, 867.8125, 868.1500, 868 3125, 868.3500, 868.4625, 868.6500, 868.8500, 868.9375 MHz
CHARLOTTE (MECKLENBURG COUNTY), NORTH CAROLINA
866.1500, 866 7000, 867 3750, 867.6500, 868.9250 MHz
CHARLOTTE (MECKLENBURG COUNTY), NORTH CAROLINA
866.2625, 866.8125, 867.3125, 868.2625, 868.8125 MHz
CHARLOTTE (MECKLENBURG COUNTY), NORTH CAROLINA
866.8750, 867.3750, 867.8750, 868.8750, 868.9000 MHz

OHIO

AKRON
Call Sign KNNG878, Granted 04/17/2001.
AKRON (SUMMIT COUNTY), OHIO
866.0375, 866.2875, 866 5625, 868.6500, 868.9125 MHz
AKRON (SUMMIT COUNTY), OHIO
866.0375, 866.2875, 866.5625, 868.6500, 868.9125 MHz
AKRON (SUMMIT COUNTY), OHIO
866.0375, 866.2875, 866.5625, 868.6500, 868.9125 MHz
UNIONTOWN (SUMMIT COUNTY), OHIO
868.9125 MHz
TWINSBURG (SUMMIT COUNTY), OHIO
868.9125 MHz
Call Sign WNNE207, Granted 08/10/1999.
AKRON (SUMMIT COUNTY), OHIO
851 3125, 852 0875, 852.1125, 852.3875, 853 1125, 853.3625, 853.5125, 854.2625, 854 3625, 854 4875, 854.5125, 855.0875, 855.2625, 855.3125, 855.5125, 856.0125 MHz
AKRON (SUMMIT COUNTY), OHIO
851.3125, 852.0875, 852.1125, 852.3875, 853.1125, 853.3625, 853.5125, 854.2625, 854.3625, 854.4875, 854.5125, 855.0875, 855.2625, 855 3125, 855.5125, 856.0125 MHz
AKRON (SUMMIT COUNTY), OHIO
851.3125, 852 0875, 852.1125, 852.3875, 853.1125, 853.3625, 853.5125, 854.2625, 854.3625, 854.4875, 854.5125, 855.0875, 855.2625, 855 3125, 855.5125, 856.0125 MHz

BELMONT COUNTY
Call Sign WPIX608, Granted 11/22/1995.
SAINT CLAIRSVILLE (BELMONT COUNTY), OHIO
866.0125, 866.2125, 866.4375, 866.5125, 866.7625, 867.0125, 867 5125, 868.4500, 868.7000 MHz
FLUSHING (BELMONT COUNTY), OHIO
866.2125, 866.4375, 866.7625, 868.4500, 868.7000 MHz
ALLEDONIA (BELMONT COUNTY), OHIO
866.2125, 866.4375, 866.7625, 868.4500, 868.7000 MHz
Bridgeport (BELMONT COUNTY), OHIO
866.2125, 866.4375, 866.7625, 868.4500, 868.7000 MHz
MOUNDSVILLE (MARSHALL COUNTY), WEST VIRGINIA
866 2125, 866.4375, 866.7625, 868.4500, 868.7000 MHz
BARNESVILLE (BELMONT COUNTY), OHIO
866.2125, 866.4375, 867.7625, 868.4500, 868.7000 MHz

CLERMONT COUNTY
Call Sign WPGU291, Granted 05/30/2000.
BATAVIA (CLERMONT COUNTY), OHIO
866 1375, 866.3875, 866.4125, 866.7750, 867.9625, 867 9875, 868.5125, 868.8375 MHz
MILFORD (CLERMONT COUNTY), OHIO
866.1375, 866.3875, 866.4125, 866.7750, 867 9625, 867.9875, 868.5125, 868.8375 MHz
CINCINNATI (CLERMONT COUNTY), OHIO
866.1375, 866.3875, 866.4125, 866.7750, 867 9625, 867.9875, 868.5125, 868.8375 MHz
MOSCOW (CLERMONT COUNTY), OHIO
866.1375, 866.3875, 866.4125, 866 7750, 867 9625, 867.9875, 868.5125, 868.8375 MHz
CINNCINNATI (CLERMONT COUNTY), OHIO
866.1375, 866.3875, 866.4125, 866.7750, 867 9625, 867 9875, 868.5125, 868.8375 MHz
BETHEL (CLERMONT COUNTY), OHIO
866.1375, 866.3875, 866.4125, 866 7750, 867 9625, 867 9875, 868.5125, 868 8375 MHz
Call Sign WPRU455, Granted 02/01/2001.
Felicity (CLERMONT COUNTY), OHIO
866.1375, 866 3875, 866.4125, 867.9625, 867.9875 MHz
LOVELAND (CLERMONT COUNTY), OHIO
866.1375, 866 3875, 866.4125, 867.9625, 867.9875 MHz

COLUMBUS
Call Sign WPQC881, Granted 05/24/2000.
COLUMBUS (FRANKLIN COUNTY), OHIO
866.5375, 866.7875, 866.8125, 867.1750, 867 2125, 867.4250, 867.4750, 867.7750, 867.8000, 868.1125, 868.1750, 868.3625, 868.4875
COLUMBUS (FRANKLIN COUNTY), OHIO
866.5375, 866.7875, 866.8125, 867.1750, 867.2125, 867.4250, 867.4750, 867.7750, 867.8000, 868.1125, 868.1750, 868.3625, 868.4875
COLUMBUS (FRANKLIN COUNTY), OHIO
866.5375, 866.7875, 866.8125, 867.1750, 867.2125, 867.4250, 867.4750, 867.7750, 867.8000, 868.1125, 868.1750, 868.3625, 868.4875
LOCKBOURNE (FRANKLIN COUNTY), OHIO
866.5375, 866.7875, 866.8125, 867.1750, 867.2125, 867 4250, 867.4750, 867.7750, 867.8000, 868.1125, 868.1750, 868.3625, 868 4875
CENTERBURG (MORROW COUNTY), OHIO
867.0375, 867.3750, 867.7250, 867.9875, 868.7375 MHz
COLUMBUS (FRANKLIN COUNTY), OHIO
866.5375, 866.7875, 866.8125, 867.1750, 867.2125, 867 4250, 867 4750, 867.7750, 867.8000, 868.1125, 868.1750, 868.3625, 868.4875

HAMILTON COUNTY
Call Sign WPFS987, Granted 01/04/2000.
CINCINNATI (HAMILTON COUNTY), OHIO
866.1625, 866.2500, 866.2750, 866.3000, 866.5375, 866.6500, 866.7875, 867 2375, 867.5375, 867.7375, 867.7625, 867.8125, 867.8500, 867 9500, 868.1250, 868.1500, 868.2625, 868.3625, 868.5625 868.9500
CINCINNATI (HAMILTON COUNTY), OHIO
866.1625, 866.2500, 866.2750, 866.3000, 866.5375, 866.6500, 866.7875, 867.2375, 867.5375, 867.7375, 867.7625, 867.8125, 867.8500, 867.9500, 868.1250, 868.1500, 868.2625, 868.3625, 868.5625. 868.9500
CINCINNATI (HAMILTON COUNTY), OHIO
866.1625, 866.2500, 866.2750, 866.3000, 866.5375, 866.6500, 866.7875, 867.2375, 867.5375, 867.7375, 867.7625, 867.8125, 867.8500, 867.9500, 868 1250, 868.1500, 868.2625, 868.3625, 868.5625, 868.9500
CINCINNATI (HAMILTON COUNTY), OHIO
866.1625, 866.2500, 866.2750, 866.3000, 866.5375, 866.6500, 866.7875, 867.2375, 867.5375, 867.7375, 867.7625, 867.8125 867.8500, 867.9500, 868.1250, 868 1500, 868.2625, 868.3625, 868.5625, 868.9500
CINCINNATI (HAMILTON COUNTY), OHIO
866 1625, 866.2500, 866.2750, 866.3000, 866.5375, 866.6500, 866.7875, 867.2375, 867.5375, 867.7375, 867.7625, 867.8125 867.8500, 867.9500, 868.1250, 868 1500, 868.2625, 868.3625, 868.5625, 868.9500
CINCINNATI (HAMILTON COUNTY), OHIO
866.1625, 866.2500, 866.2750, 866.3000, 866.5375, 866.6500, 866.7875, 867.2375, 867.5375, 867.7375, 867.7625, 867.8125. 867.8500, 867.9500, 868.1250, 868.1500, 868 2625, 868.3625, 868.5625, 868.9500

LAKE COUNTY
Call Sign WNAS488, Granted 11/22/2000.
KIRTLAND (LAKE COUNTY), OHIO
851.4125, 851.4375, 851.4625, 852.4125, 852 4375, 852.4625, 853.4125, 853.4375, 853.4625, 854.4125, 854 4375, 854.4625, 855.4125, 855 4375, 855.4625 MHz
MADISON (LAKE COUNTY), OHIO
851 4125, 851.4375, 851.4625, 852.4125, 852.4375, 852.4625, 853.4125, 853.4375, 853.4625, 854.4125, 854.4375, 854.4625, 855.4125, 855.4375, 855.4625 MHz
PAINESVILLE (LAKE COUNTY), OHIO
851 4125, 851.4375, 851.4625, 852.4125, 852.4375, 852 4625, 853.4125, 853.4375, 853.4625, 854.4125, 854.4375, 854.4625, 855.4125, 855.4375, 855.4625 MHz
WILLOWICK (LAKE COUNTY), OHIO
851.4125, 851 4375, 851.4625, 852.4125, 852.4375, 852.4625, 853 4125, 853 4375, 853.4625, 854.4125, 854.4375, 854.4625, 855.4125, 855.4375, 855.4625 MHz

MONTGOMERY COUNTY
Call Sign WPBE603, Granted 04/23/1999.
DAYTON (MONTGOMERY COUNTY), OHIO
866.0625, 866.3125, B66.3750, 866.5750, 866.8500, 867.1000, 867.3500, 867.6250, 867.6500, 868.2000, 868.2500, 868.5000, 868.5750, 868.7500, 868.8500 MHz
OAYTON (MONTGOMERY COUNTY), OHIO
866.0625, 866.3125, 866.3750, 866.5750, 866.8500, 867.1000, 867.3500, 867.6250, 867.6500, 868.2000, 868.2500, 868.5000, 868.5750, 868.7500, 868.8500 MHz
MIAMISBURG (MONTGOMERY COUNTY), OHIO
866 0625, 866.3125, 866.3750, 866.5750, 866 8500, 867.1000, 867 3500, 867.6250, 867.6500, 868.2000, 868.2500, 868.5000, 868.5750, 868.7500, 868.8500 MHz
BELLBROOK (GREENE COUNTY), OHIO
866.0625, 866 3125, 866 3750, 866.5750, 866.8500, 867.1000, 867 3500, 867.6250, 867 6500, 868 2000, 868 2500, 868.5000, 868.5750, 868.7500, 868.8500 MHz

OHIO, STATE
Call Sign WPDY308, Granted 10/19/1998.
COLUMBUS (FRANKLIN COUNTY), OHIO
851.5625, 851.6625, 851.8375, 851.9625, 852.3375, 852.3875, 858.4625, 859.4625, B59.7625, B60 7625 MHz
Call Sign WPQC865, Granted 05/24/2000.
HARRISBURG (PICKAWAY COUNTY), OHIO
866.3500, 866.7000, 867.1375, 867.4000, 867.6625 MHz
CHILLICOTHE (ROSS COUNTY), OHIO
866.6125, 866.8750, 867.3000, 867 6000, 868.0750 MHz
DELAWARE (DELAWARE COUNTY), OHIO
866.2750, 866.3250, 866.6000, 866.6375, 866.9500, 867.3375, 867.8500 MHz
LONDON (MADISON COUNTY), OHIO
866.9250, 867.0500, 867.2750, 867.5625, 867.5875, 867.8250 MHz
Call Sign WPQF760, Granted 06/27/2000.
RICHFIELD (SUMMIT COUNTY), OHIO
867.9375, 868.1750, 868.600D, 868.8000 MHz
AKRON (SUMMIT COUNTY), OHIO
866.0875, 868.3500 MHz
MARION (MARION COUNTY), OHIO
866.3750, 866.4000, 866.7250, 866.7750, 867.3125, 867.5750 MHz
STEAM CORNERS (MORROW COUNTY), OHIO
866.1500, 866.6500, 867.2625, 868.9625 MHz
Call Sign WPQF784, Granted 06/28/2000.
CASTALIA (ERIE COUNTY), OHIO
866.6125, 866.9250, 867.2250, 867.4875 MHz
ELYRIA (LORAIN COUNTY), OHIO
867.2000, 867.7000, 867.9875 MHz
GRAFTON (LORAIN COUNTY), OHIO
866.9375, 867.3625, 867.8125, 868.3125, 868 9750 MHz
BELLEFONTAINE (LOGAN COUNTY), OHIO
866.2250, 866.3000, 867.1500, 867.8125, 868.1625, 868.8875 MHz
SIDNEY (SHELBY COUNTY), OHIO
866.6500, 867.6000, 868.1250, 868.7875 MHz
GREENVILLE (DARKE COUNTY), OHIO
867 7000, 868.1750 MHz
Call Sign WPQF785, Granted 06/28/2000.
CIRCLEVILLE (PICKAWAY COUNTY), OHIO
866.9000, 867.2375 MHz
BLOOMFIELD (MUSKINGUM COUNTY), OHIO
866.4750, 866.9250, 867.2000 MHz
LINNVILLE (LICKING COUNTY), OHIO
866.1250, 866.5875 MHz
SAINT LOUISVILLE (LICKING COUNTY), OHIO
866.2375, 866.3625 MHz
ZANESVILLE (MUSKINGUM COUNTY), OHIO
866.2875, 867 7375, 868.2000 MHz
LANCASTER (FAIRFIELD COUNTY), OHIO
866.0625, 867.5750, 868.6125 MHz
Call Sign WPQF786, Granted 06/28/2000.
COLLEGE CORNER (BUTLER COUNTY), OHIO
868.0875 MHz
LOUDONVILLE (ASHLAND COUNTY), OHIO
867.4125, 867.5625, 867.8250, 868.1625, 868.8875 MHz
MANSFIELD (RICHLAND COUNTY), OHIO
867.2375, 867.7875, 868.0875, 868.8625 MHz
AUKERMAN (WAYNE COUNTY), OHIO
866.2000, 866.6875, 868.2250, 868.7750 MHz
ASHLAND (ASHLAND COUNTY), OHIO
866.3500, 866.7125, 867.0500 MHz
WOOSTER (WAYNE COUNTY), OHIO
866 5375, 867.1750, 867.6125 MHz
Call Sign WPQG208, Granted 06/29/2000.
NEW CASTLE (COSHOCTON COUNTY), OHIO
867.3000, 868.3000, 868.9500 MHz
MILLERSBURG (HOLMES COUNTY), OHIO
866.1000, 866.5750, 867.3500 MHz
SUGAR CREEK (HOLMES COUNTY), OHIO
867.2500, 867.5375, 867.8875 MHz
Call Sign WPSE443, Granted 03/27/2001.
NORTH BEND (HAMILTON COUNTY), OHIO
856.4375 MHz
Call Sign WPSE555, Granted 03/28/2001.
GERMANO (HARRISON COUNTY), OHIO
867 1000 MHz
Call Sign WPVR868, Granted 08/07/2002.
PAULDING (PAULDING COUNTY), OHIO
852.0375 MHz
Call Sign WPVR869, Granted 08/07/2002.
COLLEGE CORNER (BUTLER COUNTY), OHIO
851.7625 MHz
LISBON (COLUMBIANA COUNTY), OHIO
852.7625 MHz
Call Sign WPVR870, Granted 08/07/2002.
EAST LIVERPOOL (COLUMBIANA COUNTY), OHIO
851.1375 MHz
Call Sign WPVR874, Granted 08/07/2002.
PENEY FORK (JEFFERSON COUNTY), OHIO
851.5875 MHz
EAST SPRINGFIELD (JEFFERSON COUNTY), OHIO
853.0125, 853.4625 MHz
LOVELAND (CLERMONT COUNTY), OHIO
851.2625 MHz
Call Sign WPVS311, Granted 08/08/2002.
CINCINNATI (HAMILTON COUNTY), OHIO
856.8375 MHz
NORTH BEND (HAMILTON COUNTY), OHIO
853.4125, 856.4375 MHz

STARK COUNTY
Call Sign WPLP821, Granted 08/16/2002.
ALLIANCE (STARK COUNTY), OHIO
866.2500, 866.3375, 866.9500, 867.3125, 868 1125, 868.4000 MHz
HARTVILLE (STARK COUNTY), OHIO
866.2500, 866.3375, 866.9500, 867.3125, 868.1125, 868.4000 MHz
NAVARRE (STARK COUNTY), OHIO
866.2500, 866.3375, 866.9500, 867.3125, 868.1125, 868.4000 MHz
CANAL FULTON (STARK COUNTY), OHIO
866 2500, 866.3375, 866 9500, 867.3125, 868 1125, 868.4000 MHz
EAST CANTON (STARK COUNTY), OHIO
866.2500, 866.3375, 866.9500, 867.3125, 868.1125, 868.4000 MHz
EAST CANTON (STARK COUNTY), OHIO
866.2500, 866.3375, 866 9500, 867.3125, 868.1125, 868 4000 MHz

OREGON

Union Pacific Railroad Company
Call Sign WPRG370, Granted 09/12/2000.
PORTLAND (MULTNOMAH COUNTY), OREGON
160.9800, 161.0550, 161 2800, 161.3550, 161.4300 MHz

PENNSYLVANIA

BUCKS COUNTY
Call Sign WPRJ424, Granted 10/12/2000.
DOYLESTOWN (BUCKS COUNTY), PENNSYLVANIA
501.0375, 501 1625, 501 1875, 501.2125, 501 2375, 501 2625, 501.3625, 501.4125, 501 5125, 501 5625, 501.5875, 501.6625, 501.7125, 501.7375, 501 7625 MHz
PLUMSTEADVILLE (BUCKS COUNTY), PENNSYLVANIA
501.1625, 501 3625, 501 5125, 501.5625, 501 7125, 501.7375 MHz
ALMONT (BUCKS COUNTY), PENNSYLVANIA
501.1625, 501 3625, 501 5125, 501 5625, 501.7125, 501 7375 MHz
SPRINGTOWN (BUCKS COUNTY), PENNSYLVANIA
501.1625, 501.3625, 501.5125, 501 5625, 501 7125, 501 7375 MHz
SOLEBURY (BUCKS COUNTY), PENNSYLVANIA
501 1625, 501.3625, 501 5125, 501 5625, 501.7125, 501.7375 MHz
NEW HOPE (BUCKS COUNTY), PENNSYLVANIA
501.1625, 501.3625, 501.5125, 501 5625, 501 7125, 501.7375 MHz
Call Sign WPRJ425, Granted 10/12/2000.
FEASTERVILLE (BUCKS COUNTY), PENNSYLVANIA
501 0375, 501 1875, 501 2125, 501 2375, 501.2625, 501.3500, 501 4125, 501.5875, 501.6625, 501.7625, 508 0750, 508 1750, 508.4500
NEWTOWN TOWNSHIP (BUCKS COUNTY), PENNSYLVANIA
501.0375, 501 1875, 501.2125, 501.2375, 501.2625, 501.3500, 501 4125, 501 5875, 501.6625, 501 7625, 508 0750, 508.1750, 508.4500
LEVITTOWN (BUCKS COUNTY), PENNSYLVANIA
501.0375, 501.1875, 501.2125, 501.2375, 501 2625, 501.3500, 501.4125, 501.5875, 501.6625, 501 7625, 508.0750, 508 1750, 508.4500
BENSALEM (BUCKS COUNTY), PENNSYLVANIA
501.0375, 501 1875, 501.2125, 501.2375, 501.2625, 501 3500, 501 4125, 501 5875, 501 6625, 501.7625, 508 0750, 508 1750, 508 4500
WARMINSTER NAWC (BUCKS COUNTY), PENNSYLVANIA
501.0375, 501 1875, 501.2125, 501.2375, 501.2625, 501 3500, 501.4125, 501 5875, 501 6625, 501.7625, 508 0750, 508.1750, 508 4500
LOWER MAKEFIELD TWP (BUCKS COUNTY), PENNSYLVANIA
501.0375, 501.1875, 501.2125, 501 2375, 501.2625, 501.3500, 501 4125, 501.5875, 501.6625, 501 7625, 508 0750, 508.1750, 508 4500

PHILADELPHIA
Call Sign WPRW578, Granted 03/01/2001.
PHILADELPHIA (PHILADELPHIA COUNTY), PENNSYLVANIA
866 1000, 866.2875, 866 3375, 866.3625, 866 5875, 866.6875, 866 7875, 866 8125, 866.8375, 867.0625, 867.0875, 867 1125, 867.3500, 867 5625, 867 5875, 867.8125, 867 8375, 867.8625, 867.9375, 868.0625, 868.0875, 868.2875, 868 3125, 868.3375, 868.5375, 868.5625, 868.5875, 868 7875, 868.8125, 868.8375 MHz
PHILADELPHIA (PHILADELPHIA COUNTY), PENNSYLVANIA
866.0125, 866 1000, 866.2875, 866 3375, 866.3625, 866.5125, 866.5875, 866.6875, 866 7875, 866 8125, 866 8375, 867.0125, 867.0625, 867 0875, 867.1125, 867 3500, 867.5125, 867 5625, 867 5875, 867.8125, 867 8375, 867 8625, 867.9375, 868 0125, 868.0625, 868.0875, 868.2875, 868.3125, 868.3375, 868.5375, 868.5625, 868.5875, 868 7875, 868 8125, 868 8375 MHz
PHILADELPHIA (PHILADELPHIA COUNTY), PENNSYLVANIA
866.1000, 866.2875, 866.3375, 866.3625, 866.5875, 866.6875, 866 7875, 866.8125, 866.8375, 867 0625, 867.0875, 867.1125, 867 3500, 867.5625, 867 5875, 867 8125, 867.8375, 867.8625, 867.9375, 868.0625, 868.0875, 868.2875, 868 3125, 868.3375, 868.5375, 868.5625, 868.5875, 868.7875, 868.8125, 868.8375 MHz
PHILADELPHIA (PHILADELPHIA COUNTY), PENNSYLVANIA
866.1000, 866.2875, 866.3375, 866.3625, 866.5875, 866.6875, 866.7875, 866 8125, 866.8375, 867.0625, 867.0875, 867.1125, 867 3500, 867 5625, 867 5875, 867 8125, 867 8375, 867.8625, 867 9375, 868 0625, 868 0875, 868 2875, 868.3125, 868 3375, 868 5375, 868.5625, 868.5875, 868.7875, 868.8125, 868 8375 MHz
SOMERTON (PHILADELPHIA COUNTY), PENNSYLVANIA
866 1000, 866.2875, 866 3375, 866 3625, 866 5875, 866 6875, 866 7875, 866.8125, 866 8375, 867 0625, 867.0875, 867.1125, 867.3500, 867.5625, 867 5875, 867 8125, 867.8375, 867.8625, 867 9375, 868.0625, 868 0875, 868.2875, 868 3125, 868 3375, 868 5375, 868.5625, 868 5875, 868.7875, 868.8125, 868.8375 MHz
PHILADELPHIA (PHILADELPHIA COUNTY), PENNSYLVANIA
866.1000, 866.2875, 866.3375, 866 3625, 866.5875, 866.6875, 866.7875, 866.8125, 866.8375, 867.0625, 867 0875, 867.1125, 867.3500, 867 5625, 867 5875, 867.8125, 867 8375, 867.8625, 867.9375, 868 0625, 868.0875, 868 2875, 868.3125, 868.3375, 868 5375, 868.5625, 868.5875, 868.7875, 868.8125, 868 8375 MHz

Call Sign WPUI511, Granted 03/12/2002.
PHILADELPHIA (PHILADELPHIA COUNTY), PENNSYLVANIA
866 1000, 866.2875, 866.3375, 866.3625, 866.5875, 866.6875, 866 7875, 866.8125, 866 8375, 867.0625, 867.0875, 867.1125, 867.3500, 867 5625, 867.5875, 867.8125, 867.8375, 867.8625, 867.9375, 868.0625, 868.0875, 868.2875, 868.3125, 868.3375, 868.5375, 868.5625, 868.5875, 868.7875, 868.8125, 868.8375 MHz
COLWYN (PHILADELPHIA COUNTY), PENNSYLVANIA
866.1000, 866 2875, 866.3375, 866.3625, 866.5875, 866.6875, 866 7875, 866.8125, 866.8375, 867.0625, 867.0875, 867.1125, 867.3500, 867.5625, 867.5875, 867 8125, 867.8375, 867.8625, 867.9375, 868.0625, 868 0875, 868 2875, 868.3125, 868.3375, 868 5375, 868.5625, 868.5875, 868.7875, 868.8125, 868 8375 MHz
PHILADELPHIA (PHILADELPHIA COUNTY), PENNSYLVANIA
866 1000, 866 2875, 866 3375, 866.3625, 866.5875, 866.6875, 866 7875, 866.8125, 866 8375, 867.0625, 867.0875, 867 1125, 867 3500, 867 5625, 867.5875, 867 8125, 867 8375, 867 8625, 867 9375, 868 0625, 868.0875, 868.2875, 868.3125, 868.3375, 868.5375, 868 5625, 868 5875, 868 7875, 868.8125, 868 8375 MHz
PHILADELPHIA (PHILADELPHIA COUNTY), PENNSYLVANIA
866.1000, 866.2875, 866.3375, 866.3625, 866.5875, 866 6875, 866.7875, 866.8125, 866 8375, 867.0625, 867.0875, 867 1125, 867.3500, 867.5625, 867 5875, 867 8125, 867.8375, 867.8625, 867 9375, 868 0625, 868.0875, 868.2875, 868.3125, 868.3375, 868.5375, 868 5625, 868.5875, 868.7875, 868.8125, 868.8375 MHz

SOUTH CAROLINA

SCANA Communications Inc
Call Sign WPQB894, Granted 05/15/2000.
LAURENS (LAURENS COUNTY), SOUTH CAROLINA
854 8375, 854.9125, 855 0375, 855 1375, 855.3375, 855.5125, 856.8875, 856.9125, 857 8125, 857.8375, 858.8125, 859 8625, 860.8125

SOUTH DAKOTA

SOUTH DAKOTA, STATE
Call Sign WPWA674, Granted 09/27/2002.
Call Sign WPKH250, Granted 02/19/1997.
DEADWOOD (LAWRENCE COUNTY), SOUTH DAKOTA
173.3625 MHz
DEADWOOD (LAWRENCE COUNTY), SOUTH DAKOTA
173.3625 MHz

TENNESSEE

DYERSBURG
Call Sign WPIM587, Granted 05/08/2002.
DYERSBURG (DYER COUNTY), TENNESSEE
856 4875, 857 4875, 858.4875, 859 4875, 860.4875 MHz

MEMPHIS
Call Sign WPAJ881, Granted 07/18/2002.
MEMPHIS (SHELBY COUNTY), TENNESSEE
855 4625, 856 2375, 856 4375, 856.4625, 856 7125, 856.9375, 856.9625, 857.2375, 857 4375, 857.4625, 857.7125, 857 9375, 857.9625, 858 2375, 858 4375, 858.4625, 858 7125, 858.9375, 858.9625, 859.2375, 859.4375, 859.4625, 859.7125, 859.9375, 859.9625, 860.2375, 860.4375, 860 4625, 860 7125, 860.9375, 860.9625 MHz
MEMPHIS (SHELBY COUNTY), TENNESSEE
855 4625, 856.2375, 856.4375, 856.4625, 856.7125, 856.9375, 856 9625, 857.2375, 857.4375, 857.4625, 857.7125, 857.9375, 857 9625, 858.2375, 858.4375, 858.4625, 858.7125, 858.9375, 858.9625, 859.2375, 859 4375, 859 4625, 859.7125, 859.9375, 859.9625, 860.2375, 860.4375, 860.4625, 860 7125, 860.9375, 860.9625 MHz
MEMPHIS (SHELBY COUNTY), TENNESSEE
855.4625, 856 2375, 856.4375, 856.4625, 856.7125, 856.9375, 856.9625, 857 2375, 857 4375, 857.4625, 857.7125, 857.9375, 857.9625, 858.2375, 858 4375, 858.4625, 858.7125, 858.9375, 858.9625, 859.2375, 859.4375, 859.4625, 859.7125, 859.9375, 859.9625, 860.2375, 860.4375, 860.4625, 860 7125, 860.9375, 860.9625 MHz
MEMPHIS (SHELBY COUNTY), TENNESSEE
855.4625, 856.2375, 856.4375, 856.4625, 856 7125, 856.9375, 856 9625, 857.2375, 857.4375, 857 4625, 857.7125, 857.9375, 857.9625, 858.2375, 858 4375, 858.4625, 858.7125, 858.9375, 858.9625, 859.2375, 859 4375, 859.4625, 859 7125, 859.9375, 859 9625, 860.2375, 860.4375, 860.4625, 860 7125, 860 9375, 860.9625 MHz
MEMPHIS (SHELBY COUNTY), TENNESSEE
855 4625, 856.2375, 856 4375, 856.4625, 856 7125, 856.9375, 856 9625, 857 2375, 857 4375, 857.4625, 857.7125, 857.9375, 857.9625, 858.2375, 858.4375, 858.4625, 858.7125, 858 9375, 858.9625, 859.2375, 859 4375, 859.4625, 859 7125, 859.9375, 859.9625, 860.2375, 860.4375, 860.4625, 860.7125, 860.9375, 860.9625 MHz

NASHVILLE & DAVIDSON COUNTY
Call Sign WPGJ688, Granted 05/06/1999.
ANTIOCH (DAVIDSON COUNTY), TENNESSEE
856.2125, 856.2625, 856.4625, 856.4875, 856.7125, 856.7625, 856.9375, 856.9875, 857.2125, 857.2625, 857.4625, 857.4875, 857.7125, 857 7625, 857.9875, 858.2125, 858.2625, 858.4625, 858.4875, 858.7125, 858 7625, 858.9375, 858.9875, 859.2625, 859.4625, 859.7125, 859.7625, 859.9375, 859.9875, 860 2125, 860.2625, 860.4625, 860.7125, 860.7625, 860.9375, 860.9875 MHz
NASHVILLE (DAVIDSON COUNTY), TENNESSEE
856.2125, 856 2625, 856.4625, 856.4875, 856.7125, 856.7625, 856 9375, 856 9875, 857.2125, 857 2625, 857.4625, 857.4875, 857.7125, 857.7625, 857 9875, 858.2125, 858.2625, 858.4625, 858.4875, 858.7125, 858.7625, 858.9375, 858.9875, 859.2625, 859.4625, 859.7125, 859.7625, 859.9375, 859.9875, 860.2125, 860.2625, 860.4625, 860.7125, 860.7625, 860 9375, 860.9875 MHz
NASHVILLE (DAVIDSON COUNTY), TENNESSEE
856.2125, 856.2625, 856.4625, 856.4875, 856.7125, 856.7625, 856 9375, 856.9875, 857 2125, 857.2625, 857.4625, 857.4875, 857.7125, 857.7625, 857.9875, 858.2125, 858.2625, 858.4625, 858.4875, 858.7125, 858.7625, 858.9375, 858.9875, 859.2625, 859.4625, 859.7125, 859.7625, 859.9375, 859.9875, 860.2125, 860.2625, 860.4625, 860.7125, 860.7625, 860.9375, 860.9875 MHz
BELLEVIEW (DAVIDSON COUNTY), TENNESSEE
856.2125, 856.2625, 856.4625, 856.4875, 856.7125, 856.7625, 856.9375, 856.9875, 857.2125, 857.2625, 857.4625, 857.4875, 857.7125, 857.7625, 857.9875, 858.2125, 858.2625, 858.4625, 858 4875, 858.7125, 358 7625, 358 9375, 858.9875, 859.2625, 859 4625, 859.7125, 859.7625, 959.9375, 959.9875, 860 2125, 860.2625, 860.4625, 860.7125, 860 7625, 860 9375, 860.9875 MHz
JOELTON (DAVIDSON COUNTY), TENNESSEE
856.2125, 856 2625, 856.4625, 856 4875, 856.7125, 856.7625, 856.9375, 856.9875, 857.2125, 857 2625, 857.4625, 857.4875, 857.7125, 857.7625, 857.9875, 858 2125, 858.2625, 858.4625, 858 4875, 858.7125, 858.7625, 858.9375, 858.9875, 859.2625, 859.4625, 859.7125, 859.7625, 859.9375, 959 9875, 860.2125, 860.2625, 860.4625, 860.7125, 860.7625, 860 9375, 860.9875 MHz
Call Sign WPPW562, Granted 02/11/2000.
NASHVILLE (DAVIDSON COUNTY), TENNESSEE
866.4625, 867.4250, 867.7375, 867.9875, 868.7375 MHz

TEXAS

AUSTIN
Call Sign WPQY813, Granted 12/05/2000.
AUSTIN (TRAVIS COUNTY), TEXAS
866.0125, 866.0375, 866.0625, 866.0875, 866.1375, 866.1625, 866.1875, 866.2125, 866.2375, 866.2625, 866.2875, 866.3125, 866.3375, 866 3625, 866.3875, 866.4125, 866.4375, 866.4625, 866.5125, 866.5625, 866.5875, 866.6125, 866.6375, 866.6750, 866.7125, 866.7375, 866.7625, 866.7875, 866.8125, 866.8375, 866.8625, 866.8875, 866.9250, 866.9500, 866 9750, 867 1125, 867.1375, 867.1625, 867.1875, 867.2125, 867.2375,

867.2625, 867.2875, 867 3125, 867.3375, 867.3750, 867.4125, 867.4500, 867 4750, 867.5125, 867.5500, 867.5750, 867.6000, 867.6375, 867.6625, 867.6875, 867.7250, 867 7500, 867.7750, 867.8000, 867.8250, 867.8500, 867 8750, 867.9000, 867.9250, 867.9500, 867.9750, 868.0125, 868.0750, 868.1000, 868.1250, 868 1500, 868.1750, 868.2000, 868.2250, 868.2500, 868.2750, 868 3000, 868.3250, 868.3750, 868.4000, 868.4250, 868.4625, 868.5000, 868.5250, 868.5500, 868.5750, 868.6000, 868.6250, 868.6625, 868.6875, 868 7125, 868.7500, 868.7750, 868.8000, 868.8250, 868.8500, 868 8750, 868.8875, 868.9250, 868.9500, 868.9750 MHz

Call Sign WPUJ461, Granted 09/13/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
866.2625, 866.6125, 866.8625, 867 1375, 867.7750 MHz

Call Sign WPUJ462, Granted 09/13/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
866.0375, 866.0625, 866.1375, 866 1625, 866.2875, 866.3125, 866.3875, 866.4125, 866.5625, 866.5875, 866.7125, 866.7375, 866.8125, 866.8375, 866.9250, 867.0875, 867 1125, 867.1625, 867.1875, 867 3125, 867.3375, 867 4125, 867 5750, 867.6000, 867.6375, 867.6875, 867.8250, 867.8500, 867.9500, 868.0750, 868.1000, 868.1250, 868.2750, 868.3250, 868.3625, 868.4250, 868.5500, 868.5750, 868.6250, 868.6875, 868.8250, 868.8500, 868.8750, 868.9500 MHz

Call Sign WPUJ463, Granted 09/13/2002.
MANOR (TRAVIS COUNTY), TEXAS
867.8750, 868.2250, 868.5000, 868 9250 MHz

Call Sign WPUJ464, Granted 09/13/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
867 2625, 867 7250, 868.1750, 868.7750 MHz

Call Sign WPUJ465, Granted 09/13/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
866.0375, 866.0625, 866.1375, 866.1625, 866.2875, 866.3125, 866.3875, 866.4125, 866.5625, 866.5875, 866.7125, 866.7375, 866.8125, 866.8375, 866.9250, 867.0875, 867.1125, 867.1625, 867.1875, 867 3125, 867 3375, 867 4125, 867.5750, 867.6000, 867.6375, 867.6875, 867.8250, 867 8500, 867.9500, 868.0750, 868.1000, 868.1250, 868.2750, 868.3250, 868.3625, 868.4250, 868.5500, 868.5750, 868.6250, 868.6875, 868.8250, 868 8500, 868.8750, 868.9500 MHz

Call Sign WPUJ466, Granted 09/13/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
866.0375, 866 0625, 866.1375, 866.1625, 866 2875, 866 3125, 866.3875, 866.4125, 866.5625, 866.5875, 866 7125, 866 7375, 866.8125, 866.8375, 866.9250, 867 0875, 867.1125, 867.1625, 867.1875, 867 3125, 867.3375, 867.4125, 867 5750, 867.6000, 867.6375, 867 6875, 867.8250, 867 8500, 867.9500, 868.0750, 868.1000, 868.1250, 868 2750, 868.3250, 868.3625, 868.4250, 868.5500, 868.5750, 868.6250, 868.6875, 868.8250, 868.8500, 868.8750, 868.9500 MHz

Call Sign WPUJ468, Granted 09/13/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
866.0375, 866.0625, 866.1375, 866.1625, 866 2875, 866.3125, 866.3875, 866.4125, 866.5625, 866.5875, 866.7125, 866.7375, 866.8125, 866.8375, 866.9250, 867.0875, 867.1125, 867.1625, 867 1875, 867.3125, 867.3375, 867.4125, 867.5750, 867.6000, 867.6375, 867.6875, 867.8250, 867.8500, 867.9500, 868.0750, 868.1000, 868.1250, 868.2750, 868.3250, 868.3625, 868 4250, 868.5500, 868.5750, 868.6250, 868.6875, 868.8250, 868.8500, 868.8750, 868 9500 MHz

Call Sign WPUJ469, Granted 09/13/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
866 0375, 866.0625, 866.1375, 866.1625, 866.2875, 866.3125, 866.3875, 866.4125, 866.5625, 866.5875, 866.7125, 866.7375, 866 8125, 866.8375, 866.9250, 867.0875, 867.1125, 867.1625, 867.1875, 867.3125, 867 3375, 867.4125, 867.5750, 867.6000, 867.6375, 867.6875, 867.8250, 867.8500, 867.9500, 868 0750, 868.1000, 868.1250, 868.2750, 868.3250, 868.3625, 868.4250, 868.5500, 868.5750, 868.6250, 868.6875, 868.8250, 868.8500, 868 8750, 868.9500 MHz

Call Sign WPUJ470, Granted 09/13/2002
BEE CAVE (TRAVIS COUNTY), TEXAS
867.6625, 867.9250, 868 4000, 868.8000 MHz

Call Sign WPUJ592, Granted 09/13/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
866 0375, 866.0625, 866.1375, 866.1625, 866.2875, 866.3125, 866 3875, 866 4125, 866.5625, 866.5875, 866.7125, 866.7375, 866.8125, 866 8375, 866.9250, 867.0875, 867 1125, 867.1625, 867.1875, 867.3125, 867.3375, 867.4125, 867.5750, 867.6000, 867.6375, 867.6875, 867.8250, 867 8500, 867.9500, 868.0750, 868.1000, 868.1250, 868.2750, 868.3250, 868.3625, 868.4250, 868 5500, 868.5750, 868.6250, 868.6875, 868.8250, 868.8500, 868.8750, 868 9500 MHz

Call Sign WPVA298, Granted 06/05/2002
BEE CAVE (TRAVIS COUNTY), TEXAS
866.0375, 866.1625, 866.2875, 866.4125, 866 5625, 866 7125, 866.8125, 866.9250, 867.0875, 867.1125, 867.3125, 867.3375, 867 5750, 867.6000, 867.8250, 867.8500, 868.1000, 868.1250, 868.3625, 868.4250, 868.6250, 868.6875, 868.8750, 868 9500 MHz

Call Sign WPVA300, Granted 06/05/2002.
Austin (TRAVIS COUNTY), TEXAS
866.0375, 866 1625, 866.2875, 866.4125, 866.5625, 866.7125, 866.8125, 866.9250, 867.0875, 867.1125, 867.3125, 867.3375, 867.5750, 867 6000, 867.8250, 867 8500, 868 1000, 868.1250, 868.3625, 868 4250, 868.6250, 868.6875, 868.8750, 868.9500 MHz

Call Sign WPVA301, Granted 06/05/2002.
MARBLE FALLS (TRAVIS COUNTY), TEXAS
866.4625, 866.8875, 867.2875, 867.8000, 868.1500, 868 7500 MHz

Call Sign WPVD245, Granted 06/21/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
866.0375, 866.0625, 866.1375, 866.1625, 866.2875, 866.3125, 866.3875, 866.4125, 866.5625, 866.5875, 866.7125, 866.7375, 866.8125, 866.8375, 866.9250, 867 0875, 867.1125, 867.1625, 867 1875, 867 3125, 867.3375, 867.4125, 867.5750, 867.6000, 867.6375, 867.6875, 867 8250, 867.8500, 867.9500, 868.0750, 868.1000, 868.1250, 868 2750, 868.3250, 868.3625, 868.4250, 868.5500, 868.5750, 868.6250, 868.6875, 868.8250, 868.8500, 868.8750, 868.9500 MHz

Call Sign WPVZ830, Granted 09/23/2002.
BEE CAVE (TRAVIS COUNTY), TEXAS
866.0375, 866.1625, 866.2875, 866.4125, 866.5625, 866.7125, 866.8125, 866.9250, 867.0875, 867.1125, 867 3125, 867.3375, 867 5750, 867.6000, 867.8250, 867.8500, 868.1000, 868.1250, 868.3625, 868.4250, 868.6250, 868 6875, 868.8750, 868.9500 MHz

Call Sign WPVZ832, Granted 09/23/2002.
AUSTIN (TRAVIS COUNTY), TEXAS
866.0375, 866.1625, 866.2875, 866.4125, 866.5625, 866 7125, 866.8125, 866.9250, 867.0875, 867.1125, 867.3125, 867 3375, 867.5750, 867.6000, 867.8250, 867.8500, 868.1000, 868.1250, 868.3625, 868.4250, 868.6250, 868.6875, 868.8750, 868.9500 MHz

Call Sign WPVZ833, Granted 09/23/2002.
MARBLE FALLS (TRAVIS COUNTY), TEXAS
866 4625, 866.8875, 867.2875, 867.8000, 868.1500, 868 7500 MHz

CALDWELL COUNTY

Call Sign WPLP819, Granted 11/13/1997.
LOCKHART (CALDWELL COUNTY), TEXAS
866 0125, 868 6500 MHz

MANSFIELD

Call Sign WNXC886, Granted 08/16/2001.
MANSFIELD (TARRANT COUNTY), TEXAS
866.0125, 866.5125, 867.0125, 867.5125, 868.0125, 868.2875, 868.3125, 868.3375, 868.3625, 868.3875 MHz

VIRGINIA

CHESAPEAKE

Call Sign WPMA403, Granted 05/04/1998.
CHESAPEAKE, VIRGINIA
866.2000, 866.7625, 866.8625, 867.0125, 867.0375, 867.6250, 867.6750, 867.7625, 867.8250, 867.9125, 867 9625, 868.0125, 868.0625, 868.1875, 868.3000, 868.3750, 868.4625, 868.7250, 868.7875, 868.9875
CHESAPEAKE, VIRGINIA
866.2000, 866.7625, 866.8625, 867.0125, 867 0375, 867.6250, 867.6750, 867.7625, 867.8250, 867.9125, 867.9625, 868.0125, 868 0625, 868.1875, 868.3000, 868.3750, 868.4625, 868.7250, 868.7875, 868.9875
CHESAPEAKE, VIRGINIA
866.2000, 866.7625, 866.8625, 867.0125, 867.0375, 867.6250, 867 6750, 867.7625, 867.8250, 867 9125, 867.9625, 868.0125, 868.0625, 868.1875, 868 3000, 868 3750, 868.4625, 868.7250, 868.7875, 868.9875

CHESTERFIELD COUNTY

Call Sign KNJU750, Granted 04/18/2002.
MIDLOTHIAN (CHESTERFIELD COUNTY), VIRGINIA
856.2125, 856.2375, 856.7625, 856.9375, 857 2125, 857.2375, 857 7625, 857.9375, 858.2125, 858.2375, 858.7625, 858.9375, 359.2125, 859.2375, 859.7625, 859.9375, 860.2125, 860.2375, 860.7625, 860.9375
BON AIR (CHESTERFIELD COUNTY), VIRGINIA
856.2125, 856.2375, 856.7625, 856.9375, 857.2125, 857.2375, 857.7625, 857.9375, 858.2125, 858.2375, 858.7625, 858 9375, 859.2125, 859.2375, 859.7625, 859.9375, 860.2125, 860.2375, 860.7625, 860.9375
BUCKINGHAM (CHESTERFIELD COUNTY), VIRGINIA
856.2125, 856.2375, 856.7625, 856.9375, 857.2125, 657.2375, 857 7625, 857.9375, 858.2125, 858.2375, 858.7625, 858.9375, 859 2125, 859.2375, 859 7625, 859 9375, 860.2125, 860.2375, 860.7625, 860.9375
RICHMOND, VIRGINIA
856.2125, 856.2375, 856.7625, 856.9375, 857.2125, 657 2375, 857 7625, 857.9375, 858.2125, 858.2375, 858.7625, 858.9375, 859.2125, 859 2375, 859.7625, 859.9375, 860.2125, 860 2375, 860.7625, 860.9375
Call Sign WPRX355, Granted 03/08/2001.
COLONIAL HEIGHTS, VIRGINIA
856.2125, 856.2375, 856 7625, 856.9375, 857 2125, 857.2375, 857 7625, 857 9375, 858.2125, 858.2375, 858.7625, 858 9375, 859.2125, 859.2375, 859.7625, 859.9375, 860.2125, 860.2375, 860.7625, 860.9375
BEACH (CHESTERFIELD COUNTY), VIRGINIA
856 2125, 856.2375, 856.7625, 856.9375, 857.2125, 857.2375, 857.7625, 857.9375, 858.2125, 858.2375, 858.7625, 858.9375, 859 2125, 859.2375, 859 7625, 859.9375, 860.2125, 860.2375, 860.7625, 860.9375
CHESTERFIELD (CHESTERFIELD COUNTY), VIRGINIA
856 2125, 856.2375, 856.7625, 856.9375, 857 2125, 857.2375, 857 7625, 857.9375, 858.2125, 858.2375, 858.7625, 858.9375, 859.2125, 859 2375, 859.7625, 859.9375, 860.2125, 860.2375, 860.7625, 860 9375
RICHMOND (CHESTERFIELD COUNTY), VIRGINIA
856.2125, 856.2375, 856.7625, 856.9375, 857.2125, 857 2375, 857.7625, 857 9375, 858.2125, 858.2375, 858.7625, 858.9375, 859.2125, 859 2375, 859.7625, 859.9375, 860.2125, 860.2375, 860.7625, 860.9375
SCREAMERSVILLE (CHESTERFIELD COUNTY), VIRGINIA
856.2125, 856.2375, 856.7625, 856 9375, 857.2125, 857.2375, 857.7625, 857.9375, 858.2125, 858.2375, 858 7625, 858.9375, 859.2125, 859.2375, 859.7625, 859 9375, 860.2125, 860 2375, 860.7625, 860.9375

FAIRFAX COUNTY

Call Sign KNIH412, Granted 05/02/2000.
FAIRFAX STATION (FAIRFAX COUNTY), VIRGINIA
852.9625, 853.1875, 853.3375, 853 4625, 853 4875, 853.6375, 853 7875, 853 9125, 853.9625, 854 1375, 854 2625, 854.2875, 854.4625, 855.9625, 855.9875, 856.2625, 857.2625, 858.2625, 859.2625, 860.2625
LORTON (FAIRFAX COUNTY), VIRGINIA
852.9625, 853.1875, 853.3375, 853.4625, 853.4875, 853.6375, 853.7875, 853.9125, 853.9625, 854.1375, 854.2625, 854.2875, 854.4625, 855.9625, 855.9875, 856.2625, 857 2625, 858.2625, 859.2625, 860 2625
FALLS CHURCH, VIRGINIA
852.9625, 853.1875, 853.3375, 853.4625, 853.4875, 853.6375, 853.7875, 853.9125, 853.9625, 854.1375, 854.2625, 854 2875, 854.4625, 855 9625, 855.9875, 856.2625, 857.2625, 858.2625, 859.2625, 860.2625
RESTON (FAIRFAX COUNTY), VIRGINIA
852.9625, 853.1875, 853.3375, 853.4625, 853.4875, 853.6375, 853 7875, 853.9125, 853 9625, 854.1375, 854.2625, 854.2875, 854.4625, 855.9625, 855.9875, 856.2625, 857.2625, 858.2625, 859.2625, 860.2625
GREAT FALLS (FAIRFAX COUNTY), VIRGINIA
852.9625, 853.1875, 853.3375, 853.4625, 853.4875, 853.6375, 853.7875, 853.9125, 853.9625, 854.1375, 854.2625, 854.2875, 854.4625, 855.9625, 855.9875, 856.2625, 857.2625, 858.2625, 859.2625, 860.2625
FAIRFAX, VIRGINIA
852.9625, 853.1875, 853.3375, 853.4625, 853.4875, 853.6375, 853.7875, 853.9125, 853 9625, 854 1375, 854.2625, 854.2875, 854.4625, 855.9625, 855.9875, 856.2625, 857.2625, 858.2625, 859.2625, 860.2625
Call Sign WNAJ365, Granted 02/02/2000.
SPRINGFIELD (FAIRFAX COUNTY), VIRGINIA
852.9625, 853.1875, 853.3375, 853.4625, 853.4875, 853.6375, 853.7875, 853.9125, 853.9625, 854 1375, 854.2625, 854.2875, 854.4625, 855.9625, 855.9875, 856.2625, 857.2625, 858.2625, 859.2625, 860.2625
ALEXANDRIA, VIRGINIA
852.9625, 853.1875, 853.3375, 853.4625, 853.4875, 853.6375, 853 7875, 853.9125, 853.9625, 854 1375, 854.2625, 854.2875, 854 4625, 855.9625, 855 9875, 856.2625, 857 2625, 858.2625, 859.2625, 860.2625

HENRICO COUNTY

Call Sign WPJQ516, Granted 10/30/2001.
RICHMOND, VIRGINIA
854.9875, 855 2125, 855.2375, 855.4875, 855.9875, 856.9625, 856.9875, 857.9875, 858 9875, 859.4375, 859 9625, 859 9875, 860.4375, 860.9625, 860 9875 MHz
RICHMOND, VIRGINIA
854.9875, 855.2125, 855.2375, 855.4875, 855 9875, 856.9625, 856.9875, 857.9875, 858 9875, 859 4375, 859.9625, 859 9875, 860 4375, 860.9625, 860.9875 MHz
RICHMOND, VIRGINIA
854 9875, 855.2125, 855.2375, 855.4875, 855.9875, 856.9625, 856.9875, 857.9875, 858.9875, 859 4375, 859.9625, 859.9875, 860 4375, 860.9625, 860.9875 MHz
RICHMOND, VIRGINIA
854.9875, 855.2125, 855.2375, 855.4875, 855.9875, 856 9625, 856.9875, 857.9875, 858.9875, 859.4375, 859.9625, 859 9875, 860.4375, 860.9625, 860.9875 MHz

Call Sign WPMY244, Granted 03/24/1999.
RICHMOND, VIRGINIA
866.2125, 866.4375, 866.4625, 866 8500, 867.1500, 867.3000, 867.8125, 868.7250, 868 8625 MHz
RICHMOND, VIRGINIA
866.2125, 866.4625, 866.7375, 866.8500, 867.1500, 867.3000, 867 8125, 868.7250, 868.8625 MHz
RICHMOND, VIRGINIA
866.2125, 866.4625, 866.7375, 866.8500, 867.1500, 867.3000, 867 8125, 868.7250, 868.8625 MHz
RICHMOND, VIRGINIA
866.2125, 866 4625, 866.7375, 866.8500, 867.1500, 867 3000, 867.8125, 868.7250 MHz

LOUDOUN COUNTY

Call Sign WPQZ390, Granted 12/12/2000.
STERLING (LOUDOUN COUNTY), VIRGINIA
866.5500, 866.5875, 866.8000, 867.0375, 867.0750, 867 3250, 868.0500, 868.6625, 868.7750, 868.9125 MHz

Call Sign WPRS263, Granted 01/09/2001.
ASHBURN (LOUDOUN COUNTY), VIRGINIA
866.5500, 866.5875, 866.8000, 867.0375, 867 0750, 867.3250, 868.0500, 868.6625, 868.7750, 868.9125 MHz
BLUEMONT (JEFFERSON COUNTY), WEST VIRGINIA
866.5500, 866.5875, 866.8000, 867 0375, 867.0750, 867 3250, 868.0500, 868 6625, 868 7750, 868.9125 MHz
BULL RUN (PRINCE WILLIAM COUNTY), VIRGINIA
866.5500, 866.5875, 866.8000, 867.0375, 867 0750, 867.3250, 868 0500, 868.6625, 868.7750, 868.9125 MHz
HERNDON (LOUDOUN COUNTY), VIRGINIA
866.5500, 866 5875, 866.8000, 867.0375, 867.0750, 867.3250, 868.0500, 868.6625, 868.7750, 868.9125 MHz
LEESBURG (LOUDOUN COUNTY), VIRGINIA
866 5500, 866.5875, 866.8000, 867.0375, 867.0750, 867 3250, 868.0500, 868 6625, 868.7750, 868 9125 MHz
LOUDOUN HEIGHTS (LOUDOUN COUNTY), VIRGINIA
866.5500, 866.5875, 866.8000, 867.0375, 867.0750, 867.3250, 868.0500, 868.6625, 868.7750, 868 9125 MHz

Call Sign WPUC262, Granted 02/01/2002.
ASHBURN (LOUDOUN COUNTY), VIRGINIA
866 5500, 866 5875, 866 8000, 867.0375, 867 0750, 867.3250, 868 0500, 868.6625, 868.7750, 868.9125 MHz

PRINCE WILLIAM COUNTY

Call Sign WPHP905, Granted 07/18/2000.
MANASSAS, VIRGINIA

866.4500, 866.4750, 866.7000, 866.7250, 866.9625, 866.9875, 867.7875, 867.9000, 868.1750, 868.3375, 868.6000, 868.6250, 868.8500, 868.8750, 868.9500 MHz
WOODBRIDGE (PRINCE WILLIAM COUNTY), VIRGINIA
866.4500, 866.4750, 866.7000, 866.7250, 866.9625, 866.9875, 867.7875, 867.9000, 868.1750, 868.3375, 868.6000, 868.6250, 868.8500, 868.8750, 868.9500 MHz
DUMFRIES (PRINCE WILLIAM COUNTY), VIRGINIA
866.4500, 866.4750, 866.7000, 866.7250, 866.9625, 866.9875, 867.7875, 867.9000, 868.1750, 868.3375, 868.6000, 868.6250, 868.8500, 868.8750, 868.9500 MHz

Warrenton Fauquier Joint Communication Center
Call Sign WPVP306, Granted 07/24/2002.
MARSHALL (FAUQUIER COUNTY), VIRGINIA
867.7000, 867.8500, 867.9250, 868.4500, 868.5500, 868.7125 MHz
REMINGTON (CULPEPER COUNTY), VIRGINIA
867.7000, 867.8500, 867.9250, 868.4500, 868.5500, 868.7125 MHz
MORRISVILLE (FAUQUIER COUNTY), VIRGINIA
867.7000, 867.8500, 867.9250, 868.4500, 868.5500, 868.7125 MHz
LINDEN (FAUQUIER COUNTY), VIRGINIA
867.7000, 867.8500, 867.9250, 868.4500, 868.5500, 868.7125 MHz

WASHINGTON

SEATTLE
Call Sign WNUB692, Granted 05/30/2001.
SEATTLE (KING COUNTY), WASHINGTON
851.0875, 851.1375, 851.1875, 851.3625, 851.4125, 851.8875, 851.9375, 851.9875, 852.1625, 852.6375, 852.6875, 852.8625, 852.9125, 853.3875, 853.4375, 853.4875, 853.6125, 854.0875, 854.1875, 854.2375, 854.3625 MHz
SEATTLE (KING COUNTY), WASHINGTON
851.0875, 851.1375, 851.1875, 851.3625, 851.4125, 851.8875, 851.9375, 851.9875, 852.1625, 852.6375, 852.6875, 852.8625, 852.9125, 853.3875, 853.4375, 853.4875, 853.6125, 854.0875, 854.1875, 854.2375, 854.3625 MHz
KINGSTON (KITSAP COUNTY), WASHINGTON
853.6125 MHz
SEATTLE (KING COUNTY), WASHINGTON
851.0875, 851.1375, 851.1875, 851.3625, 851.4125, 851.8875, 851.9375, 851.9875, 852.1625, 852.6375, 852.6875, 852.8625, 852.9125, 853.3875, 853.4375, 853.4875, 853.6125, 854.0875, 854.1875, 854.2375, 854.3625 MHz
SEATTLE (KING COUNTY), WASHINGTON
851.0875, 851.1375, 851.1875, 851.3625, 851.4125, 851.8875, 851.9375, 851.9875, 852.1625, 852.6375, 852.6875, 852.8625, 852.9125, 853.3875, 853.4375, 853.4875, 853.6125, 854.0875, 854.1875, 854.2375, 854.3625 MHz
Call Sign WPFQ240, Granted 09/13/1999.
SEATTLE (KING COUNTY), WASHINGTON
866.2875, 866.3125, 866.3375, 866.4375, 866.6875, 866.7125, 866.7375, 866.8875, 867.2875, 867.7625, 867.7875, 868.1750, 868.4750, 868.6750, 868.8750 MHz
SEATTLE (KING COUNTY), WASHINGTON
866.2875, 866.3125, 866.3375, 866.4375, 866.6875, 866.7125, 866.7375, 866.8875, 867.2875, 867.7625, 867.7875, 868.1750, 868.4750, 868.6750, 868.8750 MHz
KINGSTON (KITSAP COUNTY), WASHINGTON
866.1625, 866.4125, 866.6625, 868.2250, 868.6500, 868.9000 MHz
SEATTLE (KING COUNTY), WASHINGTON
866.2875, 866.3125, 866.3375, 866.4375, 866.6875, 866.7125, 866.7375, 866.8875, 867.2875, 867.7625, 867.7875, 868.1750, 868.4750, 868.6750, 868.8750 MHz
SEATTLE (KING COUNTY), WASHINGTON
866.2875, 866.3125, 866.3375, 866.4375, 866.6875, 866.7125, 866.7375, 866.8875, 867.2875, 867.7625, 867.7875, 868.1750, 868.4750, 868.6750, 868.8750 MHz

WISCONSIN

WISCONSIN, STATE
Call Sign KQO228, Granted 04/18/2002.
BARABOO (SAUK COUNTY), WISCONSIN
139.0125, 139.1875, 139.3625, 139.7375, 139.9125 MHz
BLACK RIVER FALLS (JACKSON COUNTY), WISCONSIN
139.0875, 139.2125, 139.4125, 139.7625, 139.9625 MHz
MILTON JUNCTION (ROCK COUNTY), WISCONSIN
139.1125, 139.2625, 139.6125, 139.8125, 140.3625 MHz
RIDGEVILLE (MONROE COUNTY), WISCONSIN
139.1625, 139.3125, 139.6625, 139.8625, 140.4125 MHz
Call Sign WNUX451, Granted 06/30/2001.
GREENBUSH (SHEBOYGAN COUNTY), WISCONSIN
856.4875, 858.4875, 859.4875 MHz
TAYCHEEDAH (FOND DU LAC COUNTY), WISCONSIN
855.4875, 858.4875, 859.4875, 860.4875 MHz
FITCHBURG (DANE COUNTY), WISCONSIN
856.4875, 858.4875, 859.4875 MHz
BOSCOBEL (GRANT COUNTY), WISCONSIN
856.4875, 858.4875, 859.4875, 860.4875 MHz
REDGRANITE (WAUSHARA COUNTY), WISCONSIN
856.9375, 858.9375, 859.9375 MHz
Call Sign WNVF925, Granted 06/30/2001.
WAUPUN (DODGE COUNTY), WISCONSIN
855.4875, 856.4875, 857.4875, 858.4875, 859.4875 MHz
STURTEVANT (RACINE COUNTY), WISCONSIN
854.9625, 856.4875, 858.4875, 859.4875 MHz
OSHKOSH (WINNEBAGO COUNTY), WISCONSIN
856.4875, 857.4875, 858.4875, 859.4875 MHz
PORTAGE (COLUMBIA COUNTY), WISCONSIN
856.4875, 858.4875, 859.4875 MHz
DE PERE (BROWN COUNTY), WISCONSIN
856.4875, 858.4875, 859.4875 MHz
FOX LAKE (DODGE COUNTY), WISCONSIN
854.4875, 855.4875, 860.4875 MHz
Call Sign WPGV568, Granted 02/16/2000.
BLACK RIVER FALLS (JACKSON COUNTY), WISCONSIN
856.4875, 858.4875, 859.4875 MHz
Call Sign WPLR315, Granted 10/12/2002.
RACINE (RACINE COUNTY), WISCONSIN
856.9375, 858.9375, 859.9375 MHz
UNION GROVE (RACINE COUNTY), WISCONSIN
856.9375, 858.9375, 859.9375 MHz
MILWAUKEE (MILWAUKEE COUNTY), WISCONSIN
856.9375, 858.9375, 859.9375, 860.9375 MHz
Call Sign WPLV685, Granted 03/13/1998.
WINNEBAGO (WINNEBAGO COUNTY), WISCONSIN
856.9375, 858.9375, 859.9375 MHz
MADISON (DANE COUNTY), WISCONSIN
811.9375, 813.9375, 814.9375, 856.9375, 858.9375, 859.9375 MHz

This concludes MT's Guide to APCO systems. The full listing plus updates may be found at http://www.signalharbor.com

TV "Rovers" and Their Radios

By John Treadgold

Crow's KPRC TV rover truck. Wally Crow photo.

"Rovers" are what television stations call the indispensable videocrews that roam around, listening to scanners and searching out news tips which can be captured on video to illustrate the newscasts. The rover brings in stories that are heard from police/fire radios, checks out call-in tips, or witnesses events from roaming around. They are regular news photographers who specialize in police, fire, and weather stories.

In major TV markets, each station will have at least one full time rover; some have round the clock rovers; others use freelancers at night. They are the first responders to a news story and will advise the station of the significance of the event.

I am a "rover" for KPRC TV in Houston, Texas, and have worked the "police beat" here for over 20 years using every type of radio from the old Bearcat 4 crystal radios to today's computer radio programs. I am frequently asked what we listen to and how we make use of radios. In this article I've combined some insights from police beat rovers at all our local stations.

My KPRC TV Rover truck setup. Radios are bolted down to deter theft. Radios with separate power units are kept in a locked cage. I keep radios that need the most adjusting at the top. J. Treadgold photo.

Houston is what we call a heavy spot news town. This means lots of "breaking news coverage" because of police and fire incidents. It's the fourth largest city in the US, with a very busy port and petrochemical complex. With tons of hazardous chemicals combined with trains, 18 wheelers, and millions of cars, there is plenty of emergency action to hear on the scanners.

The Radios

Most of the news trucks used as rovers monitor 10-12 radios...mostly transceivers (2 way radios)...and mostly set on single channels. Many scanner listeners think they need to have the radio with the largest number of channels. The problem is that when a scanner stops on an active channel, you are missing everything the other agencies are saying. Sometimes less is more.

We have dedicated radios (single channel) to Houston Fire and EMS Dispatch. Any serious police incident will need response from the above, so by monitoring these you can pick up good police calls also. These radios may be older, cheaper units that have only a few channels, since they mostly stay locked on one frequency. We use 800 MHz trunking radios to monitor many different Sheriff/outlying fire departments. A UHF scanning radio covering major city police channels and a VHF scanner covering smaller fire departments makes up the most common rover truck arrangement. Each rover will have a couple of other radios to monitor agencies of special interest to them for whatever reason.

There are over 100 public safety radio channels in the metro Houston area and no one can monitor every channel, much less all the surrounding cities. During disasters the Houston Fire Department may use five different dispatch channels. I do not try to closely monitor everything that is being said. With 12 radios to listen to I'd go crazy. Instead I listen for the tone of voice of a dispatcher or arriving unit to tell me what might be an interesting call to tune into. We are also backed up by our news desk in keeping track of the addresses of major calls.

John Treadgold in the back of his KPRC TV Rover truck. J. Treadgold photo

Communications is #1

We use FRS/GMRS radios, CB radios, station two-way radios, and cell phones to keep in contact, no matter what the disaster. All stations are now using digital two-way pagers to supplement voice radios. When Houston was pounded by tropical storm Allison last year, many cell phone towers were down. Some TV stations keep two cell phones on separate cell companies to have a better chance of getting out in disasters.

When a storm threatens, I carry an emergency communications bag with various scanners, handheld two-way radios, different cell phones, extra batteries, chargers and a small TV for weather radar info. We doublecheck frequency guides and monitor scanner web sites to try to maintain updated lists for all the counties around us. Many agencies will let us know if they are changing radio frequencies, because they want their citizens to see them on TV protecting their public. Other agencies will change in such a top secret fashion their own force won't know what channel to use.

When agencies switch to 800 MHz trunking or digital, they will sometimes sell extra radios to the media. These radios, usually Motorola, are very expensive (as in thousands of bucks), but they have very good audio, follow the conversations exactly with no loss of control channels, and last forever. They will usually have only dispatch channels programmed in them and are receive-only, except sometimes a news helicopter will be allowed some transmit functions so they can assist fire and police departments until a police chopper arrives. Midland, Kenwood, and Vertex Standard are other types

of transceiver radios used in news trucks along with Uniden, Alinco, Realistic, and Icom scanners.

If we cannot get the trunking radios directly from the agencies or through auctions, then we have to go with trunking scanners. Although these are good radios in fixed positions, we have a lot of problems with the radio reverting to scan instead of "hold" when mobile. I presume this to be because of heavy cell phone interference causing the radio to lose the control channel as we drive.

The Setup

Transceiver radios are better than most scanners at reducing intermod and have better voice audio, but cannot be easily reprogrammed. Thus, I use triple conversion scanners to get the ease of quick reprogramming plus pretty good audio.

Some news cars have separate antennas for each radio, but other stations are using one antenna for UHF, one for 800 MHz etc., and using a very high quality multi-splitter to serve several radios. Many stations use the small pancake style antennas so they can enter low clearance garages. With all the intermod in our city, it's necessary to try to keep antennas and power cords separated in an effort to get the best audio. Running the antenna and power cables in from separate sides of the mounts and enclosing them in a wire loom keeps them isolated.

Some stations have custom built console-type racks with all the radios custom-mounted, while others like being able to move the radios around to suit the operator. In either case, we use bolts instead of the little twist screws to better protect the radios from thieves.

A news truck with the newer "pancake" antennas that allow easier access to low parking garages. J. Treadgold photo

The newer alphanumeric radios make identifying who's on what so much easier than trying to remember what each radio has programmed into it. Some tips I've picked up along the way are: little reminders taped to the edge of the radio for agencies that recently changed frequencies; putting a piece of electrical tape over scan buttons so you don't accidentally hit scan on a radio you want to remain on a fixed channel; highlighting key buttons with a bright marker so you can glance down and know where the "hold" button is on your 780 radio, and where the proper audio level is for each radio.

Cut-off toggle switches are used so that you can cut out a group of similar agencies if going out of the area or when you have to talk

Derailed train in nearby Sealy, TX. Heard on a railroad channel. Not all emergencies are on police and fire bands. J. Treadgold photo. 2002.

with someone on the phone. Most wreckers and news trucks use toggle on/off switches to power up all their radios. When you turn the switch on, all radios power up at the same time on their assigned frequencies. It may also make the radios last longer by eliminating all the clicking on and off of the power knob.

Dual car batteries are good so you can leave the radios on when getting out of the car. If we had to turn the radios on and get them all adjusted every time we hopped in and out of the car, we'd miss all sorts of radio traffic. We mostly use external speakers on the radios – not only for better sound, but so all fire calls, etc., can be heard in one area of the truck. Some crews label the radio and its matching speaker for easier recognition. Some color-code both speaker and radio (red for fire channels, blue for police, etc.). These are just a few hints that I've seen used throughout the Houston area.

Call Us

All stations like scanner listeners to call in when they hear or see a possible news story. When you call, ask for the "assignment desk." The more info the better. What agency uses the channel that you heard the call on? The phone taker may not know all the frequencies by heart. What address or at least what part of town was the call? Even just knowing that you heard "Engine 7" has a fatality can help us track down the location. Please write down the info before calling to help ensure better accuracy.

We usually don't care about routine calls, unless it's the mayor's house, for example. But calls for planes down, people trapped, or injured fireman or officers are our priority. I also encourage you to submit tips or calls to

Emergency communications bag. When you have to change cars or fly somewhere else; this bag contains scanners, transceiver radios, FRS radio, dual service mobile phones, flashlight, and spare batteries in pockets on the other side.

the TV station web sites and various scanner web sites in your area. It helps newcomers know the type of activity they could be hearing in your area.

I believe in the right to monitor everything a taxpayer-supported entity broadcasts. *Monitoring Times* is full of stories of citizens coming to the aid of police and fire fighters after hearing something on a scanner. We need to speak out against any move to keep citizens from knowing what their public safety forces are doing.

Most of the fire departments here use VHF for backup dispatch and their volunteers need scanners in order to go to the call. Police officers' families want radios to listen to the sector their relative works. Storeowners want to know when a serial robber is hitting down the street. The media needs to know what is going on in their city at the time of the event, not during a staged news conference the next day.

We all owe Uniden and other radio makers a debt of gratitude for making an easy trunktracking radio as so many agencies have switched to 800 MHz trunked radios. Now I'm glad that they are working on digital models to follow some of the new systems.

However, I also believe in using the information wisely. Scanner traffic is full of mistakes and fictitious calls. Most TV stations in Houston will not go to routine suicide calls, bomb threats, or domestic disturbance calls. We also have an agreement with the Houston Police Department not to show live pictures of the locations of police sniper teams at SWAT scenes and we do our best to not reveal undercover officers or witnesses.

Radios have changed and our TV gear has changed; but the need to get first hand information from the airwaves has not.

A Note About the Author:

For more information on how scanners helped KPRC TV's John Treadgold break the exclusive story on a Houston mother who drowned her five children in her bathtub, read *Breaking Point*, a recent True Crime novel by Suzy Spencer.

Websites and Frequencies for Houston, TX:
http://groups.yahoo.com/group/Houstonscan

Houston Fire Main Dispatch	453.500
Houston EMS Dispatch	462.950
Houston EMS "Tac"	460.575
	(all use 127.3 for CTCSS tone)

Lifeflite Air Ambulance is on the Harris County, TX, 800 MHz trunking system

Product Sources:
Galls Inc. (radio mounting racks)
http://www.galls.com
1-800-854-2706

Advanced Communications of Texas
Custom radio consoles, etc.
713-827-7971

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More Antenna Lead-Ins & Satellite Update

There were several responses to the December issue of the *Beginner's Corner* regarding antenna lead-in cables and how to get them into the house. Two readers wrote about their experiences using a piece of PVC pipe inserted into an exterior wall to allow the antenna into the house.

Bill Alpert, KG6NRV of Cucamonga, CA, wrote, "...I got this idea from an ARRL book, and it worked well for me...It's a low cost solution. Pick up (or recycle) some PVC sprinkler pipe of a diameter appropriate for the cable [or cables] you'll be feeding through the wall. Drill a matching hole through the wall, and insert the pipe, leaving a couple of inches' protrusion on the outside end. Place a 90 degree elbow on the outside and point it down to keep water out. Feed the cables through, then stuff fiberglass insulation into the PVC on both ends to form an air seal. Caulk any cracks in the wall surface and you're ready to go...One nice feature: if you decide to add or change cables later, just pull out the insulation and make any changes needed. Alternatively, you can use spray foam to seal any cracks or air spaces..."

Denis Dandeneau, K1STB, from Winthrop, ME, had a few variations on this theme and added a few more details: "...I have been a ham since 1961 and the best method I found... is using a piece of 2-inch drain pipe which can be purchased at any hardware or home center. What I do is cut a 2-inch hole with a hole saw that fits into your drill. After the hole is drilled I punch a piece of the pipe through, mark it and cut it for correct length.

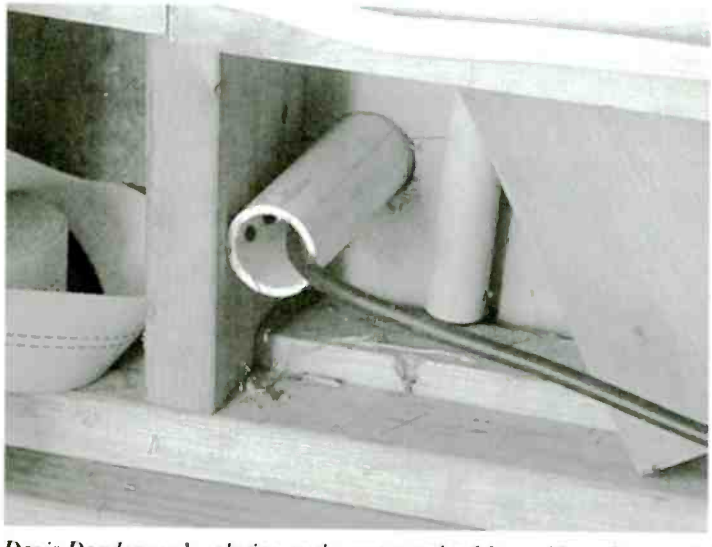
Reinsert the pipe into the hole and then, using a wood screw about 1.5 inches long, I secure the inside of the pipe to the frame of the house [note black dot inside pipe that is screwed to wall stud in Denis' photo]. I then use 45 degree elbows to make the opening [on the outside of the house] face down, eliminating rain in the shack.

I also use duct seal (available at hardware stores) and put it around the base of the pipe and outside wall (works great). Do not cement the flanges to the pipe (use duct seal) because it makes it easier to pull the 45 degree elbows off and fish the new cable through, also makes for a nice straight entry into the house..." Denis kindly provided photos of his installation which are shown here.

And Roger Nash, KE4EPO, from Memphis, TN, had a related comment concerning the lead-in subject: "I would like to remind everyone that if you select the 'High' installation [bringing the lead-in through the gable end vent] it could be inviting lightning to come inside your house. I know of someone who had to have his whole house rewired because of this. I think that all of the lightning arrester manufacturers (like Polyphaser, etc.) recommend running all types of antenna lead-in all the way down to the ground and then making a 90 degree turn to go inside. They also recommend a grounded metal panel at the entrance of your coax into your house. The coax could be taped to a heavy solid conductor wire attached to the antenna metal mast or pipe. I believe an 8-ft ground rod is recommended to be installed directly below the antenna mast. I would certainly be more in favor of the 'Low' type installation [having the antenna lead-in enter through the base of an exterior wall]."

This is certainly an excellent point, Roger. There are articles and columns in *MT* which have addressed this issue in the past, so check out your back issues or consult the *MT* Anthology. In addition, hams who subscribe to *QST* can learn more about lightning protection by checking out this year's June, July, and August issues of *QST* magazine for their series *Lightning Protection for the Amateur Radio Station.* If you're an ARRL member you can download the previous series which appeared in the October and December 1994 issues of *QST* for free.

Information on grounding your radios as well as your antennas can be found in the latest edition of the ARRL *Handbook for Radio Communications*, this year in its 80th edition. The handbook is available in soft-cover ($34.95 + $7 shipping), hardcover ($49.95 plus $8 shipping) or CD in Windows or Mac format ($39.95 + $5 shipping) from **http://www.arrl.org/shop** or call 888-277-5289. Earlier editions of the



Denis Dandeneau's solution to the antenna lead-in problem. Easy to find and work with, PVC pipe is fitted through a hole cut with a low cost 2" hole saw that fits on your drill. (Courtesy Denis Dandeneau)

Handbook can be readily found at hamfests for considerably less and will have much the same information.

There is also a section in the *ARRL Antenna Book* which covers the subject of grounding various antenna masts as well as open wire and coax feed lines. *The Antenna Book*, now in its 19th edition sells for $30 (soft-cover), $50 (leather hardbound) and $39.95 (CD ROM). For information on products designed to help hobbyists prevent lightning from damaging their equipment check out **http://www.polyphaser.com.**

❖ Satellite Industry Update

In the November and December issues of *MT* I wrote about "Tuning Into Broadcast Satellites" and there is one item that needs to be updated. Long time jazz broadcaster KKJZ (formerly KLON) ceased operating on C-band satellite Telstar 7 channel 15 when the carrier host, The Playboy Channel, switched to DigiCipherII pay-per-view format. That ended more than 15 years of continuous world class jazz on C-band. However, those with 4DTV receivers are enjoying several channels of uninterrupted, commercial free jazz programming on DMX's jazz channels, Swing 856, Classic Jazz 859, and Smooth Jazz 861. In addition, DMX Direct, the Ku-band delivered Dolby® AC-3 audio service has those channels as well as Jazz'n'Blues, Jazz Vocal Blends, Latin Jazz, and Dixieland.

Satellite Merger Failed

The proposed merger between DISH Network and DirecTV was finally called off by both participants after over a year of contentious wrangling among cable TV, over-the-air TV, the FCC, and other interested parties. It remains to be seen what the future holds for the two as major problems, such as DirecTV's piracy issue, remain unresolved. DISH has also made substantial gains in subscriber numbers during the year's wrangling and are in an even better financial and marketing position now than they were over a year ago.

In a related development, DirecTV's high speed satellite delivered Internet service, DirectTV DSL (formerly DirectPC), has been closed by corporate parent Hughes Electronics after pouring in tens of millions of dollars and garnering only 160,000 subscribers. This is the last of two satellite broadband platforms to go under in 12 months. The first to close its doors was StarBand which was a partnership which included Gilat Satellite Networks, Microsoft, EchoStar, and Radio Shack working with Compaq to supply the inboard satellite computer modems. Subscribers to DirecTV DSL will be shifted to some other land based technology or service.

Satellite Radio Sales Disappointing

The battle between the two Digital Audio Radio Services (DARS), Sirius Satellite Radio and XM Satellite Radio, continues. The biggest problem for both has been lack of subscribers, dwindling operating capital and near rock bottom stock prices. This has left investors standing on the sidelines watching as reports of possible bankruptcy for both services continue to circulate. The two found themselves victims of the wholesale hi-tech industry collapse of the last two years.

In the year 2000, stock in XM Satellite Radio, trading on the NASDAQ as XMSR, sold for as high as $43.75/share, despite the fact that it was a year and a half from launching. By the spring of 2002 it had fallen to just over $20/share. By the end of 2002 it was trading at just over $3.00/share. But, XM looked like a fantastic investment opportunity compared to beleaguered Sirius Satellite Radio, also trading on the NASDAQ as SIRI. In 2000 it was flying high with the highest of the high flying, untried hi-tech issues at as much as $35.50/share. By spring of 2002 it had sunk to $13/share and at year's end 2002 it collapsed to its all time low of just .66/share. Imagine having bought a hundred shares of Sirius satellite radio in 2000 for $3,500 and finding it three years later to be worth $66. It almost makes a weekend in 'Vegas look like a serious investment strategy.

But wait, there's less! Subscription numbers for both services have been disappointing by anyone's standards. By the first of November '02 XM had just over 200,000 subscribers. This after a full year of unending hype at all the big trade shows, countless awards by trade magazines and a full scale advertising blitz.

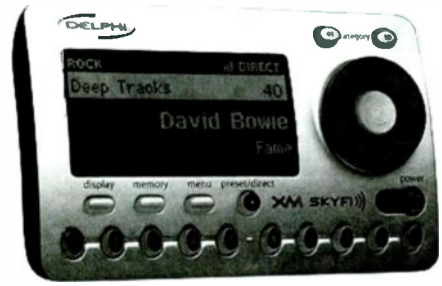
Still, XM looked like a business model showcase compared to Sirius. After technical glitches and manufacturing fiascos Sirius was finally out of the gate a full six months after XM's launch with predictably dismal results. By the first of November '02 Sirius had snagged a little over 16,000 subs. One year ago tireless brokerage house touts were flogging the Sirius stock claiming that there would be 150,000 to 200,000 subs by the end of '02. At best they were only off by 130,000. Meanwhile, just a little over six months ago stock hype-artists claimed XM would have as many as 351,000 subs by the end of '02. Again, only off by 150,000.

It's difficult to say how long either may be able to stave off the inevitable. Subscribers may have to add their satellite radio gear to the growing pile of useless products and services which were the darlings of Wall Street not too long ago.

SKYFI

One final satellite radio note: XM has teamed up with Delphi, a car radio manufacturer, to produce their SKYFI® Radio(see photo). Plans call for the SKYFI unit to retail for $130 but it requires a home or vehicle kit for another $70. Also offered is the SKYFI Audio System which is like a boombox with hi-fi speakers, satellite antenna and docking station to be used with a SKYFI receiver. The SKYFI Audio System will sell for $100. Still to be added to the cost, of course, is the $10/month subscription fee for XM satellite radio programming.

Among the features SKYFI has to offer are a large display which shows channel number, channel name, artist name, song title and channel category with 20 channel presets. The channel guide mode allows five channels to be viewed at a time while scrolling through the XM channels by channel name, number, artist name or song title. The "favorites" mode will let the listener preview the artist name and song title currently playing on their favorite channels before selecting one. In addition, the SKYFI display can be set to a large font size allowing the listener to view the information from across the room. There is a remote control included. The SKYFI Home Adaptor Kit includes a home stand, hi-gain indoor/outdoor antenna, AC power adaptor and audio cable with RCA jacks to connect to your own home stereo system.



Delphi and XM Satellite Radio's new SKYFI portable satellite radio. Is it enough to keep satellite radio hopes alive? (Courtesy XM Satellite Radio)

For more information on satellite radio you can check out each company's home page **http://www.xmradio.com** and **http://www.siriusradio.com** or go to **http://www.satradio.weblogger.com** which is an unaffiliated web site covering satellite radio and has links to both XM and Sirius as well as current channel line-ups.

Bob Grove, W8JHD
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Caveat: Power Transformer Voltage Reduction

In our December issue, we discussed several ways to reduce the primary voltage to an antique power transformer. Tom Lamb, K8ERV, pointed out why one of my suggestions – putting a rectifier diode in series with the primary – was NOT recommended!

As Tom correctly points out, a transformer requires the full cycle of AC in order to operate correctly; if partially-rectified voltage is applied, the core will overheat because it doesn't follow the hysteresis (magnetization/demagnitization) power cycle properly. Naturally a skeptic, I had to verify this!

I attached a power transformer to an AC wattmeter and read the power when operating with full AC; next, I inserted the rectifier diode – the power dissipation of the transformer multiplied several times! Shortly thereafter, the power transformer produced a miniature a fourth-of-July pyrotechnics display and was consigned to the trash barrel!

So, DON'T put a diode in series with the primary winding of a power transformer! But the other suggestions – series resistance or a Variac (voltage-variable transformer) work just fine. Thanks, Tom.

Q. Because of deed restrictions in my neighborhood, I have to plan an "invisible" antenna. If I run about 53 feet of wire under the eave of a gable, making an inverted V, would I feed it at the end or the middle? (Raymond Vane, Ft. Myers, FL)

A. For shortwave reception in the typical 4-22 MHz popular frequency range, it shouldn't make much difference, but if you have a choice, I'd recommend feeding it at the middle which is a better impedance match at the higher frequencies. Be sure to use coax lead-in to reduce local electrical noise pickup. Of course, you will have to cut the wire at the center, soldering one element to the shield and the other to the center conductor.

For general-purpose shortwave listening, any random wire 30-70 feet long works well; the longer wire favors the lower frequencies. Consider running a length of thin hookup wire out to a tree or other high support; it can be plastic insulated with an inconspicuous neutral color like gray. Stranded wire withstands the repeated flexure by wind much better than solid.

In a similar situation, I once erected about 20 feet of TV-antenna mast pipe, anchored to the house by a simple bracket and supported at the ground by a bottle with the pipe fitting over its neck. I connected the coax center conductor to the base of the pipe and the shield to a conventional 8-foot ground rod driven down next to it. It was a great receiving antenna.

You could put a flag, birdhouse, or TV antenna (insulated at its clamp by a ring of PVC tubing over the pipe), if allowed, at the top.

Q. Can a metal gutter on a house or apartment be used as a shortwave antenna? Would this provide reception equivalent to a wire of similar length? (Jeffrey Muhr, Springfield, OR)

A. It sure can and would. This is one of the alternative antenna recommendations for folks who cannot erect a visible outdoor receiving antenna. Sometimes these antennas are electrically noisy because of erratic contact at the gutter joints, but this is easily solved by drilling a hole through the union and tightly screwing the joints together. Such an antenna is not as good as one erected high and clear of the building, but it can produce surprising reception.

Q. Why does turning the squelch control on a scanner or shortwave radio suddenly create loud static? And why is the squelch setting to do this different on AM narrow, AM wide, FM narrow, and FM wide? Are scanners set to receive AM or FM, and wide or narrow? (Jerry None, email)

A. Squelch (called "mute" on FM stereos) is simply a means of automatically switching off the audio amplifier to remove the annoying background hiss between signals when tuning, or between transmissions on two-way communications. The higher you set your volume control, the louder the audio will be when a signal is detected, or if you should turn the squelch control to defeat its mute function.

Virtually all VHF/UHF two-way scanner communications are narrow FM; the notable exceptions are aircraft (AM) and broadcasting (wide FM). The ideal scanner will adjust for these modes, allowing the squelch to break at the same setting for any one of them; unfortunately, this isn't done – it's easier (and cheaper) to let the user do it manually. Squelch circuits "listen" for a set signal voltage to activate; this signal voltage is retrieved after filtering, and if wide filters are selected, more signal voltage is likely to get through because more spectrum is being monitored.

But there is also another circuit called automatic gain control (AGC) which reduces the amplification of the radio in the presence of strong signals; this will also have an effect on the amount of signal voltage reaching the squelch circuit, making it switch at different levels for different modes.

In the slowly-evolving era of receiver design utilizing digital signal processing (DSP) and fast Fourier transform (FFT), squelch control should become more uniform.

Q. Can I plug my ICOM 4-ohm external speaker into the earphone jack of my shortwave portable? (Richard Dailey, Pittsburgh, PA)

A. At low volume, yes, but if the audio sounds severely muffled or distorted, it may mean that the low impedance speaker is "loading down" the receiver's higher-impedance-rated amplifier, and its use should not be continued. It is better to use a speaker of higher impedance, say, 8-16 ohms, coming closer to the impedance of the earphone(s). The higher impedance does not require as much current in the amplifier, thus avoiding overheating it.

If the required impedance for the earphones is not stated in the manual, you may wish to measure the actual resistance of the included earphones with an ohmmeter; this will give you a rough approximation of the required impedance.

...And one for our readers to answer

Q. When and how did receiver S meters become calibrated in "S units" up to S9, then dB over S9? (Edward Walsh, PhD)

A. This is a darned good question, and I've never been able to find out myself. Early S meters were arbitrarily scaled, and I've been told that it was Hallicrafters that elected to standardize the 6 dB per S unit, S9 maximum scale, with 10 dB increments above that. But why S9 and not 10? Or 20? And why aren't the overage levels in 6 dB increments as the lower increments are?

Readers, do you have any more definitive information?

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

Getting Started

Bright Ideas

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12 News flash! As you read this in February, it is possibly too late for action. But for those of you that check the internet dealers for radio prices, there were some incredibly good deals in December. Personally, I snatched the Yaesu VR-5000 from Grove Enterprise's website for only $489 (List price $899.) The kicker was the $125 Digital Signal Processing filter that they threw in for free. I saved over $600! If you use fuzzy math, I figure I got the radio for free.

If I had more money, I would have snagged the Yaesu 817 HF/VHF/UHF transceiver for only $516. GigaParts Inc. threw in the CT-62 ($29 computer connect cable), and the YF-122CW Filter ($175.) Another example was the Yaesu ham transceiver model VX-150. This two hundred channel, five watt HT was only $79. It meets military specifications, and is computer programmable. Where else could you get a 200 channel scanner that will do alpha number tags, plus CTCSS, and digital squelch decoding? Don't forget the frequency/PL tone pager function.

Other manufacturers were meeting the competition. The Icom 2TH was only $89, and they threw in an extra NiCad battery for free. The battery itself cost about $60. Amazing. The current supply of the mini- receivers is dwindling. So are the prices. If you don't have one, check out the Icom R-2, or Q7A. If you are not active on the internet, this should get you going. You see, reading *MT* can save you money!

13 Many of the newer scanners and receivers allow you to program several operating parameters into a memory channel. I found that this enables me to scan smarter. For example, I am very interested in any fire, or police calls in my area. But I live in a remote rural area and those calls are few and far between. The sheriff, as well as the county fire district, covers a lot of territory in the northern sector and radio traffic is almost constant. I created a special memory bank using only the repeater inputs and car to car or tactical fireground frequencies. I further customize these by programming the correct PL tone and the 10dB attenuator. Now I only hear those units that are within a mile or two.

Naturally, I also program a few "emergency" frequencies which are only used when there is an exciting emergency. I like 121.5 AM for aircraft emergencies, the airport's new emergency frequency, the statewide fireground of 153.830, and the Washington state disaster coordinating frequency of 156.135. Hint: In California they use CALCORD on 156.075. I will let you figure out the one for your state or local area. Normally this radio sits pretty quiet, but now I know if there is a good call nearby.

14 Neck lanyards have become a popular, often required way of displaying company or personal ID. Teenagers and college student use them as key rings. Now you know what those "strings" are that hang out the side of their cargo pants. Well, how about using it to keep your mini scanner or FRS radio handy? The smaller the radio, the better it works.

15 One of my favorite radios is my Icom GAT. Well, I dropped it and scratched off two areas of paint. The plastic underneath was pure white, so the missing paint was rather obvious. I touched it up by using some dark gray/green metallic paint that I normally use for painting toy models. A few seconds with the brush and it is as good as new, at least to the naked eye.

16 If you are a faithful reader of this column, you will remember an earlier idea of using auto stereo speakers, and/or mini desktop computer speakers for your scanner audio output. Home theater and computer-related speakers are usually shielded. On sale, they are a good bargain at $10-20.

In the moving process, the black paint on the grille of my speaker rubbed off in a few places. I could have repainted the entire surface with black paint. But I used my faithful black permanent ink marker to dab the scratch marks. A near perfect match. I was rummaging through the garage the other day and found another pair of old computer speakers. Years ago, they looked rather strange. But styles change, and now they suddenly looked very cool. I tried them, and they sounded great for the scanners. Not all old speakers will look or sound good, but it is time to check you garage, or perhaps a neighbor's. Exactly what do you have in your garage? Can you use it in the radio room?

17 Like many scanner enthusiasts, I joined the yahoo mailing groups for radio topics such the Pro 92, 95, Yaesu 120, etc. Well, I got tired of reading the newbies who ask the same questions day after day. So I edited my "email preferences" and instead of daily email, I just visit the site every few days to search out the interesting topic headers. If I see "what cable?" or "where do I find the software" one more time...

18 The FCC refarming program for the VHF spectrum is finally here. Many of the new licenses are for the new 7.5 kHz narrow splinter band. This doubles the possibilities from the old 15.0 kHz spacing standard. In Spokane, we show a new fire repeater output of 154.1075 with an input of 158.8575. Check your local listings. Most scanners and receivers won't tune to these new 7.5 kHz steps, but they can still hear them. When I entered 154.1075, the scanner automatically rolled over to 154.105. If you fear that might interfere with reception on your 154.115 channel, then change that one to 154.120. If that station has very strong signal, and "bleeds" over, you can try using the attenuator function. Experiment: you can meet the challenge! That is part of the fun in the monitoring avocation.

19 Time for a couple of my annual indoor, winter projects. How about some preventive maintenance on your radios? I gently clean all the scanners, polish the displays, and clean the BNC connections (I use a Q-tip dipped in rubbing alcohol.) Update the frequency lists, and check your scanners' programming. Plan the spring travel vacation. Hey, if the college students can take a week to party at the beach, you are entitled to a frequency searching road trip. It is right there in the Monitoring Hobby Bill of Rights. The same one that outlines our freedom to buy a new radio every three months.

I seem to be getting lots of regular mail asking questions I can't answer. May I suggest you direct general questions to Bob Grove at the *Ask Bob* column. Though I prefer email, if you write to the *Ideas* column and expect a reply, please send an SASE. If you receive no reply, I did not have an answer to your question.

Robert Wyman
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Florida Films and Seattle Scanning

Let's get right into this month's frequencies and information.

On-Scene Commander: Films

Last month we discussed the ease of monitoring local film and television productions. Two major films were recently being produced in my area, *The Fast and The Furious 2* and *Bad Boys 2*. Both productions filmed throughout the urban and rural areas of South Florida, and both utilized dozens of state, county and municipal police officers for traffic control and security.

The *Fast and The Furious 2* actually filmed on Florida's Turnpike, Interstate 75, and several other roads for days at a time. An extensive news media campaign was launched to keep the public informed of the road closures and detours, supplemented by electronic message signs placed at the affected routes.

While closing the Turnpike or an Interstate may sound like a nightmare, the production's detailed planning resulted in the safe and efficient movement of vehicles around the filming locations. When both films are in theatres later this year, watch the roadway scenes knowing that police, fire-rescue, local government, traffic barricade contractors and the local news media were all "behind the scenes" making it happen.

On-site film production frequencies follow below:

Bad Boys 2	The Fast and The Furious 2
464.5	153.325
464.55	173.275
464.6	

Who's Listening? Matt Cawby

Being a hotbed for conventions, tourism, special events, government offices, federal contractors and military reservations, one would think Seattle would also be home to thousands of dedicated scanner hobbyists. If that's the case, however, they are all pretty silent.

Matt Cawby is the main voice of the Seattle area. Matt's daily posts on newsgroups keep hobbyists informed of his monitoring activities and the intensity of radio traffic throughout the Pacific Northwest. Matt also travels to various sites, both active and historic, in search of frequencies, radio system clues, and radio user information.

"I have been a carpenter since 1978. Since 1997 I have been doing business as Allen Construction (**http://www.microvoltradio.com/allen_construction.htm**). Two years ago I attended some computer hardware classes at a local community college. This helped me to pass two exams and obtain an A+ certification as a computer tech. I worked at Boeing for a while in the computer division, didn't like working inside that much, so now I'm driving nails again."

Operating from his home in Mountlake Terrace, a city about 10 miles north of Seattle, Matt keeps abreast of local action with Radio Shack scanners including models 2026, 2035, 2037 and 2045. He also has a Drake R8A Shortwave Communications Receiver. Antennas include a Radio Shack discone, Grove Omni, and a magnet mount unit for his vehicle. Helping with his daily frequency and callsign loggings is a scanner audio recorder that compresses a day's worth of radio transmissions into a few minutes of listening.

Matt started in the hobby around 1970 with a police band tunable radio. Through the years since then, he has run the spectrum of listening interests: local police and fire, local government, private and industrial sites, federal agencies and aircraft. He "graduated" from a tunable radio to a Bearcat 210 programmable radio in the early 1980s, then moved into a more intense hobby experience with a Radio Shack Pro-2006 around 1988.

Specifically, Matt learned that some of the best radio clues were not on the scanner, but in the library. "I researched local government budgets to see what they were buying (in terms of radio systems), and where the money was going." With that information, Matt compiled lists of radio components, specifications, frequencies, operating locations and...with the scanner...channel designations, unit numbers and operating procedures.

These days, milcom is his full-time target, with a particular emphasis on military UHF frequencies. Matt's website, **http://www.microvoltradio.com**, contains the detailed results of his monitoring efforts.

"Another of my hobbies is photographing Nike missile sites. At one time there was a launch site several miles from my house. Now it's FEMA Region 10 HQ. The PDXMILCOM website has some of my photos in the Pictures area."

"When I have time I like to visit the Nike IFC and launcher sites S-03 at Bothell, WA, and S-20 at Issaquah, WA. Ed Thelen's Nike Missile website has technical and operational information I review before my field trips. Most of the sites have some common features I try to identify – there are no structures standing at these two sites.

but certain artifacts are still visible. Concrete pads for the radars at the control sites, foundations for barracks, the missile assembly building, administration buildings, etc."

"The Issaquah launcher site was intact until the mid '80s. All the buildings are gone now and the magazines covered with several feet of dirt. The Issaquah IFC site was originally an anti-aircraft battery in WW II. It's now a county park; there is a bulletin board at the entrance with some nice old photos of a guy loading a cannon at the site, and a detailed diagram of the site in 1957. I think there were 20 Nike sites in Washington. I have briefly visited the Bainbridge Island and Redmond sites, but haven't had time to do much poking around."

"Magnuson Park in Seattle is pretty interesting, it was NAS Sandpoint until about 1970. The control tower and several aircraft hangars are still standing; most of the runways have been covered with dirt. One of the hangars was used for the Navy commissary until recently, the airplane tie downs are still visible in the concrete parking lot."

"Paine Field in Everett is another Cold War site. Until 1968 it was Paine AFB and served as an Air Defense Command fighter interceptor base. The 64th FIS equipped with F-102s ended alert operations at Paine in 1966, the 57th FG and their F-106s were inactivated in 1968. Until about 10 years ago there was an ordnance area east of the airport with about a dozen bomb magazines; unfortunately there is a new office building on the site now. The Washington Air National Guard has several buildings at Paine. They used to fly CH-47s out of the airport but the neighbors complained; now all the helicopters are at Gray AAF in Tacoma."

"I like to study U.S.G.S. maps of the Seattle area; there are some vague references to military sites. Near my home there is an outline of 'U.S. Military Reservation.' A community college and several schools are located there. At the south end there is a large concrete wall and what was possibly a loading platform. I'll have to investigate further..."

"This is a weird hobby, but it's interesting to me."

Actually, Matt, it's a very valuable hobby. Much of the WWII and Cold War-era military base information has never been fully documented, and many of the participants are no longer around to share their memories. The Nike bases and radar sites seem to be particularly attractive to history buffs, and several websites have been dedicated to preserving this information (links below).

Thanks, Matt, for sharing your information and having the dedication to contribute on a daily basis. If any *MT* readers travel to Seattle, you'll need only Matt's list to hear all the action.

Links of Interest from this Column

The Fast and The Furious 2 traffic detour information site:
http://www.ff2info.com or
http://homepage.mac.com/ff2productioninfo/

Matt Cawby's Northwest Aircraft Communications page:
http://www.microvoltradio.com/

Chris Parris' PDXMILCOM group (including Matt's historic military site photos):
http://groups.yahoo.com/group/pdxmilcom/

Ed Thelen's Nike Missile History Site: **http://ed-thelen.org/loc.html**

Abandoned Airfields History Site:
http://members.tripod.com/airfields_freeman/index.htm

Florida's Cold War Museum: **http://www.nike252.com/Default.htm**

The Air Defense Radar Veteran's Association: **http://www.radomes.org**

U.S. Army Corps of Engineers, Formerly Used Defense Sites (FUDS):
http://hq.environmental.usace.army.mil/programs/fuds/fudsinv/fudsinv.html

Boeing's Airborne Surveillance Testbed:
http://www.boeing.com/defense-space/ic/ast/mission.html

Boeing's 757 Testbed: **http://www.boeing.com/news/releases/1999/photorelease/photo_release_990311n.htm**

Matt's "Essential" Frequency List for the Seattle Area:

121.500	Emergency
122.775	Seattle media aircraft
123.025	King County Sheriff helicopter Guardian One
123.100	Civil Air Patrol
125.100	Seattle Center-Whidbey Island
125.125	New Mexico ANG F-16 tactical
127.700	Port Angeles Coast Guard Air Station
129.400	ARINC international and overseas flights
129.825	Airlift Northwest ARINC
135.850	FAA Airport ILS inspection
135.950	FAA Airport ILS inspection
141.850	USAF Thunderbirds
143.625	Space Station
143.675	New Mexico ANG F-16 tactical
143.850	USAF Thunderbirds
148.050	New Mexico ANG F-16 tactical
148.125	Civil Air Patrol Tacoma repeater
148.150	Civil Air Patrol
155.295	Airlift Northwest Dispatch Primary
159.075	Washington State Patrol aircraft
225.725	E-8C Joint STARS
225.800	AWACS use with Oregon ANG
225.975	E-8C Joint STARS
228.050	Oregon ANG tactical
228.500	AWACS
228.900	NORAD
228.975	E-8C Joint STARS
235.100	Aerial Refueling
235.900	NORAD
238.900	Aerial Refueling
239.000	Seattle Center-Medford
239.700	NORAD
243.000	UHF Guard
244.400	CH-47 Hooker Ops
251.100	Seattle Center-Yakima
252.000	NORAD
253.400	Camp Rilea, Ore.
255.400	FSS Seattle Radio
256.800	Gray AAF Tower
257.600	Seattle Center-The Dalles
257.650	Seattle Center-Medford
259.200	Camp Rilea, Ore.
260.800	NORAD
260.900	NORAD
261.200	AWACS use
261.950	SatCom
262.325	AWACS use
264.900	Aerial Refueling
265.400	NORAD
266.700	HC-11 CH-46 tactical
267.000	NORAD
269.000	Seattle Center-Larch Mt.
269.100	U.S. Customs
270.300	Seattle Center-Stampede Pass, Whidbey
271.000	NORAD
273.000	JOLLY 21 tactical
273.600	Seattle Center-Beacon Hill, Yakima
275.900	NORAD
276.400	Gray AAF Tower Secondary
276.500	Aerial Refueling
277.600	NORAD
279.600	Seattle Center-Redmond, Ore
280.500	Oregon ANG Portland Ops
281.400	Seattle Center-Pendleton
282.600	NORAD
283.900	Aerial Refueling
288.400	NORAD
288.900	Oregon ANG Portland CP
291.600	Seattle Center-Whidbey MOAs
292.600	Aerial Refueling
293.700	141st ARW Fairchild Guard Ops
295.400	Aerial Refueling
295.800	Aerial Refueling
298.300	Oregon ANG Portland Ops
300.025	Oregon ANG tactical
300.050	Oregon ANG tactical
300.075	Oregon ANG tactical
300.125	Oregon ANG tactical
300.225	Oregon ANG tactical
300.325	Oregon ANG tactical
300.525	Oregon ANG tactical
303.000	Oregon, McChord, Fairchild ANG tactical
303.100	AWACS use with Oregon ANG
305.500	Aerial Refueling
306.900	Seattle Center-Ft Lawton, Paine App/Dep
307.800	Seattle Center-Mullan Pass, Okanogan MOA
311.000	Fairchild AFB CP
313.750	VMFA 225 F-18 A/A
314.200	Dyess AFB C-130 interplane
317.600	Seattle Center-Scappoose
317.950	AWACS use with Oregon ANG
319.200	Seattle Center-Whidbey Island
319.500	Aerial Refueling
321.000	Fairchild AFB CP
321.300	AWACS check in with Seattle Center
322.950	USAF Thunderbirds
324.400	Aerial Refueling
324.650	E-8C Joint STARS
333.550	Oregon ANG tactical
335.950	AWACS use with Oregon ANG
337.100	Oregon ANG tactical
337.400	Camp Rilea, Ore.
341.750	AWACS
342.300	McChord AFB tactical
343.500	Aerial Refueling
343.600	Seattle Center-Larch Mt.
343.900	Seattle Center-Yakima
344.700	Aerial Refueling
349.100	Camp Rilea, Ore.
364.200	NORAD
350.350	VS-41 S-3B A/A
351.100	Oregon ANG tactical
353.900	Seattle Center-Beacon Hill, Yakima
360.700	Seattle Center
366.300	Aerial Refueling
375.200	Fairchild AFB Dispatch
377.700	37th BS B-1B A/A
378.200	Aerial Refueling
379.100	Gray AAF Bullseye Radio
381.000	939th ARW Portland
381.800	Port Angeles Coast Guard Air Station
386.000	NORAD
388.225	E-8C Joint STARS
388.850	B-2 A/A
390.000	Moffett Federal Airfield tactical
395.150	E-8C Joint STARS

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Into the Icefields

A *Scanning Canada* reader writes with a request:

"I live in Calgary and I was so pleased to see your column in *Monitoring Times*. I used to listen to the city police here quite a bit, but a few years ago they switched to a digital system and I was out of luck. Finding frequencies from Industry Canada is like asking them to pull out all of their own teeth without any freezing. 'Fire, ambulance, police and armed forces frequencies are not given out to the public,' is what I was told on numerous occasions by our fine government employees. The Industry Canada web site is not much help either.

"Do you know of any of the above from Calgary or any scanning clubs out here?..... I really enjoy your column and hope that you are a regular contributor to the magazine for years to come. Thank you for your time and any information that you can send my way."

(e-mail from Alvin Brownell)

Thank you for your kind comments on the column, Alvin. You are partially correct: Industry Canada (the federal government department responsible for administering radio spectrum in Canada) does restrict certain sensitive frequencies, but many other emergency service frequencies are available. Can any readers in the Calgary area help Alvin with unpublished frequencies and trunk groups in use in that city? Write to me at the e-mail address at the top of the page and I will include reader contributions in a future column.

❖ Further into the Mountains

Last month *Scanning Canada* rode the rails up alongside British Columbia's Sea To Sky Highway as far as the ski resort of Whistler. This month we travel another few miles up the line and deep into the mountains to Pemberton.

The small town of Pemberton nestles snugly between the Coast Mountains and the Lillooet Range. Mid-summer snow lingers idly on the mountaintops all around Pemberton. The famous Pemberton Ice Fields and a cluster of glaciers lie just to the west between glistening peaks grazing the sky at over nine thousand feet above sea level. *Scanning Canada* will visit even higher peaks further east in Alberta's Continental Divide, in the midst of the Rocky Mountains, but here in Pemberton we are just an easy hour and a half's drive from sea level at Squamish.

ScanCan arrived in Pemberton from further east, descending cautiously by car from the heights of the Cayoosh Mountain. I had put my rental car – a brand new, full-size Toyota – into low gear to avoid over-heating the brakes as we hugged the curves down the long, steep, winding drop into the Lillooet River valley. The road had many pull-outs for runaway trucks, but I had managed to keep the vehicle under control during the very, very long descent.

By the time we hit the valley the car's transmission smelt badly overheated, but the fairly flat road into Pemberton allowed the car's fluids time to cool. Not so quick to cool was my XYL (= "wife" for non-hams) who watched me fiddle with my scanner while en route down the mountain. "It's for the *Monitoring Times* column," I had explained. A cool silence in return indicated that maybe it was time to focus on the driving.

Our picture this month shows the BC Rail station at Pemberton. The inset gives a close-up view of the antennas on the roof of the station. The larger, vertically polarized lobe is the VHF railroad frequency antenna. A complete set of railroad VHF frequencies was listed in the November 2002 column. In Pemberton, the most active frequencies are 159.57 and 160.305 MHz.

The lower antenna is a stacked Yagi array with folded dipole driven elements. This antenna is used for BC Rail's UHF link on two frequency pairs: 413.1625/413.4125 and 418.1625/418.4125 MHz. The purpose of the UHF frequencies is not precisely known, but one source lists a trackside alarm site using these frequencies.

As *ScanCan* drove alongside extensive sections of the BC Rail track during a recent visit to BC, I noted that folded dipole VHF antennas seemed to be located at almost every station along the track. Presumably, the mountainous terrain requires the use of many repeaters to maintain line-of-sight signals between trains and control points. The folded dipole design affords a wide bandwidth to cover the relatively broad slice of the VHF spectrum occupied by the railway companies.

The following table lists some other interesting frequencies that will break squelch in the Pemberton area. If you head out of town into the surrounding country looking for the source of these signals, beware, this is bear country!

Logging Operations
152.960 157.620 158.310 158.550 158.580 165.000 167.940 168.060 - Various commercial logging and trucking companies

First Nations Bands
154.310 Mt.Currie Firehall - Lillooet Tribal Council
159.030 Mt.Currie Band Council - Forestry

Government Departments & Utilities
163.125, 163.830, 163.890, 163.995 - Ministry of Forests Fire Base
143.415, 148.585, 414.0875, 414.5625 - Ministry of Transportation and Highways
142.365, 142.605, 149.110, 149.260, 149.680 - Ministry of Health Ambulance Service
419.9125, 462.4625, 463.5125, 467.4625 - BC Hydro & Power Authority

Adventure
159.690 - Outward Bound Western Canada
160.170 - Whistler Jet Boating, Pemberton
123.200 - Air Traffic Frequency Pemberton Airport
167.310 - Pemberton Helicopters Pemberton Airport

Leaving Pemberton, BC Rail's line winds its way up the slopes to the northeast behind the Cayoosh Range, tracking alongside a long, slender pair of mountain valley lakes towards the Fraser River Canyon. We will take a final look at the BC Rail line next month as we near the northern end of BC's Highway 99 and say our farewells as the tracks head north into the interior of British Columbia. One last brief stop features what may be the loneliest railway station in Canada. 73 till then.

"Pemberton's BC Rail Station with close-up view of station antennas.

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Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner	$139.95
Bearcat 250D 1,000 ch. Trunktracker III handheld scanner	$339.95
Bearcat 245XLT 300 ch. Trunktracker II handheld scanner	$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner	$84.95
Bearcat Sportcat 200 alpha handheld sports scanner	$159.95
Bearcat Sportcat 180B handheld sports scanner	$139.95
Bearcat 80XLT 50 channel handheld scanner	$99.95
Bearcat 60XLT 30 channel handheld scanner	$74.95
Bearcat BCT7 information mobile scanner	$139.95
AOR AR16BQ Wide Band scanner with quick charger	$199.95
Sangean ATS909 306 memory shortwave receiver	$209.95
Sangean ATS818 45 memory shortwave receiver	$139.95
Uniden WX500 Weather Alert with S.A.M.E. feature	$39.95

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Is Wireless E-Mail the Future of HF?

Several articles in popular media have described the growing phenomenon of cheap electronic mail (e-mail) via shortwave high-frequency (HF) radio. While it was originally promoted as a cheap, temporary alternative to satellite telephone, HF e-mail has become a mode all its own. It's another powerful new tool for communication by ordinary people as opposed to giant corporations.

❖ Technical War Over

Several developments in the past year have given HF e-mail a huge boost. The battle of the modes has more or less been won by PACTOR-II and III. PACTOR, which stands for "Packet Teleprinting Over Radio," is a computer modem and standard marketed by SCS (Special Communications Systems). SCS is a German company founded by the hams who invented PACTOR for amateur use.

PACTOR addresses the failure of standard "packet radio" data networking to work satisfactorily on HF. It adds robust features inspired by AMTOR, Amateur Teleprinting Over Radio, itself a near-clone of the SITOR (Simplex Teleprinting Over Radio) mode long used for commercial HF ship Telex. More recently, a PACTOR interface has allowed e-mail to be sent to and from the Internet using the same protocols.

The SCS PACTOR-II controllers, upgradeable to PACTOR-III with new firmware, are still the hot-rod units of the industry, using a powerful processor and memory. These boxes are a bit on the pricey side for hobbyists, however, at US$650 and $950. Of course, one can always use the lower-performing, less dedicated implementation of PACTOR included in third-party units ranging from the very expensive Wavecom decoder to the amateur-grade Kantronics.

PACTOR-I, meanwhile, is very much around, especially for the original link establishment. It's easily copyable on many hobby decoders, or even Windows computers with the popular MixW sound card software. PACTOR-I is incredibly slow, however, and not used much in commercial e-mail.

❖ Legal War Over

Very low-end, HF e-mail has always been the communication of choice for recreational vessels. Here in California, there is a large subculture of boaters, not all of them rich, who spend a great deal of time on the high seas or in isolated ports. This has led to a real hobby-within-a-hobby of using amateur radio for safety and communication with the landlubbers back home. It's not just "Where's the party?" messages, or requests for supplies.

The popularity of the ham e-mail system led boaters to develop cooperative, non-profit networks like SailMail. This $200-per-year association uses essentially similar technology, giving the familiar look and feel with fewer rules and no need to get an amateur license. Radios are just the standard maritime upper-sideband transceivers, plus the PACTOR controller, computer, and cables. The software used is a very slight modification of the popular amateur programs called AirMail and Winlink, both of which have large followings and are worth columns in themselves.

SailMail and another abortive co-op were once threatened with legal action by PinOak Digital, which attempted the service on a for-profit basis. PinOak never attracted users, and recently reorganized as SeaWave, with a focus on commercial vessels. More successful is the South African Bushmail, intended for isolated African land mobiles using PACTOR-III. It supports the Australian Codan mode as well, and costs US$1000 per year.

Another interesting network is by WLO and its affiliates. It is under new ownership, but still offers HF e-mail. Interestingly, it also has the last commercial ship-to-shore telephone service in the US. Lastly we have mighty Globe Wireless, the industry's heavy hitter, with satellite capability and a generally more high-powered system intended for large vessels.

❖ Monitoring HF E-mail

Next to the amateur network, SailMail is the easiest to monitor. It has fewer stations than the amateurs, fewer bells and whistles, and users are limited to 10 minutes a day. However, encrypted mail is allowed, there are no restrictions on business traffic, and the license requires no study.

Here's the list of SailMail's PACTOR frequencies. These are the assigned channel centers, in kilohertz (kHz).

HPPM2, Panama
2650, 5870, 10329, 10337, 13980, 13955, 18610, 18651, 22643, 22653

KUZ533, Honolulu, HI
2686.4, 5836, 7957.4, 10325, 13930, 18264

KZN508, Rockhill, SC
2656.4, 5876.4, 7961.4, 7981.4, 10331, 13992, 13998, 18618, 18630

OSY, Belgium
6330.5, 8422, 12580.5, 16684.5

RCO1, Maputo, Mozambique
7857.4, 10335, 13930, 18264, 22212, 27888

V8V2222, Brunei
5212, 10323, 13426, 14987, 20373

VZX2824, Firefly, NSW, Australia
4162, 5085.8, 6357, 8442, 10476.2, 12680, 13513.8, 14436.2, 16908, 18594, 22649

WHV382, Friday Harbor, WA
2794.4, 5830, 7995, 10315, 13940, 18277

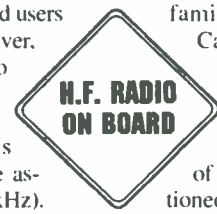
WHV681, San Luis Obispo, CA
2713.4, 2800.4, 5824, 5861.4, 8020.4, 10320, 10982, 13915, 13946, 18296

WPTG385, Corpus Christi, TX
2719.4, 5858, 7940, 10360, 13905, 13925, 18375, 22880

WPUC469, South Daytona Beach, FL
2806.4, 5896, 7968, 8008, 10365, 13920, 18380, 18490, 22895, 22960

WRD719, Palo Alto, CA
5881.4, 7971.4, 10343, 13971, 13986, 18624

XJN714, Lunenburg, NS, Canada
4805, 7822, 10523, 13937, 18234, 21866



❖ More Antarctica

The US base at McMurdo has been heard using 7995 and 9032 kHz USB to work aircraft and remote ground operations in various parts of the continent. Callsigns continue to be associated with ice and snow, such as SKIER and SKATER.

South polar summer brings the iceberg season, when the bergs drift free of melting sea ice. The Argentine Navy has South Atlantic ice reports on 4305 and 8448 kHz CW. Argentina and Chile, both of which reach to South America's extreme southern tip, conduct an international ice patrol. It's similar to the more familiar operation done by the US and Canada in the North Atlantic ice season.

Antarctic icebergs have recently been very much in the news, due to collapsing glaciers and possible global warming. One enormous berg is the size of Manhattan Island. The "growlers" mentioned in these messages are truck-sized fragments of melting icebergs, floating dangerously and invisibly low in the water. Similarly sized, more pointy fragments are "bergy bits," which can resemble whitecaps at a distance.

Keep a good lookout, and see you next month.

Utility World

Utility Logs

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ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
AWACS	Airborne Warning And Control System
CAMSLANT	Communication Area Master Station, Atlantic
Coq-8	8-tone Algerian "Coquelet" teleprinting system
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Administration
DSC	Digital Selective Calling
E10	Israeli phonetic English female "numbers"
E10a	Israeli phonetic "numbers," callup only
EAM	Emergency Action Message
FAX	Radiofacsimile
FACSFAC	Fleet Area Control & Surveillance Facility
FEC	Forward Error Correction teleprinting system
FM	Frequency Modulation
GMDSS	Global Maritime Distress & Safety System
HFDL	High-Frequency Data Link (air digital system)
HF-GCS	High-Frequency Global Communications System
M22	Israeli Navy 4XZ, "VVV" markers and numbers
M8	Cuban CW, "cut numbers" ANDUWRIGMT
M8a	Three-message case of above
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
M/V	Motor Vessel
MWARA	Major World Air Route Area
NASA	National Aeronautics & Space Administration
PACTOR	Packet Teleprinting Over Radio
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
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 Spanish female, "Atencion!" callup
V2a	Three-equal-message case of above

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

75.0 HBG-Standard time station, Switzerland, in CW at 2217. (Ary Boender-Netherlands)

2187.5 SWGU-Greek vessel *Ceilotralier*, GMDSS safety test with Rome Radio, in DSC, at 2310 (Day Watson-UK)

3402.0 RITA58-Latvian military, calling RITA91 in packet at 2213. (Boender-Netherlands)

3476.0 Gander Radio-North Atlantic MWARA, Canada, telling a Britannia flight that Shannon Radio (Ireland) is on 2872 primary and 2971 secondary, not 3476, at 0630. (Allan Stern-FL)

4027.0 Cuban AM Spanish "numbers" (V2), in progress at 0304. (Camillo Castillo-Panama)

4372.0 Bravo Foxtrot-Probable US Navy, with a net on the Virginia FACSFAC frequency, at 0130. (Rick Baker-OH)

4464.0 Unid-Israeli intelligence AM "numbers" (E10), message in progress at 0342. (Barry Williams-AL)

4480.0 Cuban AM Spanish "numbers" (V2), in progress at 0214. (Castillo-Panama) Unid-Spanish female voice with 5-figure groups, loud but possibly jammed, at 0342. (Williams-AL) *[V2. -Hugh]*

4739.0 Golden Hawk-US Navy Tactical Support Center, Brunswick, ME, working Orion 04, a P-3C, at 0054. (Mark Cleary-SC)

5000.0 BPM-Standard Time Station, Xian, China, with AM time signals and identifiers at 2028. (Watson-UK)

5159.0 4XZ-Israeli Navy, Haifa (M22), with CW marker, at 2109. (Watson-UK)

5211.0 WRPH-NASA Booster Recovery Vessel *Liberty Star*, working Cape Radio in space shuttle launch, at 0316. (Baker-OH) *Liberty Star* and NASA BRV *Freedom Star*, working Cape Radio, Cape Canaveral, FL, same launch, at 1318. (Stern-FL)

5230.0 VLB25-Abnormal Israeli intelligence callup (E10), AM at 1745. Also abnormal callups VLB 6H8B and VLB B202 at 1955, VLB H13KUF at 2025, VLB55 at 2145, and VLB50 at 2145 and 2220. (Boender-Netherlands)

5418.0 Cuban CW "cut numbers" (M8a), at 0201. "Atencion" AM voice broadcast (V2a), at 0202. (Castillo-Panama)

5616.0 Agar 25-US Air Force FIST (Flying Infrared Signature Technology) NKC-135, checking in with Gander at 0528. NASA 817, on Leonid observation with Agar 25, working Gander at 0535, sent to 3016.0 at 0635. (Stern-FL)

5690.0 Rescue 1503-US Coast Guard, patch to rescue command center via CAMSLANT, at 1255. (Baker-OH)

5696.0 Wolf 01-Surveillance aircraft giving CAMSLANT Chesapeake a message to Panther (US DEA), at 0156. American Airlines 361-Commercial flight in radio check with CAMSLANT at 0341. *[Yow! -Hugh]* (Baker-OH) Coast Guard Rescue 1719-US Coast Guard aircraft in a search, at 0420. (Ron Perron-MD) Coast Guard 6018, en route to Key West, at 1009. Panther, working 38C at 2322. (Cleary-SC)

5705.0 Fire Dome-US military, with 28-character EAM on Zulu-145, simulcast on 8992 and 11244, at1944. (Jeff Haverlah-TX)

5758.0 Cuban CW (M8a), at 0201. (Castillo-Panama)

6030.0 VLB2-Israeli AM "numbers" callup only (E10a), at 0245. (Williams-AL)

6234.0 Coast Guard 1706-US Coast Guard, making secure radio checks, also heard on 8337, at 0025. (Cleary-SC)

6458.5 Unid-US Armed Forces Radio/TV Service, broadcasting a USC football game, at 0240. (Stern-FL)

6529.0 Unid-Several Spanish speakers in what sounded like a net, at 0658. (Brent Davenport-CO) *[This unidentified net has been hanging around 6525-6535 upper/lower sideband for at least 15 years; purpose unknown. -Hugh]*

6697.0 Polo Game-US Military, with 28-character EAM, simulcast on 8992 and 11244, at 2325. (Haverlah-TX)

6739.0 NASA 817, working Offutt HF-GCS, NE, at 0300. (Cleary-SC) Offutt-US Air Force, NE, with a 28-character EAM at 0650. (Davenport-CO) McClellan-US Air Force HF-GCS, CA, with a 171 character EAM, also sent hourly by Offutt and others, also on 8992, 13200, and 15016, starting at 1600. (Wayne Rankin-CA) *[Probably related to the annual fall command post exercises. -Hugh]*

6757.0 Lordship-US military, with a 28-character EAM on Zulu-165, at 2153. (Haverlah-TX)

6768.0 Cuban CW (M8a), at 1301. (Castillo-Panama)

6795.0 Cuban CW (M8a), also 6824, 6853, and 7889 at 1202, also 6933, 6989, and 7889 at 1302. (Castillo-Panama)

6797.0 4XZ-Israeli Navy, Haifa (M22), with apparent plain text CW traffic, at 2058. (Watson-UK)

6912.0 SYN2-Israeli intelligence AM "numbers," callup only (E10a), several transmissions 0040-0150. (Ed Walsh-AL) SYN2-Israeli intelligence AM callup only (E10a), simulcast 6930, at 0145. ClO2-Israeli AM callup only (E10a), at 0245. (Williams-AL)

6924.0 Unid-Nightly long conversations using voice-inversion scrambling, at 2200. (Mark Morgan-OH)

6930.0 CIO 2BVT02-Abnormal Israeli intelligence callup (E10), AM at 1900. (Boender-Netherlands)

6967.0 "Tango"-US Joint Task Force exercise net, also Hotel Whiskey, at 0208. (Cleary-SC) "Whiskey Tango"-Female net control operator, probably the same exercise, discussing possible hung ordnance with "Hotel Whiskey" and "Oscar," also mention of "Alligator-4" *[Link-11 data frequency -Hugh]* at 0215. (Mark Burns-IN)

7535.0 Norfolk SESEF-US Navy Ship Electronic Systems Evaluation Facility, Norfolk, VA, working aircraft at 2318. (Larry Wheeler-VA)
7565.3 WPC-Seawave, Middletown, NY, with CW marker every 3 minutes, at 2040. (Watson-UK)
7646.0 DDH7-Hamburg Meteo, Germany, with North European marine weather in RTTY, at 2045. (Watson-UK)
7657.0 Panther-US DEA, working a drug interdiction aircraft, at 2252. (Cleary-SC)
7690.0 Puerto Rico-US Air Force, patch from an unheard aircraft to Ramstein, at 0601. (Haverlah-TX)
7738.0 Unid-Slow, shaky hand-sent CW at 2026. (Watson-UK)
8103.0 4XZ-Israeli Navy, Haifa (M22), CW markers and offline-encrypted traffic, at 1633. (Watson-UK)
8178.5 Coby 20-US military, working Coby 10 in an exercise, at 1717. (Haverlah-TX)
8396.5 UCMP-Russian M/V *Vera Moukhina*, passing ARQ Telex via Arkhangelsk Radio, at 1750. (Patrice Privat-France)
8401.5 Unid-Message in Romanian, sounded like a Black Sea oil rig, in ARQ at 2118. (Privat-France)
8403.0 Unid-Probably Rio Radio, Brazil, with SITOR-B fishing reports in English, at 1812. (Bob Hall-RSA)
8414.5 ZNRH3-M/V *MT Raghnild Knutsen*, working Lyngby Radio in DSC, at 0830. (Privat-France)
8432.5 UFN-Novorossiysk Radio, Russia, working vessel UDTB in SITOR-A at 2257. (Watson-UK)
8864.0 Reach 6729-US Air Force Air Mobility Command, with position for Gander Radio at 1058. (Stern-FL)
8912.0 Jack Knife-US Customs Service, Jacksonville, FL, working drug interdiction aircraft "69," at 2338. (Cleary-SC)
8971.0 Demon 03-US military, working Blue Star, PR, at 0802. (Stern-FL) Card File 710-US Navy, working Panther (DEA), at 1226. (Baker-OH) Goldenhawk-US Navy, Brunswick, ME, working Orion 07 at 1245. (Cleary-SC)
8980.0 Rescue 2112-US Coast Guard, attempting a patch to Miami Ops via CAMSLANT, at 0555. (Baker-OH)
8983.0 CAMSLANT-US Coast Guard, VA, working Coast Guard 2118 at 0032. CAMSLANT, assigning CG 2105 to a search off FL, at 2116. CAMSLANT, tracking and message from Panther for drug mission Wolf 02, at 2248. (Cleary-SC)
8992.0 Reach 521-US Air Force Air Mobility Command, in patch via Puerto Rico to Hilda Meteo, at 0143. Skater 96-US Air Force, working Thule, came from 11175, at 0200. (Cleary-SC) Offutt, calling Diego Garcia, then passing Skyking message at 0318. (Stern-FL) Jewel Box-US military, broadcasting the two 171-character EAMs (see 6739), also simulcast on 11244, at 1632. Unknown station with Skymaster (not Skyking) broadcast at 2035. (Haverlah-TX)
9016.0 Snow Plow-US military, with a 28-character EAM on Zulu-175, simulcast 8992 and 11244, at 1647. (Haverlah-TX)
9031.0 Ascot 9309-UK Royal Air Force, working Kinloss at 1540. (Privat-France)
9043.0 Navy LV 232-US Navy, calling Ascension HF-GCS, no joy at 2339. (Cleary-SC)
9057.0 Dread Lock-US Military, with 28-character EAM on Zulu-180, simulcast 6697 and 8992, at 0409. (Haverlah-TX)
10204.0 Formless-US military, with a 28-character EAM on Zulu-190, simulcast 8992 and 11244, at 0814. (Haverlah-TX)
10315.0 Magic 54-Probable North Atlantic Treaty Organization AWACS, working DHN66, Germany, at 1415. (Privat-France)
10780.0 Cape Radio-US Air Force, Cape Canaveral, FL, working Razor 33, front end of an E-8C JSTARS (Joint Surveillance Target Attack Radar System), at 1845. (Stern-FL)
11159.0 Ruler 91-Mississippi Air National Guard, in patch via Offutt to Hilda East and Jackson CP, at 0325. (Cleary-SC)
11175.0 Nighthawk 71-US Marine Corps helicopter, radio check with Offutt HF-GCS at 0017. Tuff 47-US Air Force bomber, patch via Offutt to Barksdale AFB Meteo, at 2328. (Cleary-SC) Offutt-US Air Force, NE, with EAMs for X-Ray Force at 2318 and 2334. (Haverlah-TX)
11181.0 Reach 446-US Air Force Air Mobility Command, patch via Offutt to Kelly AFB, at 0111. Top Cat 2-New Jersey Air National Guard tanker, patch via Offutt to McGuire Meteo, at 2237. (Cleary-SC)
11232.0 Canforce 2907-Canadian Forces, getting weather from Trenton Military at 0020. Shado 67-US Air Force, working Trenton at 0156. Sentry 61-US Air Force, working Trenton at 2327 (Perron-MD)
11244.0 Offutt-Offutt HF-GCS, NE, with Skyking at 2108. (Cleary-SC)
11384.0 CO0045-Continental Airlines flight 45, with HFDL position for Shannon at 0927. Shannon, giving active frequencies as 8842 and 11384, HFDL at 0919. (Watson-UK)
12412.5 NOJ-US Coast Guard, Kodiak, AK, with various FAX weather charts at 1600. (Watson-UK)
13089.0 NMN-US Coast Guard "Perfect Paul" voice synthesized weather, at 2224. (Williams-AL)
13155.0 Beer Party-US military, with an hour+37 EAM, at 1937. (Haverlah-TX)
13306.0 Air Force One-US Air Force Presidential aircraft, in North Atlantic MWARA with New York and Santa Maria, starting at 1817. (Mike Moraassutti-Ontario, Canada) New York Radio, working Air France 3672, at 1908. (Stern-FL)
13927.0 Shark 98-Probably US Air Force, making MARS patches at 0239. Puma 03-US Air Force bomber, patch via AFA1MH, OH, at 1802. (Stern-FL) Reach 458 and Reach 705-US Air Force Air Mobility Command, both making MARS patches at 2240. (Cleary-SC)
15016.0 Andrews-US Air Force, MD, with EAMs for Hotel Force and Quebec Force, at 1640 and 1646. Andrews, EAM for Victor Force and Zulu Force, at 1757. Offutt, with EAM for Storm Trooper, at 2217. (Haverlah-TX)
16333.5 V5G-Romanian MFA, hand keyed CW no-traffic message at 1054. (Boender-Netherlands)
16804.5 3FAQ8-M/V SD *Victory*, GMDSS/DSC call to Lyngby Radio at 1500. SXYA-M/V *Federal Dora*, position in DSC at 1500. (Privat-France)
16816.0 ZSC-Capetown Radio, RSA, with the SITOR-B message, "...weather and navigational warning service at 0900 and 1730 UTC daily will terminate on Friday 22nd November 2002," at 1730. (Watson-UK)
17447.0 URL-Sevastopol Radio, Russia, working ships in RTTY and CW at 1510. (Hall-RSA)
19036.4 BKO-Algerian Embassy, Bamako, Mali, calling Algiers in Coq-8, at 0951. Algerian Embassy, Nairobi, Kenya, with Coq-8 traffic in French at 0953. (Watson-UK)
19056.7 Unid-Egyptian Embassy, probably Islamabad, Pakistan, with SITOR-A chatter and Arabic traffic, at 1426. (Watson-UK)
19131.0 Flint 951-US DEA aircraft, working Atlas (DEA), at 2126. Flint 271, working Atlas at 2130. (Hall-RSA)
19216.7 RFLI-French Navy, Fort de France, Martinique, with control messages in ARQ, at 1550. (Watson-UK)
19323.0 OMY88-Slovakian diplomatic, calling OLZ78, Prague, Czech Republic, in ALE at 1503. OLZ78, calling unknown station in ALE at 1517. (Watson-UK)
19336.7 Unid-Egyptian MFA, Cairo, calling Islamabad in SITOR-A and B, also suggested trying 16445.7, at 1539. (Watson-UK)
22337.0 OFF-US Air Force, Offutt AFB, NE, sounding in ALE at 1602. (Watson-UK)
23150.3 WPC- Seawave, Middletown, NY, with CW marker every 3 minutes, at 1138. (Watson-UK)
23214.0 PR1-US Customs Service, ALE sounding at 1532. (Watson-UK)
23337.0 RIC-US Civil Air Patrol, Richmond, VA, ALE sounding at 1557. JNR-US Air Force, Salinas, PR, sounding at 1601. HAW-US Air Force, Ascension Island, sounding at 1613. (Watson-UK)
23526.0 S92-Swedish Embassy, Managua, Nicaragua, sounding in ALE at 1607. (Watson-UK)
26804.0 Unid-Russian-sounding FM taxi or truck dispatcher, rebroadcasting a music station when not talking, at 0903. (Boender-Netherlands)

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Pakistani & Indian Diplomatic Ops

This month we take a look at a few infrequent visitors to shortwave, namely the Pakistani and Indian Diplomatic Services. We also provide details of a new Venezuelan Military Network, and a node added to the British Diplomatic/Royal Signals ALE Network.

Pakistani Diplomatic Service

A few weeks ago we bumped into a long forgotten sound, that of the odd TWINPLEX variant used by the Pakistani Diplomatic Service. Back on the air more frequently following the Afghani situation, the Pakistanis can be heard on an almost daily basis.

With TWINPLEX, basically a double-throughput, four tone version of SITOR-A, most users tend to employ symmetric tone spacing with the 100bd MFSK system, for example the -400/-200/+200/+400Hz spacing of the Danish and Norwegian operations.

For some reason (most probably to foil casual listeners), the Pakistanis decided on a -200/-85/+85/+600Hz configuration. Luckily the Hoka series of decoders have the ability for the user to set the tone configurations of MFSK systems, thus allowing the traffic to be seen.

Here are the most commonly logged frequencies (kHz) for MFA Islamabad:

10891.7 11411.7 13446.7 14461.7 14481.7 14990.7 16051.7 16246.7 16266.7 16286.7 16386.7 18051.7 18061.7 18071.7 19031.7 20011.7 20017.0 20976.7 22006.7 23021.7

Embassies with traffic for the MFA will send the selcal (selective calling) KMEU to call Islamabad. Plain text chatter between the operators can often be seen at the conclusion of regular traffic which is usually composed of 5-letter group, off-line, encrypted messages, or sometimes regular English text.

Embassies are addressed "PAREP" followed by the location, short for "Pakistan Representative" and the MFA is referred to as "Foreign Islamabad," as can be seen in the message excerpt below:

dl-125 dto 171310
from foreign islamabad
to parep new delhi
repeated to parep ankara
no d-6739 (mfg and car)/96
dated 17 november 1996.

ambassadar from director general (afg. and car).
enclosed for your information is a copy of telex
no.pol.1/96-ms dated 16th november received from parep
mazar-e-sharif.

Besides the use of the "parep" addressee, there is also a routing indicator. In the case of the example above "dl-125" refers to New Delhi. Stations close down the link by sending the characters "jjjjj:".

Indian Diplomatic Service

Rarer these days than MFA Islamabad are the signals from New Delhi's diplomats, but they do appear from time to time. Although once quite active with both SITOR-A and a 3-channel FEC-A VFT arrangement, the Indians tend to stick to standard 50bd/400Hz Baudot RTTY, making their stations a welcome catch for those with simple gear.

Over the years, MFA New Delhi has used a callsign scheme based on the link in use, prefixed by "8WD," with embassies using a different 8W-series call for the return traffic. Here are a few of the common ones used:

8WD2	MFA New Delhi to Rangoon, Myanmar
8WD32	MFA New Delhi to Hanoi, Vietnam
8WD4	MFA New Delhi to Belgrade, Serbio
8WD5	MFA New Delhi to Kabul, Afghanistan
8WD6	MFA New Delhi to Port Louis, Mauritius
8WD14	MFA New Delhi to Beijing, China
8WD17	MFA New Delhi to Thimpu, Bhutan
8WD36	MFA New Delhi to Phnom Penh, Cambodia
8WA23	Embassy Beijing, China
8WB2	Embassy Kcbul, Afghanistan
8WW3	Embassy Moscow, Russia

A fairly distinctive call-up is used, as the following example shows, ending in a repeated "ovovov" for the "over" to the other station:

8wd7 8wd7 8wd7 de 8wb4 8wb4 8wb4
ryryryryryryryryryryryryryryryryryryryryryryryryryryryryryry
this is the time for all good men to come to the aid of notion
fig chk 0000 qqqq wwww eeee rrrr tttt yyyy uuuu i-ii oooo
int qrk int qrk hr qru hr qru qru hr qru hr qru ///

yr yr yr qrk qrk qrk qrk qrk 5/5/5/5/5/5/5/5/5/5/5/
hr hr hr qru qru qru qru qru qru ovovovovovovovovovovovovovo

Messages from the MFA are headed and signed with "foreign new delhi," with traffic from the embassies headed and signed (for example) "indembassy" followed by the location. The majority of traffic is composed of 5-letter group, off-line, encrypted messages. There is frequent chatter in English between the operators. Communications are shut down with the use of a repeated "ofofofofof".

New Venezuelan Army Network

Around Thanksgiving last year, Venezuela was experiencing a number of problems with striking oil workers. From the increase in activity on a number of known Venezuelan Army frequencies, several units were mobilized to protect what is a key export for this South American country.

One such network appeared on 14673.2 kHz (USB) with clear voice, MIL-188-141A ALE and MIL-188-110A high-speed modem traffic. Here are the ALE identifiers heard on this network:

FCMIL
MA340, 341, 342, 346
MCMIL
MI346, 347, 348
MM349
REDMONAGAS2002

This last identifier indicates a location in the Monagas municipality which is rich in oil and gas reserves. Other places to hear the Venezuelan Army are:

2354, 4453, 7896, 8178, 8859, 9232, 10396, 10558, 12185, 12191 13455 and 13506 kHz (USB)

All high-speed modem activity is encrypted, but shows a distinctive signature of "TEQTEQTEQ..." at the beginning of each frame of data.

These signatures are proving to be a valuable indicator of a 110A modem's user (especially in the absence of any accompanying voice or ALE) and we have started to document them at *Utility Monitoring Central* (see Resources).

New Node in British ALE Network

The extensive joint Diplomatic and Military (Royal Signals Corps) ALE network (see Resources) has added ANK (Ankara, Turkey) as a new node. Our guess is that this is in preparation for the likely increased activity in that country as a result of the expected (perhaps now in progress) military action in Iraq.

Resources:

Information at http://www.chace-ortiz.org/umc/
Pakistani MFA Profile - mfatext/Pakistan.txt
Indian MFA Profile - mfatext/India.txt
High-Speed Modem Signatures - hispeed.html
Egyptian MFA Profile - mfatext/Egypt.txt
British ALE Network - mil/army/Ukrs.txt

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Internet Resources for DXers

STOCKPILES OF B-02 SCHEDULES

BCL-ITALIA:
http://www.bclnews.it/b02schedules
(via Stewart H. MacKenzie, WDX6AA, swl)
NAGOYA DX CIRCLE:
http://www2.starcat.ne.jp/~ndxc/b02ex.htm
(also with lots of audio links, and also see:)
http://www2.starcat.ne.jp/~ndxc/link.htm (gh)

CIRAF ZONE MAPS

ITU numerical target area designations, often appearing in schedules:
http://www.itu.int/ITU-R/terrestrial/broadcast/hf/refdata/maps/index.html
from which you may pick various regions or a blown-up world map at
http://www.itu.int/ITU-R/terrestrial/broadcast/images/broad-ciraf2.gif (gh)
CIRAF stands for *Conferencia Internacional de Radiodifusión por Altas Frecuencias*. It is in Spanish because these zones were defined at the World Administrative Radio Conference held in Mexico in 1948 (Kathy Otto, SENTECH, RSA)

AFGHANISTAN [non] Radio Afghanistan in Pashto/Dari:
0130-0227 6000 DHA 250 kW / 045 deg [UAE]
0230-0327 9655 DHA 250 kW / 045 deg [UAE]
1330-1627 18940 KVI 400 kW / 095 deg [Norway]
(Ivo and Angelt Observer, Bulgaria)

ARGENTINA RAE in the 0000-0400 period is back on 11710 only, dropping 6060 far B-02 (Gabriel Iván Barrera, *Conexión Digital*) Affects English 0200-0300 UT Tue-Sat; has been coming in pretty well on 11710 (Glenn Hauser, OK, *DX Listening Digest*) RAE has two DX programs in Spanish, *Actualidad DX* on Tue, and an entirely different *Suplemento* to it on Fri, each 10-12 minutes at 1220 on 15345, 2315 on 15345, 11710 and 6060 (Gabriel Iván Barrera, *Conexión Digital*)

AUSTRALIA HCJB hoped to inaugurate Kununurra site in WA Dec 22; tentative introductory schedule: 0700-1200 11755 25 kW, rest 100 kW: 1230-1430 UT 15130 kHz, 1430-1730 15135, 1730-1800 15430 (Adrian Peterson, AWR Wavescan)

R. Australia refuses to publish composite schedule on website, or anywhere else, exacerbating growing alienation with hordes of SW listeners in prime coverage areas, most of whom have no facilities to migrate to satellite or RealAudio. RA sees its main audience across Asia/Pacific being serviced through rebroadcasting or relays via local AM and/or FM stations, satellite, and the Internet, and to heck with direct HF delivery! (Bob Padula, Australia)

AUSTRIA With savings needed, the board of ORF has been asked to present o plan for the closure of ROI short wove, with programs to go out on Internet only. Internationol SW may stop altogether in March. SW frequencies would then carry a few domestic programs in German only.

However, ROI management have told AIB: "A decision will now be taken in March. In the meontime the baard has asked management to pursue other options for funding ROI including approaching the government for separate funding and an increase in license fees. We are hopeful thot this will secure the long-term future of our international broadcasting. We appreciate expressions of concern pouring in from around the world." (AIB *Newsletter*)

Besides RAI's daily broadcasts in English, the printed schedule shows 0000-0030 on 9870 and 13730 as Sat & Sun only. Also, *My Music with Paul Catty*, Sun 0905-1000 on 6155, 13730 and 2305-0000 on 5945, 6155. Radio Afriko International: 2203-2300 on 5945, 6155 Sat and Sun on the frequency plan, Sat only in program guide (Patrick Travers, UK, World DX Club)

BOLIVIA 4930.0, Radio Son Miguel, Riberalta. *0908-0920 ex-4924v opening with UT-3 timecheck, *Música Boliviano* (Hideki Watanabe, Saitama, Japan, *Radio Nuevo Mundo*)

R. Comorgo has a "listeners' page" including pictures at **http://www.radiocamargo.cjb.net/** Station manager José Luís Garcia Pastrana wishes more DX listeners would get in touch with him (Henrik Klemetz, Sweden, *dxing.info*)

BULGARIA R. Bulgaria DX program in English: Fri 2235 5800 7500, Sat 0035 & 0335 7400 9400, Suns 0748 12000 13600, 1248 12000 15700 (Rumen Pankov, Bulgaria, *BC-DX*)

CANADA RCI in French at 1705 on 2nd harmonic 43130, quite weak and fading (Ron Trotto, IL, *World Of Radio*)

CANARY ISLANDS Full Gospel Las Palmas Church sent a thank you letter for my reception report of 6715-USB, signed by Gyusub Chung, son of Byung-Sung Chung, the Full Gospel World Mission Association, Africa General Council, General Superintendent Reverence. Output is 100 Watts and is located at the church. Schedule: Sunday 1100-1230 and 1900-2030, Wednesday 2030-2130, Friday 2200-2400. Every Friday, the sound quality gets lower because there are two church services going on at the same time. Approximately 420 people are coming to the church regularly. A lot of Koreans are working in fishery (shipowners, fish-company owners, fishermen) and some have restaurants. Address: Ploza de Agustín del Castillo, 3, Las Palmas de Gran Canario, Spain (Max van Arnhem, The Netherlonds, *hord-core-dx*) E-mail QSL adds that "Twice a year, we do the service in English, and twice a year, we do the service in Spanish too. During our church's service, we translate meantime to Spanish, English, and Chinese." (via Daniele Canonica, Switzerland) Las Palmas church on 6715-USB at 2205 had interference from Halifax Military, aviation channel. Hard to believe Spain would authorize the church on such a frequency; likely a pirate (David Hodgson, TN, *DX Listening Digest*)

COLOMBIA Ondas del Orteguaza, Florencia, at 1125-1140 on 6960 = 6 x 1160, pop music, ID with Todelar network, local ads. Some other harmonics currently observed: on 2200 a permanent one from 1100, Planeta Rica of Emisora Ideal which has alsa reached USA; lately R. Súper de Cali on 4800, 4 x 1200. La Voz de tu Conciencia on 12022 and La Voz del Guaviare on 12070 [both 2nd harmonics] (Rafael Rodríguez, Colombia, *Conexión Digital*)

What's the unID carrier on 15056.5 at 1745? (Terry L Krueger, FL, *DX Listening Digest*) Also here, no audio yet (Olle Alm, Sweden) Peaking to S9 at 1100 (Noel R. Green, England, *Cumbre DX*) 15058.67, 2152-2205. Thanks to Henrik Klemetz for some fine detective work on this one. Henrik listened to my audio clips, and was able to discern clues pointing to Ecos del Atrato, third harmonic of 5019v (George Maroti, DXpedition in Chamberlain, *Cumbre DX*)

Voz de La Resistencia, FARC clandestine, heard on new 6175.07, Sunday Dec 1 at 1032-1100: probable sign-on with anthem and ID *"Al aire C-R-B Cadena Radial ?Bolivariana? Voz de la Resistencia transmitiendo desde la cordillera de los Andes...de las Fuerzas Armadas Revolucionarias de Colombia FARC, ejército del pueblo."* Into talks and rock music. Good signol (Mark Mohrmann, VT, *DX Listening Digest*) Had not been reported on SW for quite some time, thought to be on FM only; previously had been well above 6.2 MHz, out of band. Per HFCC, RFI via French Guiana is on 6175 in Spanish 1000-1030. FARC would pick up a lot of listeners by starting right after another Spanish broodcast on same frequency (gh) Unable to confirm FARC on 6175 the next several mornings (Hans Johnson, *Cumbre DX*) Nor at previous afternoon time of 2100-2200 (Rafael Rodriguez, Bogotá, *Conexión Digital*) But on 10000-USB, loud and clear, estación *"Viva Bolívar"*, de las Fuerzas Armadas Revolucionarias de Colombia. La Cadena Radial Bolivariana, *"La Voz de la Resistencia"*, heard at 2043-2108* with revolutionary music and commentaries against the Colombian oligarchy; and another day at 1545 with a FARC communiqué about the Venezuelan situation; loud and clear (Adán González, Venezuela, *DX Listening Digest*)

CONGO DR R. Okapi, 11690 with music and IDs, around 1900-1930 (Christer Brunström, Björn Fransson, Sweden, *SW Bulletin*) Partial QSL sent from Fondation Hirondelle, 3 rue traversière, 1018 Lausanne, Switzerland (Emmanuel Ezeani, Sokoto, Nigeria, *DX Listening Digest*) 11690 at 2228-2335; the Okapi jingle sung by a female heard twice. SINPO only 13441, but atmospheric noise was low (George Moroti, Mount Kisco, New York, *Cumbredx*) 11690 also at 0545 Afro vocols, singing "Okapi" ID ot 0553 (Harold Frodge, MI, MARE DXpedition) Beware after 0600 when another French service for Africa comes on same frequency (gh) 11690, *0600-0800* doily, R. Africa International, Jülich. We big white hunters were chasing okapi, but instead of it, out of bushes came a group of African Methodists. Oh well, back to camp, Ernest (Jari Lehtinen, Maakeski DXpedition, Finland, *hard-core-dx*)

COSTA RICA In Dec, RFPI expanded 15039 to 24 hours, and 7445 to 2100-1300, tho the latter clashes with Taiwan at 2200-2400 and after 1100 (gh) Note our new mailing addresses. To reach the Oregon business office with contributions, T-shirts orders, etc., write RFPI, PO Box 3165, Newberg, OR 97132-3165 or e-mail radioforpeace@yahoa.com Send info requests and reception reports to RFPI, PO Box 75 - 6100 Ciudad Colón, Costa Rica or e-mail info@rfpi.org (RFPI *Weekly Update*)

The United Nations University for Peace is trying to evict RFPI. It had originally welcomed RFPI onto its grounds in 1987, thanks to its then president Rodrigo Carazo, but now under different administration, it has become increasingly hostile; an eviction notice was served in July. James Latham says no explicit reason has been given, but suspects it's because of connections Maurice Strong has with large corporations, while RFPI broadcasts reports on the anti-globalist movement. This is the latest in two years of harassment by the university administration. Strong serves as

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-02=winter season: [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

president of the university council, on the board of World Economic Forum, numerous corporations, special advisor to president of World Bank. UPaz Dean Edmundo Ericssan says relations with RFPI have not been close for same time; RFPI and the university are going their separate ways, tho he wishes them well. Latham says university has recently held gatherings of School of the Americas alumni, and is now guarded by armed men in a country without an army. The university's actions against RFPI amount to attempting censorship (Pauline Bartolane, *Freespeech Radio News*)

A handy excerpt from REE's full schedule, to keep track of which frequencies are via the Cariari relay:

0000-0400	11815
0200-0600	6040
0200-0600	11880
1000-1300	11815
1100-1400	5970 (M-F)
1100-1400	15170 (M-F)
1200-1500	5970 (Sun)
1200-1500	15170 (Sun)
1200-2300	15125 (Sun)
1500-2300	9765 (Sun)
1500-2300	17850 (Sun)
1600-2300	9765 (Sat)
1600-2300	15125 (Sat)
1600-2300	17850 (Sat)
1800-2000	9765 (M-F)
1800-2000	15125 (M-F)
1800-2000	17850 (M-F)

(via Ángel Rodriguez Lazana, *El Dial*)

CUBA Apparently all RHC USB transmissions (11705 at 01-05, 9665 at 05-07, and 13660 at 2030-2130) are well-concealed or inactive. On AM, 11670 to Eu at 2030-2130 ex-13750. 6180 has been noted in English, tentatively replacing 9550 at 0500-0700 and 2230-2330. At 2230, heavy clash with Brazil (Mark J. Fine, VA, *DX Listening Digest*) RHC announced new 6195 for Caribbean services including English 2230-2330 (Adán Gonzalez, Venezuela, *DX Listening Digest*) Not heard here, just BBC, with which this would also clash badly (gh)

[nan] R. Marti, Nov 22 at 1500-1515 was broadcasting a program in Chinese on 11815, 11930, 13820 and 21675, news and music until abruptly switching back to Spanish during *"El Cubano y su fe"* (Oscar, Miami, *DX Listening Digest*) Program feedline mixup, I suppose, if the Chinese were from IBB; or maybe deliberately for Chinese 'advisors' in Cuba?? (gh)

CYPRUS TURKISH Bayrak Radio International audible on 6150 after CRI relay closed at 2156 until 2229, pop songs, English and Arabic, mentioned "Bayrak Internctional" (George Maroti, NY, *Cumbre DX*) e-mail from Mustafa Tosun confirmed that it was Bayrak International I heard and that Arabic is one of the languages used at 2200-0400 (Marati, *EDXP*) Reception improved as dawn approached; after 0400 one could even listen to the program. Announcements (in English) in very random manner, neither on hour nor half hour. Disco and pop nonstop (Jari Lehtinen, Maakeski DXpedition, Finland, *hard-core-dx*)

DOMINICAN REPUBLIC On 3749.75, HIBC, La Voz del Progreso, San Francisco de Macoris, (harmonic 3 x 1250) at 0054-0140+, LA pop music, 0059 ad block and canned ID. Fair signal with very good peaks (Mark Mohrmann, VT, *DX Listening Digest*)

ECUADOR HCJB's Allen Graham, besides *DX Partyline*, does an *Aventura DX* segment in Spanish, reconfirmed Sun 2239-2248 on 15140, interviewing hams (gh)

EL SALVADOR 17835.3, Radio Imperial, SINPO 34333 at 2232 in Mount Kisco. May have modified something, as they're now on 17835.3, while in September they were around 17833. Strength much, much better. Christian contemporary music, in Spanish (George Maroti, NY, *Cumbre DX*) Frequent IDs mentioning 810 and 17835, peaking during this hour (gh, OK)

ERITREA/ETHIOPIA [nons] UNMEE via Merlin, UAE, 250 kW / 225 degrees to EAf at new times: Tue 1030-1130 21550; Sun 0900-1000 21715 (Ivo and Angell Observer, Bulgaria) Partly in English

GERMANY Deutsche Welle has a new, colorful QSL to celebrate 50th anniversary in 2003 (Anker Petersen, Denmark, DSWCI *DX Window*)

Upon official launch of DRM at the World Administrative Radio Conference in June 2003, DW will initiate digital SW programs to Europe and the Middle East. Conversion of two transmitters at Sines, Portugal, relay will have been completed by then. DW plans to broadcast 8.5 program hours daily in DRM standard in German, English and Arabic. Second stage will expand this and introduce additional programs for Asia via Sri Lanka. If market developments allow, DRM broadcasts are planned for America in 2005. This would require further transmitters in Antigua and Rwanda be converted (DW via Rachel Baughn)

GREENLAND No trace of reported R. Greenland on 3815-USB during DXpedition at Sheigra, even tho several MW frequencies from Greenland could be heard during the reported 1500-1600 and 2100-2200 UT slots (Dave Kenny, Scotland, BDXC-UK)

GUAM KTWR took quite a hit from typhoon Pongsona Dec 8. All transmitters were off the air and the five curtain antennas a wreck. (Bill Damick, TWR via Bob Padula, *EDXP*) Sustained winds reached 250 kph, with gusts to 300. The antenna array suffered severe damage, although all the towers remained erect and apparently undamaged. Three of the five antenna curtains were "shredded," according to TWR's staff on the island (*American City Business Journals* via Artie Bigley)

Guam's other SW station, KSDA, was also off the air until further notice. The island suffered extensive damage to electrical distribution system, especially in southern part where AWR SW station is located. Many power poles carrying electricity snapped, leaving most residents without power, including station. Then KSDA's emergency generator broke down (AWR website)

GUATEMALA I'd estimate that 80% of the country's AM stations have been taken off the air. If AM is off, there is no way that SW is going to be on. FM is the trend. We took R. Cultural off 3300 because we hadn't received any reports on it for a year; couldn't justify expense of running 10 kW with no reports. May put it back on at 500 watts or 1 kW to occupy frequency. Continue to run 5955 with 1 kW for DXers. We have a website in the works at **http://www.radiocultural.com** where we plan to stream audio. Radio Maya, 3324.8 and Radio Buenas Nuevas, 4800 have FM and are putting in repeaters to cover the hard-to-reach areas. I wouldn't expect them to be an shortwave much longer (Wayne Berger, TGN, via Hans Johnson, *Cumbre DX*)

HONDURAS R. Internacional, San Pedra Sula, reactivated in Dec after 15 months, on 4930.6, opening at 1250, nice signal and modulation. (Hans Johnson, TX, *Cumbre DX*)

HUNGARY After canceling several European languages, R. Budapest new schedule from Dec. 16 added more English: to Eu add Sun only 1600-1628 on 6025, 11680. Daily at 2000-2028 add 7175 to 6025, 7135. Daily to Eu 2200-2228 on 6025, add to SAf on 11885. NAm still 0200-0228, 0330-0358 on 9835 (Observer, Bulgaria)

IRAN [nan] Payam-e Daost, the Baha'i station, expanded its daily broadcasts from two half-hours to two half-sesquihours: 0230-0315 on 7465, 1800-1845 on 7480. Also on satellite, web: **http://www.Bahairadio.org —** Payam-e-Doost Radio, PO Box 765, Great Falls, Virginia 22066; Payam@BahaiRadio.org (Siamak Monjazeb, Payam-e-Doast Radio via pimabahais via David S. Lesh, *DXLD*) Clandestine? Not hostile nor proclaiming overthrow of government by any means (including peaceful). Background: **http://www.bahai-library.org/newspapers/050901-1.html** (Paul Ormandy, NZ, *CRW*) 7465 blocked here by WWCR, but what is believed to be Payam-e Daast was actually heard on 7460 with test tones from 0224, program at 0230, presumed via Maldava (Hans Johnson, Ria Handa TX, *Cumbre DX*) New 7460.0 *0230-0314* clandestine R. Payam-e Daast, Farsi. IDs, inspirational talks, Iranian string music, song (Anker Petersen, Denmark, *@tividade DX*)

ITALY New volcano QSL series of Rai International: Etna, Vesuvia, Stramboli, Vulcano (Vladimir Dorashenka, Dneprodzerzhinsk, Ukraine, *Signal*)

KASHMIR Hearing new AIR station on 4830 at 1530 with news. Concert to closing ID at 1801 as R. Kashmir (Stuart Austin, Blackpool, England, *DX Listening Digest*) \\ many others, 4760, 4775, 4895, 5040 (Nael R. Green, Blackpaal, *dx_india*) Jammu back on SW, new 50 kW inaugurated Dec 11: 0025-0445 4830, 0630-0930 5965, 1030-2310 4830 (Jase Jacab, *DXing.info*)

LATVIA From Dec 22, Laser Radio, UK, broadcasts every Sunday at 1800-2300 on 5935, 100 kW via Ulbroka. See **http://laserradio.net/** featuring items for radio hobbyists, anoraks and hams, with the very best music from the '60s, '70s and '80s. Also via **live365** (via Mike Terry, *DXLD*)

LEBANON [nan] The France-based Rally for Lebanon, part of the Free Patriotic Movement of former Army Commander Michel Aoun, who has been in exile 11 years, announced start of broadcasts on Nov. 22, 1600-1700 UT on 11515. Reports wanted to fpmradio@yahoo.com or radio@tayyar.org (*Daily Star*, Lebanon via Alan Penningtan) **http://www.tayyar.org/contenu/PagePrincipale.php** and **http://www.tayyar.org/files/revuedepresse/AR/assafir_radio201102.htm** both contain Arabic items mentioning 11515. First day 22 Nov at 1600 heard on 11515.40, speech, songs, strong and clear, slight fading; that was Lebanese Independence Day. By 25 Nov was on 11515.0 and reception not so brilliant here, just continuous Arabic songs. TDP website **http://www.airtime.be/schedule.html** lists *"Sawt Lubnan Al-Hauriya"* daily 1600-1700 on 11515, but anybody's guess as to actual transmitter site (Pennington, BDXC-UK) So in test phase could be at least two different sites were used, on slightly different frequencies (Glenn Hauser, *World Of Radio*) Voice of Freedom/Radio Tayyar/Radio Streem, 1600-1700 on 11515 via Samara, Russia, 250 kW, 224° to ME, perfect here (Ivo and Angell Observer, Bulgaria) Address is: Rassemblement Pour Le Liban, 63 Rue Sainte Anne, 75002 Paris, France. Supporting organization in USA is Council of Lebanese American Organizations, **http://www.clao.com** (Anker Petersen, DSWCI *DX Window*) Or is it via France? (gh) 11515 not heard one Sunday; I got instead France International in Persian *1600-1630* (Mahmud Fathi, Germany, *Cumbre DX*) Speech by the Free Patriatic Movement's head, Michel Aoun, explained that station opposes Syrian control of Lebanon (via Achraf Chaabane, Tunisia, *CRW*)

MALAWI [non] I'm sure last month's report of MBC heard in Namibia on 3385 was a mistake. There is no trace of MBC on SW, and what is audible on 3385 is a spur of BBC on 3255 (Vashek Korinek, RSA, *BC-DX*)

MÉXICO RMI's schedule on 11770, 9705, effective until Dec. 31, at least, showed: *Antena Radio Summary* [in English of preceding Spanish news magazine]: M-F 1500-1530, 2300-2330, Tue-Sat 0400-0430 [repeats, or new shows?]; *Talking Mexico*: same times as above Sat-Sun except UT Mon when *La Hora Nacional* is on at 0400-0500. *Mailbox*: Tue 1530, Sun 1530, Thu 0430; *DXperience*: Thu 1530, Tue 2330, Sun 0430, Sun 2330; *Radio Correo Del Aire*: Sun 1630, Fri 2100; *Estación DX*: Sun 2000, Tue 2100, Fri 0330.

R. Educación, 6185, has a media and mailbag show, *Sintonía Libre*, at 0430-0500, heard at least on UT Mon & Thu; 0530 an ID in English asking for reports (Glenn Hauser, OK, *DX Listening Digest*)

MOLDOVA R. Pridnestrovye has new weekly English service, Wed *1700-1730* on 5960, an uncoördinated frequency (Vladimir Titarev, Ukraine, *Clandestine Radio Watch*) ID as "the Radio of the Dniestr Moldavian Republic" (Mike Barraclough, Letchworth, UK, *DX Listening Digest*)

MOROCCO B-02 RTM in Arabic:

0000-0500 5980 MOR 250 kW / 083 deg
0900-1500 15340 NAD 250 kW / 110 deg
1500-2200 15345 NAD 250 kW / 110 deg
1100-1500 15335 MOR 250 kW / 027 deg
2200-2400 7135 MOR 250 kW / 027 deg

(Observer, Bulgaria) MOR = unspecified site in Morocco at 35N34 005W58; NAD = Nador 35N03 002W55

NIGERIA V. of Nigeria in English, *"Listeners Letters"* program heard Sat 0645 on 15120, asked for reception reports. Repeat on Suns 1145, Mons at 2215, and on Wednesdays at?? (Rumen Pankov, Bulgaria, *BC-DX*)

[non] We broadcast on 13855 daily at 1830 in Hausa, 1915 in English

(Salama Radio via Hans Johnsan, *Cumbre DX*) So no Sackville 15365 at 19 as per earlier sked; just a plan? (gh)

PAKISTAN PBC B-02 English: (Including CIRAF numerical target zones; see top]

Assami	11655 15455 0045-0115 41 [portly in English]
English	11570 15070 1600 1615 37-39 (ex 15105)
English	15530 17725 1600-1615 48s 52 53 57
Urdu/English	17835 21465 0800-1104 17 18SE 27-29
Urdu/English	9400 11895 1700-1900 17 18SE 27-29 AFG C Asian Reps, Russia (ex 9290)

(R. Pakistan via Noel R. Green, UK, *BC-DX*)

News in English 1600-1615 heard on 4790, 11570, 15070, not on 15530, 17725 (Rumen Pankov, Bulgaria, *BC-DX*)

PERÚ New R. San Agustín, 4627.2, heard after 2350 with Ecuadorian and Peruvian folk music until abrupt closing at 0140. Announcements say is from Celendín province on 65 meters (Rafael Rodríguez, Colombia, *Conexión Digital*) The former R. Cosmos, heard around this frequency? R. Corazón de Hunadoy heard on several dates in November on frequencies around 2862, 3812 and 5723, around 1040 and 0140 UT (Alfredo Benjamin Cañote Bueno, Chaclacoyo, Lima, *DX Listening Digest*) These work out to be harmonics up to the 6th, of 945v kHz

SA'UDI ARABIA [non] A new clandestine, V. of al-Aslah launched Dec 7, 1900-2100 on 7590; see **http://islah.org/radio1.htm#3** (Mahmud Fathi, Germany) Listed at TDP website as Radio Alislah. The islah.org site had an article in which Bin Laden is referred to as a "good warrior." (Hons Johnson) Strong in NZ (Paul Ormandy) Also in south Italy (Roberto Scaglione, all *Cumbre DX*)

Sa'udi Arabia's bonned emigré opposition inaugurated its first radio broadcasts to the kingdom from an unspecified "European country." Listeners across the Arabian peninsula can tune into the Arabic-language "Voice of Reform" station launched by the London-based Movement for Islamic Reform in Arabia (MIRA) on the 11.096 MHz frequency on the Hotbird satellite, 24 hours a day and supplemented by SW on 39.35 metres [sic] between 1900 and 2100 GMT, MIRA spokesman Saad al-Faqih said.

Faqih said he wos unsure how Washington would react to the new station. "Perhaps Woshington will appreciote it given the Sa'udi outhorities' hesitancy about fully cooperating in providing the United States with information about the activities of Islamist groups in the region," he said. "Or maybe they'll be apprehensive obaut broadcasts which carry the hallmarks of the Islamic opposition. But it's the Sa'udi government which will be really uncomfortoble about programs which allow Sa'udis to express themselves freely and without comebock by taking advantage of new technologies such os the Internet."

The Sa'udi authorities have long made strenuous efforts to stop opposition groups getting their message across inside the kingdom, putting strong pressure on broadcasters around the region not to give them a platform (from **http://www.middle-east-online.com/english/?id=3559** via Alan Pennington, UK) Al-Faqih speaks frequently to the Western press about the Middle East, bin Laden and the War on Terrorism. Sawt al-Islah (Voice of Reform): MIRA, BM Box: MIRA, London WC1N 3XX, UK **http://www.miraserve.com** (Nick Grace, *Clandestine Radio Watch*)

"The station is based somewhere in Europe," Al-Faquih said. "What we con say is that we don't broadcast from England in order not to cause any embarrassment to the British govemment." (AP via Artie Bigley) My suspicion is that the name of the site includes an ø (Kai Ludwig, Germony, *DX Listening Digest*) 7590 had o weak and very fluttery signal here at 1900. 99% chance that this is Norway as other CIS and continental stations did not behave like this (Olle Alm, Sweden, *DX Listening Digest*) It is remarkable that Norkring/Kvitsøy had dropped 9980 on Dec 10 for its broadcasts in Norwegian and Danish during that specific period, probably to make this transmitter available for a Merlin broadcast! Both Kvitsøy transmitters were back for the Norwegian broadcast from R. Norway at 2105 on 7490 and 9510 (Anker Petersen, Denmark, *CRW*) After four days, bubble jamming began (Achraf Chaabone, Rajesh Nambiar, UAE, Hans Johnson, Kouji Hashimoto, *CRW*) When will TDP – and for that matter, legitimate broadcasters like NRK, go too far in handling clandestine broadcasts, which are really terrorist? They are playing with fire. Sounds like this one comes close, endorsing Bin-laden (gh)

SOMALIA R. Hargeysa presumed on 7530 USB + carrier, an hour later than usual during Ramadan until 1959*, very weak during excellent propagation (George Maroti, Chamberlain, Maine DXpedition, *Cumbre DX*)

SPAIN REE's program of erudite and folk music from its own RTVE label, *Nuestro Sello*, is heard M-F 1010 on 11815, 21570; 1605 on 15125, 21570, 21700, Tue-Sat 0105 on 9620, 11815, 11945, 15160 (Paulo Roberto e Souza, Amazonas, *@tividade DX*) REE also has a *Zarzuela* show Sat 1330 on 21570, 21700 (Célio Romais, *ibid.*)

SYRIA [non] Arabic Radio starting *1600 on 7470 // 12085 although not running exact at the same time. Via Russia-Samara?

ID twice as *"Hureeya Hur-A-Arabeeya"*, military music and chanting, long drawn out speech, mentioning Syria, Arafat. ID and sign-off at 1630. SINPO 35343 (Silvain Domen, Belgium, *World Of Radio*) 7470 replacing the other 12 MHz (gh)

TATARSTAN/RUSSIA B-02 Radio Tatarstan via Samara:

0500-0600 15105 150 kW / 065 deg to FE
0700-0800 15105 250 kW / 060 deg to CAs
0900-1000 11915 100 kW / 305 deg to Russia
(Ivo and Angel! *Observer*, Bulgaria)

TIBET [non] V. of Tibet in Tibetan/Chinese via Tashkent at 1430-1515 on 12025 ex-11550 ex-11975, plus Chinese jammer. And at 1213-1300 on 21635 ex-21525 (*Observer*, Bulgaria) Back on 11975, along with Chinese musicjammer (Silvain Domen, Belgium, *DX Listening Digest*) They move back and forth; no telling where they are now (gh)

TUNISIA R. Tunis continues to emit strong spur on 7190, 35 kHz down from nominal 7225, at 1915, Arabic \\ 12005. Unfortunately, *PWBR* '2003' shows 7190 as a real outlet! (Bab Padula, Australia, *EDXP E-Net*)

UKRAINE There could be no greater proof that superpower is no match for avoiding the auraral zone. If RUI was really running 1000 kW on 9810, it's unusable here, 0100 UT – certainly a signal, but weak and heavy flutter (Glenn Hauser, Enid OK)

UAE UAE Radio - Dubai B02 Engineering Schedule (not available in HFCC Master File nor anywhere else as for as I know!):

11795 1700-0000 Eu
11950 1700-0000 Eu
13630 1200-0000 NAf
13675 0600-0000 Eu
13675 0400-0600 Au NZ
15370 1000-1200 NAf
15395 0600-0000 Eu
15435 0400-0600 Siberia As
17830 0400-0600 Au NZ
17865 0600-1700 Eu
21605 0600-1700 Eu [really 21598v — gh]
21700 0400-0600 Au NZ

12005, 15400 and 17890 are registered for 24-hrs on an "as required" bosis. [The very frequencies which are required for English at 0330 to NAm; and 0530?? English also at 1030, 1330, 1600 -gh] (Bob Padula, *EDXP*)

USA On one of his VOA *Main Street* segments Kim Elliott mentioned he had attended a meeting of BBG, where VOA language services were prioritized; top of the list were Arabic, Farsi, Mandarin, Spanish; further down, English to Africa. But Worldwide English was not on the list (gh)

The RFE/RL service to Iran, R. Azadi, was closed Dec. 1 after four years, in preparation for the lounch Dec. 16 of its replacement, R. Farda (Tomorrow), on the same plus odditional SW frequencies, adding MW, also on satellite and internet. Like R. Sawa for Arabs, R. Farda is designed to appeal to Iran's younger generation with a mix of pop music and short newscasts, but the VOA Farsi service is not being abolished, as VOA Arabic service was. See **http://www.radiofarda.org**

Radio Farda is under direction of Mardo Soghom and Ali Farhoodi. Sara Valinejad, a professional performer of Persian music in the Greater Washington area, is music director (from IBB/BBG press info; Tom Dine, publicdiplomacy.org via Michiel Schaay, *Cumbre DX*) In the interim, the former Azadi frequencies of RFE/RL were carrying half an hour of news daily, and 2.5 hours of music (RFE/RE *Media Matters*) During which, confusingly, both Azadi and Farda IDs were heard by many DXers (gh)

WRMI, 15725, has been providing a fine public service, even if just fill, classical music in the 1400-1600 period weekdays; also music scheduled Sat 1300-2300, Sun 1500-2100. Sametimes banus Prague relays appear in the 1400 half hour \\ 21745 but several seconds behind, internet feed? (Glenn Hauser, OK)

WRNO became active again mid-December around 0130-0249, especially UT Mon, on 7355, minister speaking about economic collapse. Modulation generally low (Bill Matthews, OH, *EDXP*) Also other nights, programmed by Good News World (Scott R Barbour Jr, NH, *DX Listening Digest*) Actually 7354.6 in same time period, irregular (Hans Johnson, TX, *Cumbre DX*)

Fugitive clandestine SW broadcaster Steve Anderson, of United Patriot Radio, was arrested without incident in rural Cherokee County, NC, a few miles from MT HQ, Nov. 22 thanks to a tip following a second segment about him on Fox's *America's Most Wanted*. He had been sought for more than 13 months after shooting up a police car in Kentucky. Anderson's arrest prompted great relief, especially from former Somerset KY news editor Carol Coffey, whose life Anderson had threatened on a broadcast (vio Louisville *Courier-Journal* via Artie Bigley; Lexington *Herald-Leader*) A few days later a federal Grand Jury in London, KY, indicted Anderson on 18 weapons charges. If convicted, the maximum potential penalties are life imprisonment, $250,000 fine (Jeff Neal, Somerset *Commonwealth-Review* via Mike Terry)

[non] Tuning around, landed on 9840 at 0600, for some lively talk in Arabic, punctuated every few minutes by wild Spike Jones-ish percussion! The altemating M&W worked themselves up to some big laughs before it ended at 0615. What could this be? I should have figured it out immediately, since the opening as well as closing theme was "Never On Sunday." Ended with AWR IS and ID, address in Cyprus. Gotta admit, those Arabic Seventh Day Adventists have a sense of humor! This was via Germany, 100 kW (Glenn Hauser, OK, *DX Listening Digest*)

URUGUAY Emisora Ciudad de Montevideo, 6010 at 0230 in Dec with special remote live event about Carnival, precursor of relays from Teatro de Verano during Carnival month, Feb into early March (Horacio Nigro, Uruguay, *Cumbre DX*)

UZBEKISTAN [non] Jomming by China of Uzbek-language SW broadcasts may be because the language can be understood by the Uighur minority in China, but to my ear Kazakh is even closer and it is not jammed. Possibly China, which has transmitters available, is jamming Uzbek on behalf of the Uzbekistan govemment (Dmitri Mezin, Russia, *Clandestine Radio Watch*)

VENEZUELA [non] *Aló presidente* de Hugo Chávez, Sundays starts anywhere from 1400 to 1500 via Cuba on 15230, new 15570 and 17750 (Adán González, Catia La Mar)

VIETNAM [non] VOV in English at 0107 on unlisted 5905 (Harold Frodge, MI, MARE DXpedition) Originating from 6175 Sackville, mixing with another Sackville relay at 0100-0145, DW in English on 6040, halfway between (gh)

Current clandestines via 9930, KWHR Hawaii, the first two arranged thru TDP: 1230-1300 R. Free Vietnam (New Orleans); 1300-1400 Que Huong Radio; 1400-1500 R. Free Asia (in Vietnamese); 1500-1600 R. Free Vietnam (California) (Ludo Maes, TDP via *CRW*)

WALES [non] Wales Radio International's website had contradictory info about its current schedule; confirmed by monitoring in Nov, to Eu Fri at 2130 on 7325 the summer frequency, instead of the supposed winter channel 6010; NAm UT Sat 0300 on 9735 (Geoffrey Rose, Dan Sampson, *Prime Time Shortwave*) And the third transmission, to Australasia confirmed Sat 1130-1200 on 17625 (Barry Hartley, NZ, *BC-DX*)

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

Global Forum

Broadcast Logs

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0045 UTC on 7325
LITHUANIA: Radio Vilnius. Text on electronic advancements. Additional Euro DXing observed: **Radio Slovakia Intl** 9440, 0100-0105. Czech Rep.'s **Radio Prague** 6200, 0200-0210; **Swiss Radio Intl** 11660, 2345-2355. (David W. Weronka, Benson, NC) **Radio Sweden** 9490, 0235; **Radio Bulgaria** 9400, 0240; Germany's **Deutsche Welle** 6020 (via Sackville, Canada relay) 0340. (Howard Moser, Lincolnshire, IL) **Radio Exterior Espana**, Spain 15110, 2014 in Spanish. (Stewart MacKenzie, Huntington Beach, CA) 9840, 2125-2135. (Joe Wood, Gray, TN/*NASWA Flash Sheet*) Italy's **RAI** 6060, 0015 Italian service. (Fernando Garcia, Baltimore, MD)

0210 UTC on 4815.02
ECUADOR: Radio El Buen Pastor. Musical program to echo effect ID. Ecuadorian's monitored: **Radio Federacion** 4960, 0034-0040* (Nicholas Eramo, Buenos Aires, Argentina/*HCDX*) & 1000 tentative. (Jerry Berg,MA/NASWA FS) **Radio Oriental** 4782, 1030; Radio Centro 3290, 1100. (Garcia, MD) **Radio Quito** 4919, 0515-0530+. (Harold Frodge, Midland, MI)

0355 UTC on 4950
ANGOLA: Radio Nacional da Angola. Portuguese. Fair signal quality for male's mention of city Mulenvos. Time check to "Radio Nacional da Angola" at 0400. Signal fade during what sounded like a news script. (Frank Hillton, Charleston, SC)

0445 UTC on 6011
COLOMBIA: La Voz de tu Conciencia. Religious program to clear ID, "en onda corta...la voz de tu conciencia...," moderate signal, SIO 243. (Daniel Canonica, Muggio, Switzerland) 0009-0059 & 0133-0139, SIO 333. (Nicholas Eramo, Buenos Aires, Argentina/*HCDX*.) **La Voz del Guaviere**, 6035, 0952-1019 Latin vocals to time check, "canned" ID and Spanish newscast. (Rich D'Angelo, PA/*NASWA FS*)

0510 UTC on 5047
TOGO: Radiodiffusion Togo. French seems to be active again observing choral music to Onward *Christian Soldiers* tune. No formal ID although Togo was mention during text. Newscast at 0600 observing fading and weak signal. (Piet Pijpers, Netherlands/*HCDX*) Station logged 5047, 2110-2203. (Barbour/*NASWA FS*)

0520 UTC on 3280
GUATEMALA: Radio Chortis. Spanish rosary mass of fair-good signal quality. (Wood, TN) **Radio Buenas Nuevas** 4799.8, 1052-1102+. (Frodge, MI) **Radio Cultural** 4780, 1100 into coridos music. (Garcia, MD) **Radio Verdad** 4052.5, 0444-0505* (Wood, TN)

0543 UTC on 7125
MOLDOVA: Voice of. Jazz show of Duke Ellington music. SIO 4+33, // 7180 also via Moldova, 7125 slightly better. (Frodge, MI)

0656 UTC on 7260
VANUATU: Radio Vanuatu. South sea island music to station announcement. Yellow bird interval signal at 0700 followed by English news. Interval signal repeated at 0710, noting signal fading out very quickly. No signal noted on station's 4960 kHz. (Enzio Gehrig, Denia, Spain/*HCDX*)

0854 UTC on 6135
BRAZIL: Radio Aparecida. Announcer's talk closing with "Aparecida" singing ID jingle by group chorus. Nice clear signal. Brazil's **Radio Gaucha** 6020.32 at 0855. (Dave Valko, PA/*CumbreDX*) Tentative on **Radio Tupi** 9565, 2204-2215+; **Radio Inconfidencia** 6010.2, 2255-2301+. (Frodge, MI) **Radio Cairi** 4785, 0332-0339; **Radio Record** 6150, 0435-0445; **Radio Difusora do Amazonas** 4805, 2246-2303; **Radio Cultura** 17815, 0218-0300*; **Radio Nova Difusora** 4795, 0140-0237*; (Eramo, ARG/*HCDX*) **Radio Rio Mar** 9695, 2240+. (Arnaldo Slaen, Buenos Aires, Argentina)

0952 UTC on 15820
ARGENTINA: Radio Diez. Audible in LSB//710 AM kHz. Brief news from Buenos Aires newspapers and commentary on Brazil's politics. Time check to "Radio Diez, siempre siempre noticias" news promo. SINPO 44444 (Slaen, ARG) RAE 6060, 1000 with news, IDS & sports ; Radio Baluarte 6215, 2330 logged irregular in Portuguese. (Garcia, MD)

1030 UTC on 4995
PERU: Radio Andina. Commercials at tune-in to clear station ID. Pop music to chatty announcer's morning talk. SINPO 323332. (Gayle Van Horn, NC) Religious service from **Radio Victoria** 6020.27, 0726-0733; **Radio Cora** 4915, 2332-2345. (Slaen, ARG)

1036 UTC on 4845
GUATEMALA: Radio K'ekchi. Strong signal, though audio distorted. Canned FM promo to announcer's live K'ekchi service followed by full canned identification. (Dave Valko, PA/*NASWA FS*)

1220 UTC on 5975
TASHKENT: Radio Tashkent. English broadcast, // 6025, 9715, with Middle Eastern music Station identification, "This is Radio Tashkent." Not heard on 5885 as previously reported elsewhere. Signal on 5975 tuned in LSB to avoid adjacent channel Radio Marti on 5980. (Mark J. Fine, Remington, VA)

1617 UTC on 17673
EGYPT: Egyptian Radio. Tentative logging on this domestic service broadcast in Arabic. (Wood, TN) Radio Cairo audible 9475, 0220 in English. (Moser, IL)

1902 UTC on 15190
PHILLIPINES: Radio Philipinas. Special presentation in English on the Spanish-American War. SIO 242+, //11720 SIO 242, // 17720 SIO 2+42, 15190 best quality. (Frodge, MI)

1730 UTC on 4010
KYRGYZ REP." Kyrgyz Radio. Female announcer in Russian to possibly a frequency quote. Russian folk music with excessive co channel interferences on 4005 , 4013. (Zacharias Liangas, Thessaloniki, Greece/*HCDX*) *Nice log, also active in English 0100-0200, 2320-2330 in Asia. - GVH-ed.*

1832 UTC on 4820
BOTSWANA: Radio Botswana. Classic romantic pop tunes. Talk to "Radio Botswana" ID with S5 signal quality. (Liangas, GRC/*HCDX*) 2037-2103 on 4820. (Wood, TN)

1952 UTC on 11734.1
TANZANIA: Radio Tanzania Zanzibar. Choral chants to women in local language (Swahili?) To "RTZ" identification. SIO 232+ in LSB to avoid interference. (Frodge, MI)

2050 UTC on 11620
INDIA: All India Radio. Subcontinent music to station identification & 9595, 0000-0013. (Joe Wood, Gary, TN) 7410 (Bangalore), 2229-2230* best in LSB to avoid WBCQ on 7415. (Frodge, MI). **AIR-Delhi**-Kingsway 7125, 0105-0130; **AIR-Garakhpur** 7250, 0135-0145. (Eramo, AR/*HCDX*) **AIR-Delhi** 4860, // 4760 at 1230. (Lineback, KS/*NASWA FS*).

2130 UTC on 9540
ALBANIA: Radio Tirana. Interval signal from 2128. Schedule quote after sign-on, but no mention of 2130 broadcast. National news events to classic bumper music including *Borlero* and *William Tell Overture*. (Frodge, MI)

2223 UTC on 11895
FRENCH GUIANA: Radio Japan relay. Interviews and pop music to 2228. Station identification, // 11910 (322); 15220, 17825 via **Japan;** 2225 Ascension Island relay on 15220. (MacKenzie, CA)

2229 UTC on 3366
GHANA: GBC. All easy-listening tunes, no announcer until 2255. SIO 352 improved until 2255 and almost inaudible after 2300. Noted on 4915, 2207-2215+ with news, football scores, recaps and "Radio Ghana Accra" identification.(Frodge, MI) 4915, 2200-2215 poor copy. (Wood, TN)

2240 UTC on 5030
BURKINA FASO: Radio Burkina. French service that included talk and intros to reggae and hip hop music. Fair signal and ID just barely audible at 2300. Signal dropped off afterwards, and presume this was their sign-off. (Duane Hadley, Bristol, TN)

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

The QSL Report

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Philately and QSLing, a DX Bonus

Next time you receive a QSL card or letter, take a look at the stamps or postal marks. Chances are the station will respond with a bevy of colorful postage stamps, or perhaps a special postal cancellation. To philatelists, (stamp collectors) this extra boon is a welcome addition to their collection.

Topical collecting, the fine art of acquiring stamps specializing in one topic, has long been a popular aspect to hobbyist searching for stamps, cancellations or postal covers focusing on aspects of communications.

The US Postal Service has periodically released issues that focus on amateur radio, electronics, communications and Voice of America. Recently, with the release of Canada Post's *Fathers of the Wireless Age*, radio hobbyists are taking a second look at this slant to their DX hobby.

Canada's popular pair's release depicts two inventors, Fleming and Marconi, affixed between a stylized map of Canada. Ordering information for stamps and Official First Day covers is available at the *Newsroom* link at **http://www.canadapost.ca** or from the National Philatelic Centre. From Canada and the US, call: 1-800-565-4362. Outside the US: 902-863-6550.

DXers and collectors may also inquire for additional radio related philately at **http://www.u-e-net/philaradio/** Topics include amateur radio, broadcasting and telecommunications. You may also subscribe to their mailing list via **philaradio@ref-union.org**. Check out your mail; you may receive an extra bonus in collecting!

AMATEUR RADIO

GUAM-KH2/KF2XN (IOTA OC-026), 20 meter SSB. Full data, picture QSL card direct from Manager W2GR. Received in one month for an SASE to: Mike Benjamin, 1064 99th Street, Niagara Falls, NY 14304 USA. (Larry Van Horn-N5FPW, NC)

UAE-A61AJ, 20 meters SSB. Full data picture QSL from Manager N4QB. Received in 176 days for an SASE to: Joseph N. Veras, P.O. Box 1041, Birmingham, AL 35201. (Van Horn, NC)

VANUATU-YJ8UU, Port Via (Efate, IOTA OC-035), 20 meters SSB. Two full data color QSL cards direct from Manager ZL2HE, for a nested Euro SAE and one US dollar to: A-E Law, 58 Ruahine Street, Dannevirke 5491, New Zealand. Stuart retired to New Zealand, so Vanuatu will be harder to work. DXCC # 156. (Van Horn, NC)

Yugoslavia-YU1ANT Beograd, 10 meters SSB. Full data card from YU1KK, Barajevo, 10 meters SSB. Full data card, received in six months via ARRL bureau. (Van Horn, NC)

CANADA

Voice of Vietnam relay via Sackville, 6175 kHz. Full data color QSL card unsigned except for "greetings from Director of Overseas Service," plus program guide and frequency list. Received in 69 days for an English report. Station address: 58 Quan Su, Hanoi, Viet Nam. (Stephen Zolvinski, Columbus, OH) 9840 in 83 days. Ed Kusalik, Canada/*ODXA*)

CLANDESTINE

Afghan Theater of Operations, Commando Solo II, 8700 kHz USB. No data unsigned, eagle and military insignias card with apology and thanks written on the back. Received in 304 days for an English report and three mint stamps. QSL address: 193rd Special Operations Wing, Atten: Chief of Public Affairs, 81 Constellation Crt, Middletown, PA 17057. (William R. Wilkins, Springfield, MO)

MEDIUM WAVE

KNX, 1070 kHz AM. Full data station building card signed by Larry A. Wichman-Chief Engineer, plus program schedule and business card. Received in seven days for an AM report, one US dollar and an address label (used on reply). Station address: 6121 Sunset Blvd., Los Angeles, CA (Wilkins, MO)

KOA, 850 kHz AM. Partial data verification on station letterhead, signed by Jan Chadwell-Chief Engineer. Received for an AM report. Station address: 469 S. Monaco St., Denver, CO 80237. Station website: **http://www.850koa.com**. (Mark Redfox, Albuquerque, NM)

KFAQ, 1170 kHz AM. Informative partial data letter signed by Jay Werth-General Manager. Station is new for me since their call change from KVOO. Station address: 4590 E. 29th St., Tulsa, OK 74114-6208. (Patrick Griffith, CBT, Westminster, CO)

KTNS, 1060 kHz AM. Full data letter signed by Larry W. Gamble-Owner & GM. Received in 32 days for a taped report. Station address: P.O. Box 2020, 40356 Oak Park Way, Oakhurst, CA 93644. (Patrick Martin, Seaside, Martin, OR)

Radio Sweden 1179 kHz AM. Partial data QSL card *Comb of Bone* 2000 BC, unsigned, plus letter and program guide, and a German personal email. Received in 26 days for an AM report, without return postage. Station address: 10510 Stockholm, Sweden. (Martin Schoech, Germany/*Cumbre DX*)

PIRATE

Voice of the Abnormal, 6955 kHz USB. Full data marijuana leaves/joint sheet, signed by Guy Paganas. Received in 111 days for a pirate report and one US dollar. Pirate maildrop: P.O. Box 69, Elkhorn, NE 68022. (Wilkins, MO)

ROMANIA

Radio Romania, 15380 kHz. Full data unsigned *The North Railway Station* card, plus frequency schedule. Received in 55 days for an English email report to: *engl@rri.ro*. Website: **http://www.rri.ro.** Station address: 60-62 Berthelot, 70747 Bucharest, Romania. (Kraig Krist, Annandale, VA)

SLOVAKIA

Radio Slovakia Intl, 5930 kHz. Full data unsigned QSL card. Received in 97 days for an English report. Station address: Mytna 1, P.O. Box 55, 81755 Bratislava 15, Slovakia. (Joe Squashic, Wake Forest, NC)

SPAIN

Spanish Foreign Radio, 15385 kHz. Full data card with illegible signature, plus frequency schedule. Received in 48 days for an English email report to: *ree.rne@rtve.es*. Website: **http://www.ree.rne.es**. Station address: Radio Exterior de Espana, Relaciones con la Audiencia Seccion DX, Apaartado de Correos 156.202 E-28080 Madrid, Spain. (Krist, VA)

Radio China relay, 9690 kHz. Full data unsigned scenic QSL, plus Chinese ornament. Received in 39 days for an English report. Station address: English Service, 16A Shijingshan Street, 100040 China. (Squashic, NC)

TUNISIA

RTV Tunisienne, 7190 kHz. Full data email verification from Abdessalem Slim. Attachment contained verification info and station schedule from: *Ont@ati.tn*. Received in six days for a French report, 22 years after the first of 14 previously unsuccessful reports via registered mail, tapes, prepared QSL cards, mint stamps, IRCs, and currency. Country verified # 196 on the long, steep path to 200! (Jim Evan, TN/*Cumbre DX*) *Way to go Jim, never say never in QSLing! -ed.*

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AND THE WINNER IS...

The movie industry has its Oscars. Television has its Emmy Awards. The theatre has its Tonys. Music of just about every genre seems to have a different awards show a week! So, how – if at all – is excellence in international radio programming recognized?

While you may never have heard of either, there are actually two annual international competitions of note: the New York Radio Festival and the Third Coast International Audio Festival in Chicago. While the New York Festivals has been around since 1957, its international radio competition did not come into being until 1982. The Chicago competition is almost brand new – created in 2001 by public radio station WBEZ.

The New York Radio Festival

"For 44 years, the New York Festivals [*as they are collectively named - jf.*] has honored excellence in communications media which touch the hearts and minds of readers, listeners and viewers worldwide." So begins a capsule description of this multimedia international contest on its web site **http://www.nyfests.com.**

The Festivals began as an awards program designed primarily to reward outstanding achievements in non-broadcast media. Over its first twenty years it became the preeminent instrument of recognition for industrial and educational film and video. During the '70s, competitions for TV and cinema advertising and TV programming and promotion were added. In 1982, contests for international radio advertising, promotion and programming were launched and two years later, print advertising, design, photography and illustration were added to the mix. An international new media competition began in 1992; another for international healthcare communications in 1994; still another for advertising and marketing effectiveness in 1995. Finally in 2001, the International Midas Awards were created to recognize the world's best work in financial services communications.

Clearly, the New York Festivals has experienced unrivaled growth and prestige over its history and its Radio Festival shares in that lofty recognition. The names on the Radio Festival Board that evaluated the more than 1200 programs submitted by stations in 35 countries last year reads like a "who's who" of international radio.

The outline of the awards competition is a bit confusing to the uninitiated. Entrants appear to vie for four Grand Awards, two United Nations Awards and recognition in various other categories such as Craft and Technique, Information, Entertainment, and News; and subcategories like Culture and the Arts, Social Issues/Current Events, Educational, Investigative Reports and many others.

The big winner among international broadcasters in the most recent competition was **Radio Netherlands**, whose programs took away nine awards – seven by its English service and two by its Spanish Latin American service. Programs from Germany's **Deutsche Welle** and the **BBC World Service** came away with six awards. For those of the opinion that **Radio Free Asia** is just some propaganda mouthpiece, RFA programs were internationally recognized for excellence by winning five awards; as many as the **ABC** (**Radio Australia**'s parent corporation) and one more than Canada's **CBC**.

The Third Coast Festival

Only two years old, Chicago Public Radio's ambitious Third Coast International Audio Festival includes a competition, a nationwide broadcast, a conference, a web site and a Chicago-based "listening series." According to the web site **http://www.thirdcoastfestival.org**, the Festival was created "to present award-winning documentary and feature work to a broad audience, to honor the work of producers and enrich the resources available to them, and to generate excitement about the documentary form on radio and the internet" as audio media move into the 21st century. Chicago Public Radio says its aim is to develop the TCIAF into a forum that discovers new talent and provides active encouragement to radio documentary and feature producers working to perpetuate the craft in "fresh and vital ways."

The Third Coast conference, held in the autumn, provides an opportunity for producers to listen to each other's work and share ideas and expertise. It includes listening sessions and panel discussions, culminating in an awards ceremony. There are five top prizes and up to six honorable mentions for each, with the winners receiving monetary support for their creative efforts. WBEZ, Chicago Public Radio, produces a festival broadcast featuring the competition's award-winning work. The two hour broadcast is distributed by Public Radio International and was carried by over 150 PRI affiliates across the U.S. last year.

The Third Coast web site is a rich reference in itself. It features a new documentary audio piece every other week for listeners to sample, provides up to date information about all aspects of the Festival and offers an extensive list of links to other audio and documentary resources. In Chicago at the Gene Siskel Film Center, the Third Coast Listening Room series invites the public to hear and discuss audio documentaries and features in a theatre setting.

International broadcasters who were "winners" at the 2002 TCIAF were **Radio New Zealand International** (although the program honored was produced by the domestic Radio New Zealand) and **Radio Australia** (although the program recognized was produced by ABC Radio National), which also won an award in 2001. This leads to an interesting question.

What is "International"?

As we discussed last month, international radio services are broadcasting content originally produced by their domestic service partners for a home audience. The Internet now carries audio streams of numerous ostensibly "domestic" radio stations to international ears. So, how does anyone define just what "international" is today when it comes to broadcasting?

Both awards festivals take a very wide view of the term. It's the competition that's international and producers are free to nominate any program they feel is deserving of recognition. Where the program is broadcast – whether on a domestic station, an international service or on the internet – is not considered a relevant factor.

However, I would suggest that for our purposes, only those programs that were ultimately broadcast on an international radio service should qualify for our count. Unfortunately, there's not enough space this month to list them all, so we'll defer that to next month's column. (We'll also tell you how you can listen to some of them if you missed them when they were first broadcast.) However, should you find yourself unable to wait, you can check the two festival web sites noted earlier for further information.

Until March, good listening!

How to Use the Shortwave Guide

Convert your time to UTC.

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

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

Find the station you want to hear.

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

If a broadcast is not *daily*, the days of broadcast 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

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

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

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

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

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

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

Choose a program or station you want to hear.

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

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

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

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Program Highlights

John Figliozzi

BBCWS at 70

The **BBC World Service** celebrated its 70th anniversary in grand style – and deservedly so – in December with over a week of special programs and broadcasts, including an opportunity for listeners to directly question its managing director, Mark Byford. Even 18 months after the shutdown of direct shortwave service to North America and Australasia, a discussion was raised about it in the course of the program. Again calling it a case of establishing priorities, Mr. Byford used the occasion to congratulate himself and his management team for being willing to make the "tough decisions."

It's unfortunate that the **WS** continues to have a blind spot when it comes to this issue. To this observer, international public service broadcasting will never have the level of mass appeal that other, more commercial (and correspondingly more banal) ventures are capable of generating. Therefore, it would seem foolhardy to dismiss the importance of any significant sector of an audience, especially one that has demonstrated its commitment over the long haul.

China Radio International

CRI sent out a very nice New Year's greeting card that contained a welcome and much more detailed ***English Service*** program schedule than has been their practice in the past. The outlines of that schedule are in *MT*'s monthly program listings, but here are the regular features that are identified within each program:

· ***News & Reports***: can include *World News, China-related News, Sports News, News on Culture-Showbiz, Sci-Tech News, Business News* and *Press Clippings* depending on the day of the week. This segment runs 30 minutes M-F, 15 minutes on Sat. and 10 minutes on Sun.

· *In the Spotlight*: Cultural Carousel, Writings from China, Cultural Express and China Melody.

· ***China Horizons***: Zhejiang Special, Nanjing Today, Wuxi Journal, Changzhou Report, On the Road.

· ***Listeners' Garden***: You Ask Us, You Tell Us, Chinese Folk Song, Idioms and Their Stories, The Week Ahead, Learn to Speak Chinese.

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

0000	0015		Cambodia, National Radio Of	11940as				
0000	0015		Japan, Radio	6145na	13650as	17810as		
0000	0030		Austria, Radio Austria Intl	9870eu				
0000	0030	as	Austria, Radio Austria Intl	13730eu				
0000	0030		Egypt, Radio Cairo	9900am				
0000	0030	mtwhf/vl	Solomon Islands, SIBC	5020do	9545do			
0000	0030		Sri Lanka, SLBC	4940as				
0000	0030		Thailand, Radio	9680va				
0000	0030		UK, BBC Worls Service	3915as	5970as	11945as	17615as	
0000	0045		India, All India Radio	9705as	9950as	11620as	13605as	
0000	0055		Spain, R Exterior Espana	6055am				
0000	0057		Canada, Radio Canada Intl	9755as	11895as	9755as	11895as	
0000	0059		Canada, Radio Canada Intl	5960na	9590na			
0000	0100		Anguilla, Caribbean Beacon	6090am				
0000	0100		Australia, ABC NT Alice Springs	4810eu	9960eu			
0000	0100		Australia, ABC NT Katherine	5025do				
0000	0100		Australia, ABC NT Tennant Crk	4910do				
0000	0100		Australia, Radio	5995va	9475as	9580va	9660pa	11650va
				11660as	12080va	15240pa	15415as	17775as
				17580pa	17795va	21725va		
0000	0100		Bulgaria, Radio	7400na	9400na			
0000	0100		Canada, CBC Northern Service	9625do				
0000	0100		Canada, CFRX Toronto ON	6070do				
0000	0100		Canada, CFVP Calgary AB	6030do				
0000	0100		Canada, CKZN St John's NF	6160do				
0000	0100		Canada, CKZU Vancouver BC	6160do				
0000	0100		Costa Rica, R for Peace Intl	7445am	15040am			
0000	0100		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
				11870am	13750na			
0000	0100		Germany, Deutsche Welle	6040am	6145am	9640am	9700na	
				9765na				
0000	0100		Guyana, Voice of	3290do	5950do			
0000	0100		Malaysia, Radio	7295do				
0000	0100		Namibia, NBC	3270af	3290af			
0000	0100		Netherlands, Radio	6165na	9845na			
0000	0100		New Zealand, Radio NZ Intl	17675pa				
0000	0100		Russia, University Network	9890as				
0000	0100		Singapore, SBC Radio One	6150do				
0000	0100		UAE, AWR	6035as	6055as			
0000	0100		UK, BBC World Service	5975va	6195as	7105as	9410va	9825sa
				11955as	12095va	15280as	15310as	15360as	17790as	
0000	0100		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
				6350usb	6458usb	10320usb	12579usb	12689usb	13362usb	
0000	0100		USA, KAIJ Dallas TX	5755va				
0000	0100		USA, KIMF Otero NM	5835na				
0000	0100		USA, KTBN Salt Lk City UT	7505na				
0000	0100		USA, KWHR Naalehu HI	17510as				
0000	0100		USA, Voice of America	7215va	9890va	11760va	15185va	15290va
				17740va	17820va			
0000	0100	twhfa	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
				11695am	13710am			
0000	0100		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na		
0000	0100		USA, WEWN Birmingham AL	5825na				
0000	0100		USA, WHRA Greenbush ME	7580va				
0000	0100		USA, WHRI Noblesville IN	5745va	7315am			
0000	0100		USA, WINB Red Lion PA	12160am				
0000	0100		USA, WJIE Louisville KY	7490am	13595am			
0000	0100	sm	USA, WRMI Miami FL	9955am				
0000	0100	twhfa	USA, WRMI Miami FL	7385na				
0000	0100		USA, WRNO New Orleans LA	7355am				
0000	0100	as	USA, WSHB Cypress Creek SC	9430am				
0000	0100	wl	USA, WSHB Cypress Creek SC	9430am	15285am			
0000	0100		USA, WTJC Newport NC	9370na				
0000	0100	sm	USA, WWBS Macon GA	11900na				
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	6085na	9505na	11720na		
0000	0100	vl	Vanuatu, Radio	3945al	7260do			
0000	0100		Zambia, Christian Voice	4965do				
0000	0130		UAE, Gospel For Asia	6145as				
0005	0012		Croatia, Croatian Radio	9925sa				
0030	0100		Australia, Radio	17750as				
0030	0100		Iran, VOIRI	6015am	6135am	9580am		
0030	0100		Lithuania, R Vilnius	7325na				
0030	0100	as	Russia, Bible Voice BC	12035as				
0030	0100	as	Russia, Bible Voice BC	12035as				
0030	0100	as/vl	Solomon Islands, SIBC	5020do	9545do			
0030	0100		Sri Lanka, SLBC	4940as	6005as	6075as	9770as	15745as
0030	0100		Thailand, Radio	13695na				
0045	0100		Pakistan, Radio	11655as	15455as			
0055	0100		Italy, RAI Intl	9675na	11800na			

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

0100	0115		Italy, RAI Intl	9675na	11800na			
0100	0115		Pakistan, Radio	11655as	15455as			
0100	0125		Netherlands, Radio	6165na	9845na			
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na			
0100	0127		Iran, VOIRI	6015na	6135na	9580am		
0100	0127		Vietnam, Voice of	6175na				
0100	0130		Australia, Radio	17775as				
0100	0130	mtwhfa	Bosnia/Serbia, R. Yugoslavia	7115eu				
0100	0130	s	Germnay, Universal Life	9435as				
0100	0130		Hungary, Radio Budapest	9835na				
0100	0130	as	Russia, Bible Voice BC	12035as				
0100	0130		Slovakia, R Slovakia Intl	5930am	7230am	9440am		
0100	0130		UAE, Gospel For Asia	6145as				
0100	0130	twhfa	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
				13710am				
0100	0130		Uzbekistan, Radio Tashkent	5955as	5975as	7135as	7215as	
0100	0145		Germany, Deutsche Welle	6040am	6145am	9640am	9700na	
				9765na				
0100	0156		China, China Radio Intl	9580na	9790na			
0100	0156		North Korea, Voice of	3560as	6195as	6520am	7140as	7580am
				9345as	11735am			
0100	0200		Anguilla, Caribbean Beacon	6090am				
0100	0200		Australia, ABC NT Katherine	5025do				
0100	0200		Australia, ABC NT Tennant Crk	4910do				
0100	0200		Australia, Radio	5995va	9475as	9580va	9660pa	
				11650va	11660va	12080va	15240pa	15415as	17750as	
				17580pa	17795va	21725va		
0100	0200	vl	Austria, AWR	9835as				
0100	0200		Canada, CBC Northern Service	9625do				
0100	0200		Canada, CFRX Toronto ON	6070do				
0100	0200		Canada, CFVP Calgary AB	6030do				
0100	0200		Canada, CKZN St John's NF	6160do				
0100	0200		Canada, CKZU Vancouver BC	6160do				
0100	0200		Costa Rica, R for Peace Intl	7445am	15040am			
0100	0200		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
				11870am	13750na			
0100	0200		Cuba, Radio Havana	6090na	9820na	11705usb		
0100	0200		Ecuador, HCJB	9745na	21455usb			
0100	0200		Guyana, Voice of	3290do	5950do			
0100	0200		Indonesia, Voice of	9525va				
0100	0200		Japan, Radio	11860as	11880af	15325as	17685as	
				17810as	17835as	17845na		
0100	0200		Kyrghyz, Kyrghyz Radio	4010as	4795as			
0100	0200		Namibia, NBC	3270af	3290af			
0100	0200		New Zealand, Radio NZ Intl	17675pa				
0100	0200		Russia, University Network	9890as				
0100	0200		Singapore, SBC Radio One	6150do				
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do			
0100	0200		Sri Lanka, SLBC	4940as	6005as	6075as	9770as	
				15745as				
0100	0200		UK, BBC World Service	5975va	6195as	9410as	9525sa	9825am
				11955as	12095va	15280as	15310as	15360as	17790as	
0100	0200		Ukraine, R Ukraine Intl	5905as	9610as	9810as		
0100	0200		USA, Armed Forces Network	3903usb	4278usb	4319usb		
				4993usb	6350usb	6458usb	10320usb	12579usb	12689usb	
				13362usb				
0100	0200		USA, KAIJ Dallas TX	5755va				
0100	0200		USA, KIMF Otero NM	5835na				
0100	0200		USA, KTBN Salt Lk City UT	7505na				
0100	0200		USA, KWHR Naalehu HI	17510as				
0100	0200		USA, Voice of America	7200va	9850va	11705va	11820va	
				15250va	15300va	17740va	17820va	
0100	0200		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na		
0100	0200		USA, WEWN Birmingham AL	5825na				
0100	0200		USA, WHRA Greenbush ME	7580va				
0100	0200		USA, WHRI Noblesville IN	5745va	7315am			
0100	0200		USA, WINB Red Lion PA	12160am				
0100	0200		USA, WJIE Louisville KY	7490am	13595am			
0100	0200	sm	USA, WRMI Miami FL	9955am				
0100	0200	twhfa	USA, WRMI Miami FL	7385na				
0100	0200		USA, WRNO New Orleans LA	7355am				
0100	0200	twhfas	USA, WSHB Cypress Creek SC	9430na				
0100	0200		USA, WTJC Newport NC	9370na				
0100	0200	sm	USA, WWBS Macon GA	11900na				
0100	0200		USA, WWCR Nashville TN	3210na	5070na	5935na	7465na	
0100	0200		USA, WWRB Manchester TN	5050na	5085na	6890na		

SELECTED PROGRAMMING BEGINS ON PAGE 55

0100	0200		USA, WYFR Okeechobee FL	6065na	9505na	15060as	
0100	0200		Zambia, Christian Voice	4965do			
0110	0200	as	Australia, Radio	9660va	12080pa	17580pa	21725as
0130	0145	vl	Libya, Voice of Africa	15435irr	21695irr		
0130	0200		Australia, Voice International	17775as			
0130	0200		Iran, VOIRI	6135na	9580na		
0130	0200		Sweden, Radio	9495as			
0130	0200		UK, RTE Radio	6155na			
0130	0200	twhfa	USA, Voice of America	5995am	6130am	7405am	9455am 9775am 13740am
0138	0150		Croatia, Croatian Radio	9925sa			
0140	0200		Vatican City, Vatican Radio	7335as	9865as		

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

0200	0210		Bangladesh, Bangla Betar	4882as			
0200	0227		Czech Rep, Radio Prague Intl	6200na	7345na		
0200	0227		Iran, VOIRI	6135na	9580na		
0200	0228		Hungary, Radio Budapest	9835na			
0200	0230	twhfa	Argentina, RAE	11710am			
0200	0230		Bosnia/Serbia, R. Yugoslavia	7130eu			
0200	0230	as/vl	Solomon Islands, SIBC	5020do	9545do		
0200	0245		Germany, Deutsche Welle	7285as	9765as	11965as	13605as
0200	0256		North Korea, Voice of	4405as	9325as	11335as	11845as
0200	0256		Romania, R Romania Intl	9550na	9625as	11740as	15370eu
0200	0257		Canada, Radio Canada Intl	15150as	17860as		
0200	0259		Canada, Radio Canada Intl	6040am	9755am	11725am	
0200	0300		Anguilla, Caribbean Beacon	6090am			
0200	0300		Australia, ABC NT Alice Springs	4810eu	9960eu		
0200	0300		Australia, ABC NT Katherine	5025do			
0200	0300		Australia, ABC NT Tennant Crk	4910do			
0200	0300		Australia, Radio	5995va	9475as	9580va	9660pa 11650va 12080va 15240pa 15415as 15515as 17580pa 17750as 21725va
0200	0300	as	Australia, Radio	9660va	12080pa	17580pa	21725as
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, R for Peace Intl	7445am	15040am		
0200	0300		Costa Rica, University Network	5030am	6150am	7375am	9725sa 11870am 13750na
0200	0300		Cuba, Radio Havana	6090na	9820na	11705usb	
0200	0300		Ecuador, HCJB	9745na	12040as	21455usb	
0200	0300		Egypt, Radio Cairo	9475am			
0200	0300		Guyana, Voice of	3290do	5950do		
0200	0300		Malaysia, Radio	7295do			
0200	0300		Myanmar, Radio	7185do			
0200	0300		Namibia, NBC	3270af	3290af		
0200	0300		New Zealand, Radio NZ Intl	17675pa			
0200	0300		Philippines, Radio Pilipinas	12015me	15120me	15270me	
0200	0300		Russia, University Network	9890as			
0200	0300		Russia, Voice of Russia	6155na	7180na	9765na	12020na 13665na 15445na
0200	0300		Singapore, SBC Radio One	6150do			
0200	0300	mtwhf/vl	Solomon Islands, SIBC	5020do	9545do		
0200	0300		South Korea, R Korea Intl	9560va	11810va	15575va	
0200	0300		Sri Lanka, SLBC	6005as	6075as	6130do	9770as 15745as
0200	0300		Taiwan, R Taipei Intl	5950na	9680na	11740na	15320as 15345as
0200	0300		UK, BBC World Service	5975va	6005af	9410me	9525am 9770af 9825sa 11760va 11955as 12035af 12095va 15280as 15310as 15360as 17790as
0200	0300		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb 6350usb 6458usb 10320usb 12579usb 12689usb 13362usb
0200	0300		USA, KAIJ Dallas TX	5755va			
0200	0300		USA, KIMF Otero NM	5835na			
0200	0300		USA, KJES Vado NM	7555na			
0200	0300		USA, KTBN Salt Lk City UT	7505na			
0200	0300		USA, KWHR Naalehu HI	17510as			
0200	0300		USA, Voice of America	7200va	9850va	11705va	11820va 15250va 15300va 17740va 17820va
0200	0300		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na	
0200	0300		USA, WEWN Birmingham AL	5825na			
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	7490am	13595am		
0200	0300	sm	USA, WRMI Miami FL	9955am			
0200	0300	twhfa	USA, WRMI Miami FL	7385na			
0200	0300		USA, WRNO New Orleans LA	7355am			
0200	0300	s	USA, WSHB Cypress Creek SC	9430na			
0200	0300	h	USA, WSHB Cypress Creek SC	7535am			
0200	0300		USA, WTJC Newport NC	9370na			
0200	0300		USA, WWCR Nashville TN	3210na	5070na	5935na	7465na
0200	0300		USA, WWRB Manchester TN	5050na	5085na	6890na	
0200	0300		USA, WYFR Okeechobee FL	6065na	9505na		
0200	0300		Zambia, Christian Voice	4965do			
0200	1215		Cambodia, National Radio Of	11940as			
0205	0222		Croatia, Croatian Radio	9925na			
0215	0220		Nepal, Radio	3230as	5005as	6100as	7164as
0230	0257		Vietnam, Voice of	6175na			
0230	0300		Austria, Radio Austria Intl	7325na			
0230	0300		Iraq, Radio Iraq Intl	9687irrg	11787eu		
0230	0300		Sweden, Radio	9495na			
0245	0300	twhfa	Albania, Radio Tirana Intl	6115na	7160eu		
0250	0300		Vatican City, Vatican Radio	7305am	9605am		

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

0300	0310		Vatican City, Vatican Radio	7305am	9605am	9660af	
0300	0330		Australia, Radio	9580va			
0300	0330	sm w fa	Belarus, Radio Belarus Intl	5970eu	7210eu		
0300	0330		Egypt, Radio Cairo	9475am			
0300	0330		South Africa, Channel Africa	9525af			
0300	0330		Thailand, Radio	15460na			
0300	0330	a	UK, Wales Radio Intl	9835na			
0300	0330		USA, KJES Vado NM	7555na			
0300	0345		Germany, Deutsche Welle	6020na	6045na	9640am	9700na 11985na
0300	0356		China, China Radio Intl	9560na			
0300	0356		North Korea, Voice of	3560as	6195as	7140as	9345as
0300	0400		Anguilla, Caribbean Beacon	6090am			
0300	0400		Australia, ABC NT Alice Springs	4810eu	9960eu		
0300	0400		Australia, ABC NT Katherine	5025do			
0300	0400		Australia, ABC NT Tennant Crk	4910do			
0300	0400		Australia, Radio	5995va	9500pa	9660pa	9815pa 11650va 12080va 15240pa 15415as 15515va 17580pa 17750as 21725va
0300	0400	as	Australia, Radio	9660va	12080pa	17580pa	21725as
0300	0400	vl	Botswana, Radio	3356do	4820do	7255do	
0300	0400		Bulgaria, Radio	7400na	9400na		
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, R for Peace Intl	7455am	15040am		
0300	0400		Costa Rica, University Network	5030am	6150am	7375am	9725sa 11870am 13750na 17645as
0300	0400		Cuba, Radio Havana	6090na	9820na	11705usb	
0300	0400		Ecuador, HCJB	9745na	12040as	21455usb	
0300	0400	vl	Guatemala, Radio Cultural	5955do			
0300	0400		Guyana, Voice of	3290do	5950do		
0300	0400		Japan, Radio	17825ca	21610oc		
0300	0400		Malaysia, Radio	7295do			
0300	0400		Namibia, NBC	3270af	3290af		
0300	0400		New Zealand, Radio NZ Intl	17675pa			
0300	0400		Oman, Radio	15355af			
0300	0400		Russia, University Network	9890as			
0300	0400		Russia, Voice of Russia	6155na	7180na	12020na	13665na 15445na
0300	0400		Singapore, SBC Radio One	6150do			
0300	0400	mtwhf/vl	Solomon Islands, SIBC	5020do	9545do		
0300	0400		Sri Lanka, SLBC	6005as	6075as	6130do	9770as 15745as
0300	0400		Taiwan, R Taipei Intl	5950na	9680na	11875as	15320as
0300	0400		Uganda, Radio	4976do	5026do	7196do	
0300	0400		UK, BBC World Service	3255af	5975va	6005af	6190af 6195eu 7160af 9410va 9525am 11760va 11765af 12035af 12095as 15280as 15310as 15360as 15575va 17640as 17760as 17790as 21660as
0300	0400		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb 6350usb 6458usb 10320usb 12579usb 12689usb 13362usb
0300	0400		USA, KAIJ Dallas TX	5755va			
0300	0400		USA, KIMF Otero NM	5835na			
0300	0400		USA, KTBN Salt Lk City UT	7505na			
0300	0400		USA, KWHR Naalehu HI	17510as			
0300	0400		USA, Voice of America	4960af	6035af	6080af	7265af 7290af 7340af 7415af 9575af 9885af
0300	0400		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na	
0300	0400		USA, WEWN Birmingham AL	5825na			
0300	0400		USA, WHRA Greenbush ME	7580va			
0300	0400		USA, WHRI Noblesville IN	5745va	7315am		
0300	0400		USA, WINB Red Lion PA	9320am			
0300	0400		USA, WJIE Louisville KY	7490am	13595am		
0300	0400		USA, WRMI Miami FL	7385na			
0300	0400		USA, WRNO New Orleans LA	7395am			
0300	0400		USA, WTJC Newport NC	9370na			
0300	0400		USA, WWCR Nashville TN	3210na	5070na	5935na	7465na

0300	0400		USA, WWRB Manchester TN	5050na	5085na	6890na	
0300	0400		USA, WYFR Okeechobee FL 11855na	5985na	6065na	9505na	
0300	0400		Zambia, Christian Voice	6065do			
0310	0330		Vatican City, Vatican Radio	9660af			
0330	0345	vl	Libya, Voice of Africa	15435irr	21695irr		
0330	0350		UAE, Emirates Radio	12005na	13675na	15395na	
0330	0357		Vietnam, Voice of	6175na			
0330	0358		Hungary, Radio Budapest	9835na			
0330	0400	twhfa	Albania, Radio Tirana Intl	6115na	7160eu		
0330	0400		Malaysia, RTM Kota Kinabalu	5979do			
0330	0400		Nigeria, Radio/Kaduna	4770do			
0330	0400		Nigeria, Radio/Lagos	3326do	4990al		
0330	0400		Sweden, Radio	9495na			
0330	0400		UK, BBC World Service	15420af			
0338	0350		Croatia, Croatian Radio	9925na			
0345	0400	s hf	Seychelles, FEBA Radio	11885af			
0345	0400		Tajikistan, Radio	7245as			

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

0400	0425		Belgium, Radio Vlaanderen Intl	11985na			
0400	0427		Czech Rep, Radio Prague Intl	7345na	7385na	9435na	
0400	0430	mtwhf	France Radio France Intl	11910af	11995af		
0400	0430	vl	Guatemala, Radio Cultural	5955do			
0400	0430	s twhfa	Mexico, Radio Mexico Intl	9705am	11770am		
0400	0430		South Africa, AWR	9650af			
0400	0430		South Africa, Channel Africa	5955af			
0400	0430		Sri Lanka, SLBC	6005as	6075as	6130do	9770as 15745as
0400	0445		Germany, Deutsche Welle 15410af	6180af	7195af	9565af	9710af
0400	0445		USA, WYFR Okeechobee FL	6065na	9505na	9985eu	11530eu
0400	0450		Turkey, Voice of	6020va	7240va		
0400	0456		China, China Radio Intl	9730na			
0400	0456		Romania, R Romania Intl	9550na	11830na	15335as	17735as
0400	0500		Anguilla, Caribbean Beacon	6090am			
0400	0500		Australia, ABC NT Alice Springs	4810eu	9960eu		
0400	0500		Australia, ABC NT Katherine	5025do			
0400	0500		Australia, ABC NT Tennant Crk	4910do			
0400	0500		Australia, Radio 5995va 6080pa 7240pa 9500as 9660pa 9815pa 11650va 12080va 15240pa 15415as 15515va 17580pa 21725va				
0400	0500	as	Australia, Radio	9660va	12080pa	17580pa	21725as
0400	0500	vl	Botswana, Radio	3356do	4820do	7255do	
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, R for Peace Intl	7455am	15040am		
0400	0500		Costa Rica, University Network 11870am 13750na 17645as	5030am	6150am	7375am	9725sa
0400	0500		Cuba, Radio Havana	6090na	9820na	11705usb	
0400	0500		Ecuador, HCJB	9745na	21455usb		
0400	0500		Guyana, Voice of	3290do	5950do		
0400	0500		Malaysia, Radio	7295do			
0400	0500		Malaysia, RTM Kota Kinabalu	5979do			
0400	0500		Namibia, NBC	3270af	3290af		
0400	0500		New Zealand, Radio NZ Intl	17675pa			
0400	0500		Nigeria, Radio/Kaduna	4770do	6090do		
0400	0500		Nigeria, Radio/Lagos	3326do	4990al		
0400	0500		Russia, University Network	17765as			
0400	0500		Russia, Voice of Russia 15445na 15595na 17595na	7125na	7180na	12020na	13665na
0400	0500	mtwhfa	Russia, Voice of Russia	12010na			
0400	0500		Singapore, SBC Radio One	6150do			
0400	0500	mtwhf/vl	Solomon Islands, SIBC	5020do	9545do		
0400	0500		Uganda, Radio	4976do	5026do	7196do	
0400	0500		UK, BBC World Service 6195af 7160va 9410am 9525va 11760af 11765af 12035as 12095as 15280as 15310as 15360af 15420va 15575as 17640as 17760as 17790as 21660as	3255af	5975af	6005am	6135af 6190eu
0400	0500		Ukraine, R Ukraine Intl	6020as	7285as	9810as	
0400	0500		USA, Armed Forces Network 6350usb 6458usb 10320usb 12579usb 12689usb 13362usb	3903usb	4278usb	4319usb	4993usb
0400	0500		USA, KAIJ Dallas TX	5755va			
0400	0500		USA, KIMF Otero NM	5835na			
0400	0500		USA, KTBN Salt Lk City UT	7505na			
0400	0500		USA, KWHR Naalehu HI	17780as			
0400	0500		USA, Voice of America 9775af 9885af 15205af	4960af	6080af	7170va	7290af 9525af
0400	0500		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na	
0400	0500		USA, WEWN Birmingham AL	5825na			
0400	0500		USA, WHRA Greenbush ME	7580va			
0400	0500		USA, WHRI Noblesville IN	5745va	7315am		
0400	0500		USA, WJIE Louisville KY	7490am	13595am		
0400	0500		USA, WMLK Bethel PA	9465eu	9955eu		
0400	0500		USA, WRMI Miami FL	7385na			
0400	0500		USA, WRNO New Orleans LA	7395am			
0400	0500	tha	USA, WSHB Cypress Creek SC	12020af			
0400	0500		USA, WTJC Newport NC	9370na			
0400	0500		USA, WWCR Nashville TN	3210na	5070na	5935na	7465na
0400	0500		USA, WWRB Manchester TN	5950na	5085na	6890na	
0400	0500		Zambia, Christian Voice	6065do			
0404	0500		USA, WYFR Okeechobee FL	9715na			
0405	0412		Croatia, Croatian Radio	9925na			
0427	0500	smt o	Madagascar, Radio VO Hope	12060af	15320af		
0430	0457		Czech Rep. Radio Prague Intl	9865va	11600va		
0430	0500		Australia, Radio	17750as			
0430	0500		Netherlands, Radio	6165na	9590na		
0430	0500		Nigeria, Radio/Enugu	6025do			
0430	0500		Nigeria, Radio/Ibadan	6050do			
0430	0500		South Africa, AWR	12080af			
0430	0500		Sri Lanka, SLBC	6130do			
0430	0500		Swaziland, TWR	4775af	6120af		
0430	0500		UAE, AWR	15160as			
0445	0500		Italy, RAI Intl	5965af	6100af	7235af	
0450	0800	a	Monaco, TWR	9870eu			

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

0500	0505		New Zealand, Radio NZ Intl	17675pa			
0500	0515		Israel, Kol Israel	9435va	11605va	17600va	
0500	0530		Australia, Radio	9500as			
0500	0530	mtwh	France Radio France Intl	13610af	15155af		
0500	0530	s twhfa	Mexico, Radio Mexico Intl	9705am	11770am		
0500	0530		Netherlands, Radio	6165na	9590na		
0500	0530		South Africa, AWR	6015af			
0500	0530		South Africa, Channel Africa	11710af			
0500	0530		UK, BBC World Service	15280as			
0500	0530		Vatican City, Vatican Radio	9660af	11625af	15570af	
0500	0545		Germany, Deutsche Welle 11795na	5960na	6120na	9670na	
0500	0556		China, China Radio Intl	9560na			
0500	0600		Anguilla, Caribbean Beacon	6090am			
0500	0600		Australia, ABC NT Alice Springs	4810eu	9960eu		
0500	0600		Australia, ABC NT Katherine	5025do			
0500	0600		Australia, ABC NT Tennant Crk	4910do			
0500	0600		Australia, Radio 5995va 6080pa 7240pa 9660pa 9815pa 11880va 12080va 15240pa 15415as 15515va 17580pa 21725va				
0500	0600	as	Australia, Radio	9660va	12080pa	17580pa	21725as
0500	0600	mtwhf	Bhutan, Bhutan BC Service	5030al	6035do		
0500	0600	vl	Botswana, Radio	3356do	4820do	7255do	
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, R for Peace Intl	7455am	15040am		
0500	0600		Costa Rica, University Network 11870am 13750na 17645as	5030am	6150am	7375am	9725sa
0500	0600		Cuba, Radio Havana	9550na	9820na	9830usb	
0500	0600		Ecuador, HCJB	9745na	21455usb		
0500	0600		Guyana, Voice of	3290do	5950do		
0500	0600		Japan, Radio 13630na 15195as	5975eu	6110na	7230eu	9835eu 15195as
0500	0600		Kuwait, Radio	15110as	17810as	21755oc	
0500	0600		Malaysia, Radio	7295do			
0500	0600		Malaysia, RTM Kota Kinabalu	5979do			
0500	0600		Namibia, NBC	6060af	6175af		
0500	0600		Nigeria, Radio/Enugu	6025do			
0500	0600		Nigeria, Radio/Ibadan	6050do			
0500	0600		Nigeria, Radio/Kaduna	4770do	6090do	9570do	
0500	0600		Nigeria, Radio/Lagos	3326do	4990al		
0500	0600		Nigeria, Voice of	7255af	15150af		
0500	0600		Russia, University Network	17765as			
0500	0600	mtwhf	Russia, Voice of Russia	12010	nq		
0500	0600		Russia, Voice of Russia 15445na 15595na	7180na	7180na	12020na	13665na
0500	0600		Singapore, SBC Radio One	6150do			
0500	0600	vl	Solomon Islands, SIBC	5020do	9545do		
0500	0600		Swaziland, TWR	6120af	7205af	9500af	
0500	0600		Uganda, Radio	4976do	5026do	7196do	
0500	0600		UK, BBC World Service 9410va 11760va 11765af 11940af 11955as 15310as 15360as 15420af 15565va 15575va 17640af 17760as 17790as 17885af 21660as	6005af	6135am	6190af	6195eu 7160af
0500	0600		USA, Armed Forces Network 6350usb 6458usb 10320usb 12579usb 12689usb 13362usb	3903usb	4278usb	4319usb	4993usb
0500	0600		USA, KAIJ Dallas TX	5755va			

0600	0600		USA, KIMF Otero NM	5835na				
0600	0600		USA, KTBN Salt Lk City UT	7505na				
0600	0600		USA, KWHR Naalehu HI	17780as				
0600	0600		USA, Voice of America	6035af	6080af	7170va	7295af	9700va
			11825va	11835af	13710af	15205va		
0600	0600		USA, WBCQ Kennebunk, ME	7415na				
0600	0600	twhfa	USA, WBCQ Kennebunk, ME	9335na				
0600	0600		USA, WEWN Birmingham AL	5825na				
0600	0600		USA, WHRA Greenbush ME	7580va				
0600	0600		USA, WHRI Noblesville IN	5745va	7315am			
0600	0600		USA, WJIE Louisville KY	7490am	13595am			
0600	0600		USA, WMLK Bethel PA	9465eu	9955eu			
0600	0600		USA, WRMI Miami FL	7385na				
0600	0600		USA, WRNO New Orleans LA	7395am				
0600	0600	twhfas	USA, WSHB Cypress Creek SC	12020af				
0600	0600		USA, WTJC Newport NC	9370na				
0600	0600		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0600	0600		USA, WWRB Manchester TN	5950na	5085na	6890na		
0600	0600		USA, WYFR Okeechobee FL	5810na				
0600	0600		Zambia, Christian Voice	6065do				
0606	0600		New Zealand, Radio NZ Intl	15340pa				
0625	0600	vl	Ghana, Ghana BC Corp	3366do	4915do			
0630	0650		UAE, Emirates Radio	15435au	17830au	21695au		
0630	0600		Australia, Radio	17750as				
0630	0600		South Africa, AWR	15345af				
0630	0600		Thailand, Radio	13780eu				
0638	0650		Croatia, Croatian Radio	9925na				

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

0600	0615		South Africa, TWR	11640af				
0600	0620		Vatican City, Vatican Radio	4005af	5890eu	7250eu		
0600	0630	mtwhf	France Radio France Intl	11710af	15155af			
0600	0630		South Africa, Channel Afrca	15215af				
0600	0637		Romania, R Romania Intl	9530na	11829na			
0600	0645		Germany, Deutsche Welle	7225af	9565af	11785af		
0600	0700		Anguilla, Caribbean Beacon	6090am				
0600	0700		Australia, ABC NT Alice Springs	4810eu	9960eu			
0600	0700		Australia, ABC NT Katherine	5025do				
0600	0700		Australia, ABC NT Tennant Crk	4910do				
0600	0700		Australia, Radio	7240va	9660pa	9815pa	11880va	12080va
			13620as	15320as	15240pa	15415as	15515va	17580pa	17750as
			21725va					
0600	0700	as	Australia, Radio	9660va	12080pa	17580pa	21725as	
0600	0700		Canada, CFRX Toronto ON	6070do				
0600	0700		Canada, CFVP Calgary AB	6030do				
0600	0700		Canada, CKZN St John's NF	6160do				
0600	0700		Canada, CKZU Vancouver BC	6160do				
0600	0700		Costa Rica, R for Peace Intl	7455am	15040am			
0600	0700		Costa Rica, University Network	5030am	6150am	7375am	9725as	
			11870am	13750na	17645as			
0600	0700		Cuba, Radio Havana	9550na	9820na	9830usb		
0600	0700		Germany, Deutsche Welle	6140eu				
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do			
0600	0700		Greece, Voice of	9420eu	15630eu			
0600	0700		Guyana, Voice of	3290do	5950do			
0600	0700		Japan, Radio	7230eu	9835na	11715va	11760va	11740as
			15195as	17870pa	21755ac			
0600	0700		Kuwait, Radio	15110as				
0600	0700		Liberia, ELWA	4760do				
0600	0700		Libena, R Liberia Intl	6100do				
0600	0700		Malaysia, Radio	7295do				
0600	0700		Malaysia, Voice of	6175as	9750as	15295as		
0600	0700		Namibia, NBC	3270af	3290af			
0600	0700		New Zealand, Radio NZ Intl	15340pa				
0600	0700		Nigeria, Radio/Enugu	6025do				
0600	0700		Nigeria, Radio/Ibadan	6050do				
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
0600	0700		Nigeria, Radio/Lagos	3326do	4990al			
0600	0700		Nigeria, Voice of	7255af	15150af			
0600	0700		Russia, University Network	17765as				
0600	0700		Russia, Voice of Russia	15275au	17665au	21790au		
0600	0700		Singapore, SBC Radio One	6150do				
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do			
0600	0700		Swaziland, TWR	6120af	7205af	9500af		
0600	0700		Uganda, Radio	4976do	5026do	7196do		
0600	0700		UK, BBC World Service	6055af	6190af	6195eu	7160af	9410va
			11765af	11940af	11955as	12095va	15310as	15360as	15565va
			15575va	17640af	17760as	17790as	17885af	21660as	
0600	0700		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb	6458usb	10320usb	12579usb	12689usb	13362usb	
0600	0700		USA, KAIJ Dallas TX	5755va				
0600	0700		USA, KIMF Otero NM	5835na				
0600	0700		USA, KTBN Salt Lk City UT	7505na				
0600	0700		USA, KWHR Naalehu HI	17780as				
0600	0700		USA, Voice of America	5995va	6035af	6080af	6105af	7170af
			7295va	11825af	11835va	11930af	11995va	13710af	15205af
0600	0700		USA, WBCQ Kennebunk, ME	7415na				
0600	0700		USA, WEWN Birmingham AL	5825na				
0600	0700		USA, WHRA Greenbush ME	7580va				
0600	0700		USA, WHRI Noblesville IN	5745va	7315am			
0600	0700		USA, WJIE Louisville KY	7490am	13595am			
0600	0700		USA, WMLK Bethel PA	9465eu	9955eu			
0600	0700		USA, WRMI Miami FL	7385na				
0600	0700		USA, WRNO New Orleans LA	7395am				
0600	0700	wfa	USA, WSHB Cypress Creek SC	7535af				
0600	0700		USA, WTJC Newport NC	9370na				
0600	0700		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0600	0700		USA, WYFR Okeechobee FL	7355eu	11530eu			
0600	0700	vl	Vanuatu, Radio	3945al	4960do			
0600	0700		Yemen, Rep of Yemen Radio	9780me				
0600	0700		Zambia, Christian Voice	9865do				
0605	0612		Croatia, Croatian Radio	9470pa				
0630	0700		Austria, Radio Austria Intl	6155eu	13730eu	17870me		
0630	0700		Georgia, Georgian Radio	11805eu				
0630	0700	mtwhf/vl	Italy, IRRS	13840va				
0630	0700		Vatican City, Vatican Radio	11625af	13765af	15570af		
0637	0700		Romania, R Romania Intl	9510eu	9530na	9570eu	9625eu	
			11790eu	11829na	11940eu			

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

0700	0705		New Zealand, Radio NZ Intl	15340pa				
0700	0730	mtwhf/vl	Italy, IRRS	13840va				
0700	0730		Slovakia, R Slovakia Intl	13715au	15460au	17550au		
0700	0730		UK, BBC World Service	6005af				
0700	0745		USA, WYFR Okeechobee FL	7355eu				
0700	0756		Romania, R Romania Intl	17720af	21480af			
0700	0800		Anguilla, Caribbean Beacon	6090am				
0700	0800		Australia, ABC NT Alice Springs	4810eu	9960eu			
0700	0800		Australia, ABC NT Katherine	5025do				
0700	0800		Australia, ABC NT Tennant Crk	4910do				
0700	0800		Australia, Radio	7240va	9660pa	11880va	13620as	15320as
			15320as	15420va	15415as	17580pa	17715va	17750as	21725va
			21740va					
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, R for Peace Intl	7455am	15040am			
0700	0800		Costa Rica, University Network	5030am	6150am	7375am	9725as	
			11870am	13750na	17645as			
0700	0800		Ecuador, HCJB	5965eu	11755pa	21455usb		
0700	0800	mtwhf	Eqt Guinea, Radio Africa	15185af				
0700	0800	os/vl	Eqt. Guinea, Radio East Africa	15185af				
0700	0800	mtwhf	France Radio France Intl	15605af				
0700	0800		Germany, Deutsche Welle	6140eu				
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do			
0700	0800		Guyana, Voice of	3290do	5950do			
0700	0800		Kuwait, Radio	15110as				
0700	0800		Libena, ELWA	4760do				
0700	0800		Liberia, R Liberia Intl	6100do				
0700	0800		Malaysia, Radio	7295do				
0700	0800		Malaysia, RTM Kota Kinabalu	5979do				
0700	0800		Malaysia, Voice of	6175as	9750as	15295as		
0700	0800		Myanmar, Radio	9730do				
0700	0800		Papua New Guinea, NBC	4890do	9675al			
0700	0800		Russia, University Network	17765as				
0700	0800		Russia, Voice of Russia	11820eu	12010eu	15275au	17665au	
			21790au					
0700	0800		Singapore, SBC Radio One	6150do				
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do			
0700	0800		Taiwan, R Taipei Intl	5950na				
0700	0800		UK, BBC World Service	6190af	6195eu	9410eu	11760va	11765af
			11940af	11955as	12095va	15310as	15360as	15400af	15485va
			15565va	15575va	17640me	17760as	17790as	17885af	21660as
0700	0800		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb	6458usb	10320usb	12579usb	12689usb	13362usb	
0700	0800		USA, KAIJ Dallas TX	5755va				
0700	0800		USA, KIMF Otero NM	5835na				
0700	0800		USA, KTBN Salt Lk City UT	7505na				
0700	0800		USA, KWHR Naalehu HI	11565pa	17780as			
0700	0800		USA, WBCQ Kennebunk, ME	7415na				
0700	0800		USA, WEWN Birmingham AL	5825na				
0700	0800		USA, WHRA Greenbush ME	7580va				
0700	0800		USA, WHRI Noblesville IN	5745va	7315am			
0700	0800		USA, WJIE Louisville KY	7490am	13595am			
0700	0800		USA, WMLK Bethel PA	9465eu	9955eu			

0700	0800		USA, WRNO New Orleans LA	7395am				
0700	0800	tf	USA, WSHB Cypress Creek SC	7535af				
0700	0800		USA, WTJC Newport NC	9370na				
0700	0800		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0700	0800		USA, WYFR Okeechobee FL	9985af	11580af			
0700	0800	vl	Vanuatu, Radio	3945al	4960do			
0706	0800		New Zealand, Radio NZ Intl	11675pa				
0715	0745	mtwthf	Guam, TWR/KTWR	15215as				
0730	0745	vl/mtwthf	Vatican City, Vatican Radio	4005eu	5980eu	6185eu	7250eu	
			9645af 11740eu	15595as				
0730	0800		Australia, Radio	11695as				
0730	0800	vl	Austria, AWR	17820va				
0730	0800		Bulgaria, Radio	12000eu	13600eu			
0730	0800		Switzerland, Swiss R Intl	9885af	13790af	17665af		
0730	0800	as	UK, BBC World Service	15575va				
0738	0750		Croatia, Croatian Radio	9470pa				
0745	0800	as	Albania, TWR	12070eu				
0745	0800	mtwthf	Guam, TWR/KTWR	15215as	15330as			
0755	0800	mtwthf	Albania, TWR	12070eu				
0755	0800	mtwthf	Monaco, TWR	9870eu				

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

0800	0804		Pakistan, Radio	17835eu	21465eu			
0800	0820	s	Monaco, TWR	9870eu				
0800	0827		Czech Rep, Radio Prague Intl	11600eu	15255eu			
0800	0829		Belgium, Radio Vlaanderen Intl	5985eu				
0800	0830		Australia, ABC NT Alice Springs	4810eu	9960eu			
0800	0830		Australia, ABC NT Katherine	5025do				
0800	0830		Australia, ABC NT Tennant Crk	4910do				
0800	0830		Malaysia, RTM Kota Kinabalu	5979do				
0800	0830		Malaysia, Voice of	6175as	9750as	15295as		
0800	0830		Myanmar, Radio	9730do				
0800	0845		USA, WYFR Okeechobee FL	11580af				
0800	0850	as	Albania, TWR	12070eu				
0800	0850	s	Monaco, TWR	9870eu				
0800	0900	mtwthf	Albania, TWR	12070eu				
0800	0900		Anguilla, Caribbean Beacon	6090am				
0800	0900		Australia, Radio	5995pa	7240va	9580va	9660pa	9710pa
			11880va 12080va	15420va	15415as	17715va	17750as	17795va
			21725as 21740va					
0800	0900	vl	Austria, AWR	9660af	17820va			
0800	0900	mtwthf	Bhutan, Bhutan BC Service	5030al	6035do			
0800	0900		Canada, CFRX Toronto ON	6070do				
0800	0900		Canada, CFVP Calgary AB	6030do				
0800	0900		Canada, CKZN St John's NF	6160do				
0800	0900		Canada, CKZU Vancouver BC	6160do				
0800	0900		Costa Rica, R for Peace Intl	7455am	15040am			
0800	0900		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na	17645as				
0800	0900		Ecuador, HCJB	5965eu	11755pa	21455usb		
0800	0900	mtwthf	Eqt Guinea, Radio Africa	15185af				
0800	0900	as/vl	Eqt. Guinea, Radio East Africa	15185af				
0800	0900		Germany, Deutsche Welle	6140eu				
0800	0900	as	Guam, TWR/KTWR	15330as				
0800	0900	mtwthf	Guam, TWR/KTWR	15215as				
0800	0900		Guyana, Voice of	3290do	5950do			
0800	0900		Indonesia, Voice of	9525va				
0800	0900		Liberia, ELWA	4760do				
0800	0900		Liberia, R Liberia Intl	6100do				
0800	0900		Malaysia, Radio	7295do				
0800	0900		New Zealand, Radio NZ Intl	11675pa				
0800	0900		Papua New Guinea, NBC	4890do	9675al			
0800	0900	as	Russia, Bible Voice BC	5975eu				
0800	0900		Russia, University Network	17765as				
0800	0900		Russia, Voice of Russia	11820eu	12010eu	17495au	17525au	
			17665au 17665au					
0800	0900		Singapore, SBC Radio One	6150do				
0800	0900	a	South Africa, Radio League	9750af	21560af			
0800	0900		South Korea, R Korea Intl	9570va	13670va			
0800	0900		UK, BBC World Service	6190af	6195eu	9410eu	11760va	11940af
			11955as 12095va	15310as	15360as	15400af	15485va	15565va
			15575va 17640va	17760as	17830af	17885af	21470af	21660as
			21830as					
0800	0900		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb 6458usb	10320usb	12579usb	12689usb	13362usb	
0800	0900		USA, KAIJ Dallas TX	5755va				
0800	0900		USA, KIMF Otero NM	5835na				
0800	0900		USA, KNLS Anchor Point AK	9615as				
0800	0900		USA, KTBN Salt Lk City UT	7505na				
0800	0900		USA, KWHR Naalehu HI	11565pa	17780as			
0800	0900		USA, Voice of America	11955va	13605va	15150va		
0800	0900		USA, WBCQ Kennebunk, ME	7415na				
0800	0900		USA, WEWN Birmingham AL	5825na				
0800	0900		USA, WHRI Noblesville IN	5745va	7315am			
0800	0900		USA, WJIE Louisville KY	7490am	13595am			
0800	0900		USA, WMLK Bethel PA	9465eu	9955eu			
0800	0900		USA, WRMI Miami FL	7385na				
0800	0900		USA, WRNO New Orleans LA	7395am				
0800	0900	as	USA, WSHB Cypress Creek SC	7535eu	9845oc			
0800	0900	tw	USA, WSHB Cypress Creek SC	9845oc				
0800	0900		USA, WTJC Newport NC	9370na				
0800	0900		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0800	0900	vl	Vanuatu, Radio	3945al	4960do			
0805	0812		Croatia, Croatian Radio	13820au				
0830	0900		Australia, ABC NT Alice Springs	2310do	4835rr			
0830	0900		Australia, ABC NT Katherine	2485do				
0830	0900		Australia, ABC NT Tennant Crk	2325do				
0830	0900		Georgia, Georgian Radio	11910eu				
0830	0900	vl	Solomon Islands, SIBC	5020do	9545do			
0830	0900		Switzerland, Swiss R Intl	21770af				
0840	0850		Turkmenistan, Turkmen Radio	4930as				

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

0900	0915	as	Russia, Bible Voice BC	5975eu				
0900	0920	mtwthfs	Albania, TWR	12070eu				
0900	0920	mtwthf	Monaco, TWR	9870eu				
0900	0930		Austria, AWR	17670af				
0900	0930		Guam, TWR/KTWR	15330as				
0900	0945		Germany, Deutsche Welle	6160oc	9510va	9770as	11785af	
			15410af 17800af	17820va	17845va	17860af	21560af	
0900	0956		China, China Radio Intl	11730pa	15210pa			
0900	1000		Anguilla, Caribbean Beacon	6090am				
0900	1000		Australia, ABC NT Alice Springs	2310do	4835rr			
0900	1000		Australia, ABC NT Katherine	2485do				
0900	1000		Australia, ABC NT Tennant Crk	2325do				
0900	1000		Australia, Radio	11880as	17775as			
0900	1000		Australia, Voice International	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, R for Peace Intl	7455am	15040am			
0900	1000		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na	17645as				
0900	1000		Ecuador, HCJB	11755pa	21455usb			
0900	1000		Germany, Deutsche Welle	6140eu				
0900	1000		Guyana, Voice of	3290do	5950do			
0900	1000	as/vl	Italy, IRRS	13840va				
0900	1000		Liberia, R Liberia Int	6100do				
0900	1000		Malaysia, Radio	7295do				
0900	1000	vl/s	Malta, VO Mediterranean	9630eu				
0900	1000		New Zealand, Radio NZ Intl	11675pa				
0900	1000		Palau, KHBN/VO Hope	15725as				
0900	1000		Papua New Guinea, NBC	4890do	9675al			
0900	1000		Russia, University Network	17765as				
0900	1000		Russia, Voice of Russia	11820eu	15275au	17495au	17525au	
			17665au					
0900	1000		Singapore, SBC Radio One	6150do				
0900	1000		UK, BBC World Service	6190af	6195va	9605as	9740as	11760va
			11940af 12095eu	15190as	15310as	15360as	15400af	15485va
			15565va 15575va	17640va	17760as	17830af	17790as	17885af
			21470af 21660as					
0900	1000		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb 6458usb	10320usb	12579usb	12689usb	13362usb	
0900	1000		USA, KAIJ Dallas TX	5755va				
0900	1000		USA, KIMF Otero NM	5835na				
0900	1000		USA, KTBN Salt Lk City UT	7505na				
0900	1000		USA, KWHR Naalehu HI	11565pa	17780as			
0900	1000		USA, Voice of America	11955va	13610va	15150va		
0900	1000		USA, WBCQ Kennebunk, ME	7415na				
0900	1000		USA, WEWN Birmingham AL	5825na				
0900	1000		USA, WHRA Greenbush ME	7580va				
0900	1000		USA, WHRI Noblesville IN	5745va	7315am			
0900	1000		USA, WJIE Louisville KY	7490am	13595am			
0900	1000		USA, WRMI Miami FL	7385na				
0900	1000	th	USA, WSHB Cypress Creek SC	7535eu				
0900	1000		USA, WTJC Newport NC	9370na				
0900	1000		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0900	1000	vl	Vanuatu, Radio	3945al	4960do			
0910	0930	s	Armenia, Voice of	4810eu	15270as			
0930	1000		Georgia, Georgian Radio	11910me				
0930	1000		Lithuania, R Vilnius	9710eu				
0930	1000		Netherlands, Radio	9790va	12065va	13710as		
0938	0950		Croatia, Croatian Radio	13820au				

Shortwave Guide

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

1000	1027		Vietnam, Voice of	9840as	12020au			
1000	1029		Czech Rep, Radio Prague Intl	21745va				
1000	1030		Austria, Radio Austria Intl	6155eu	13790eu			
1000	1030		Guam, AWR/KSDA	11705as	11900as			
1000	1030		Mongolia, Voice of	12085as				
1000	1030		Sri Lanka, SLBC	4940as				
1000	1030		UK, BBC World Service	9605as	15360as	21660as		
1000	1030		UK, RTE Radio	15280au				
1000	1045		USA, KWHR Naalehu HI	11565pa				
1000	1056		China, China Radio Intl	11730pa	15210pa			
1000	1056		North Korea, Voice of	3560as	9335am	9849as	11710am	11735as
1000	1100		Anguilla, Caribbean Beacon		6090am			
1000	1100		Australia, ABC NT Alice Springs		2310do	4835irr		
1000	1100		Australia, ABC NT Katherine		2485do			
1000	1100		Australia, ABC NT Tennant Crk		2325do			
1000	1100		Australia, Radio	9580va	9660pa	11880as	15240as	15415as
				17580pa	17750as	17795va	21725va	21820as
1000	1100		Australia, Voice International		13685as			
1000	1100	as	Bhutan, Bhutan BC Service		5030al	6035do		
1000	1100		Canada, CFRX Toronto ON		6070do			
1000	1100		Canada, CFVP Calgary AB		6030do			
1000	1100		Canada, CKZN St John's NF		6160do			
1000	1100		Canada, CKZU Vancouver BC		6160do			
1000	1100		Costa Rica, R for Peace Intl		7455am	15040am		
1000	1100		Costa Rica, University Network		5030am	6150am	7375am	9725sa
				11870am	13750na	17645as		
1000	1100		Ecuador, HCJB	11755pa	21455usb			
1000	1100		Germany, Deutsche Welle		6140eu			
1000	1100		Guyana, Voice of	3290do	5950do			
1000	1100		India, All India Radio	13710as	15020as	15235as	15260as	
				17510au	17800as	17895au		
1000	1100	as/vl	Italy, IRRS	13840va				
1000	1100		Japan, Radio	9695as	15590as	21755oc		
1000	1100		Liberia, R Liberia Intl	6100do				
1000	1100		Malaysia, Radio	7295do				
1000	1100		Netherlands, Radio	9790va	12065va	13710as		
1000	1100		New Zealand, Radio NZ Intl		11675pa			
1000	1100		Palau, KHBN/VO Hope	15725as				
1000	1100		Papua New Guinea, NBC		4890do	9675al		
1000	1100		Russia, University Network		17765as			
1000	1100		Singapore, SBC Radio One		6150do			
1000	1100		South Africa, Radio Veritas		7240af			
1000	1100		UK, BBC World Service	6190af	6195va	9740as	11760va	11940af
				12095eu	15190as	15310as	15485va	15565va
				17760as	17790as	17885af	21470af	
1000	1100	as	UK, BBC World Service	15400af	17830af			
1000	1100		USA, Armed Forces Network		3903usb	4278usb	4319usb	4993usb
				6350usb	6458usb	10320usb	12579usb	12689usb
1000	1100		USA, KALJ Dallas TX	5755va				
1000	1100		USA, KIMF Otero NM	5835na				
1000	1100		USA, KTBN Salt Lk City UT		7505na			
1000	1100		USA, KWHR Naalehu HI	9930as				
1000	1100		USA, Voice of America	5745am	5985va	7370am	9590am	11720va
				15250va	15425va	15455va		
1000	1100		USA, WBCQ Kennebunk, ME		7415na			
1000	1100		USA, WEWN Birmingham AL		5825na	15745na		
1000	1100		USA, WHRI Noblesville IN		9495va	9840am		
1000	1100		USA, WJIE Louisville KY	7490am	13595am			
1000	1100		USA, WRMI Miami FL	9955am				
1000	1100		USA, WRNO New Orleans LA		7395am			
1000	1100	mwh	USA, WSHB Cypress Creek SC		6095am	11780am		
1000	1100	tfa	USA, WSHB Cypress Creek SC		11780as			
1000	1100		USA, WTJC Newport NC	9370na				
1000	1100		USA, WWCR Nashville TN		5070na	5935na	7560na	9475na
1000	1100		USA, WYFR Okeechobee FL		5950na			
1000	1100		Vatican City, Vatican Radio		5890eu			
1000	1200	s	USA, WSHB Cypress Creek SC		9455am	11780as		
1030	1045	mtwthf	Ethiopia, Radio	5990do	7110do	9704do		
1030	1100		Guam, AWR/KSDA	11900as				
1030	1100		Iran, VOIRI	15215as	15375as	15480as	21470as	21730as
1030	1100		Netherlands, Radio	5965na	6045eu	9860eu		
1030	1100		Sri Lanka, SLBC	4940as	11835as	15120as	17850as	
1030	1100		UAE, Emirates Radio	13675eu	15370eu	15395eu	21605eu	

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

1100	1104		Pakistan, Radio	17835eu	21465eu			
1100	1105		New Zealand, Radio NZ Intl		11675pa			
1100	1120	fa	Kazakhstan, R Almaty	9620eu	11840eu			
1100	1127		Iran, VOIRI	15215as	15375as	15480as	21470as	21730as
1100	1127		Vietnam, Voice of	7285as				
1100	1130	as	Bhutan, Bhutan BC Service		5030al	6035do		
1100	1130		Netherlands, Radio	9790va	12065va	13710as		
1100	1130		UK, BBC World Service	15400af	17790as			
1100	1145		Germany, Deutsche Welle		15410af	17800af	21530af	21780af
				25700af				
1100	1200		Anguilla, Caribbean Beacon		11775am			
1100	1200		Australia, ABC NT Alice Springs		2310do	4835irr		
1100	1200		Australia, ABC NT Katherine		2485do			
1100	1200		Australia, ABC NT Tennant Crk		2325do			
1100	1200		Australia, Radio	5995pa	6020pa	9475as	9580va	9660pa
				11650va	11880as	12080va	15240va	15415as
				17795va	21725va	21820as		
1100	1200		Australia, Voice International		13685as			
1100	1200		Canada, CFRX Toronto ON		6070do			
1100	1200		Canada, CFVP Calgary AB		6030do			
1100	1200		Canada, CKZN St John's NF		6160do			
1100	1200		Canada, CKZU Vancouver BC		6160do			
1100	1200		Costa Rica, R for Peace Intl		7455am	15040am		
1100	1200		Costa Rica, University Network		5030am	6150am	7375am	9725sa
				11870am	13750na	17645as		
1100	1200		Ecuador, HCJB	12005am	15115am	21455usb		
1100	1200		Germany, Deutsche Welle		6140eu			
1100	1200	as/vl	Italy, IRRS	13840va				
1100	1200		Japan, Radio	6120na	9695as	15590as		
1100	1200		Jordan, Radio	11690eu				
1100	1200		Malaysia, Radio	7295do				
1100	1200		Netherlands, Radio	5965na	6045eu	9860eu		
1100	1200		Papua New Guinea, NBC		4890do	9675al		
1100	1200		Russia, University Network		17765as			
1100	1200		Singapore, R Singapore Intl		6150as	9600as		
1100	1200		Taiwan, R Taipei Intl	7445as	11985as			
1100	1200		UK, BBC World Service	6190af	6195va	9740as	11760va	11940af
				12095eu	15190va	15310as	15485va	15565va
				17760as	17790as	17830af	17885af	21470af
1100	1200		USA, Armed Forces Network		3903usb	4278usb	4319usb	4993usb
				6350usb	6458usb	10320usb	12579usb	12689usb
1100	1200		USA, KALJ Dallas TX	5755va				
1100	1200		USA, KIMF Otero NM	5835na				
1100	1200		USA, KTBN Salt Lk City UT		7505na			
1100	1200		USA, KWHR Naalehu HI	9930as	11565pa			
1100	1200		USA, Voice of America	5985va	6110va	9760va	11705va	11720va
				15250va	15425va	15455va		
1100	1200		USA, WEWN Birmingham AL		5825na	15745na		
1100	1200		USA, WHRI Noblesville IN		9495va	9840am		
1100	1200		USA, WINB Red Lion PA	13570am				
1100	1200		USA, WJIE Louisville KY	7490am	13595am			
1100	1200		USA, WRMI Miami FL	9955am				
1100	1200		USA, WRNO New Orleans LA		7395am			
1100	1200	tfas	USA, WSHB Cypress Creek SC		6095am			
1100	1200		USA, WTJC Newport NC	9370na				
1100	1200		USA, WWCR Nashville TN		5070na	5935na	7560na	
				15825na				
1100	1200		USA, WYFR Okeechobee FL		5950na	11725sa	11830sa	
1106	1200		New Zealand, Radio NZ Intl		15175pa			
1115	1130		Israel, Kol Israel	15640va	17545va			
1115	1145		Nepal, Radio	3230as	5005as	6100as	7164as	
1120	1140	w	Kazakhstan, RAlmaty	9620eu	11840eu			
1130	1145	vl	Libya, Voice of Africa	15435irr	21695irr			
1130	1155		Belgium, Radio Vlaanderen Intl		7390as			
1130	1157		Czech Rep, Radio Prague Intl		11640va	21745va		
1130	1200		South Korea, R Korea Intl		9650na			
1130	1200		Sri Lanka, SLBC	4940as				
1130	1200	a	UK, Wales Radio Intl	17625au				
1130	1200	f	Vatican City, Vatican Radio		5595va	17515va		
1140	1200	t	Kazakhstan, RAlmaty	9620eu	11840eu			

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

1200	1225		Netherlands, Radio	5965na	6045eu	9860eu		
1200	1230		France Radio France Intl	15540af	25820af			
1200	1230		Uzbekistan, Radio Tashkent		5060as	5975as	6025as	9715as
1200	1245		USA, WYFR Okeechobee FL		5950na			
1200	1256		China, China Radio Intl	9730as	9760pa	11760pa	11855as	11980as
				15415pa				
1200	1259		Canada, Radio Canada Intl		9660as	11730as		
1200	1300		Anguilla, Caribbean Beacon		11775am			
1200	1300		Australia, ABC NT Katherine		2485do			
1200	1300		Australia, ABC NT Tennant Crk		2325do			
1200	1300		Australia, Radio	5995pa	6020pa	9475as	9580va	9660pa
				11650va	11880as	12080va	15415as	15240pa
				17580pa	17725va	21820as		
1200	1300		Australia, Voice International		13685as			

1200	1300		Canada, CBC Northern Service	9625do				
1200	1300		Canada, CFRX Toronto ON	6070do				
1200	1300		Canada, CFVP Calgary AB	6030do				
1200	1300		Canada, CKZN St John's NF	6160do				
1200	1300		Canada, CKZU Vancouver BC	6160do				
1200	1300		China, Voice of Hope	7485as				
1200	1300		Costa Rica, R for Peace Intl	7455am	15040am			
1200	1300		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as					
1200	1300		Ecuador, HCJB	12005am	15115am	21455usb		
1200	1300		Germany, Deutsche Welle	6140eu				
1200	1300		Germany, Overcomer Ministries	5975eu				
1200	1300	as/vl	Italy, IRRS 13840va					
1200	1300		Jordan, Radio	11690eu				
1200	1300		Malaysia, Radio	7295do				
1200	1300		New Zealand, Radio NZ Intl	15175pa				
1200	1300		Papua New Guinea, NBC	4890do	9675al			
1200	1300		Russia, University Network	17765as				
1200	1300		Russia, Voice of Hope	13590as				
1200	1300		Singapore, R Singapore Intl	6150as	9600as			
1200	1300		Taiwan, R Taipei Intl	7130as	9610au			
1200	1300		UK, BBC World Service	6190af	6195va	9740as	11760va	11940af
			12095eu 15190va 15310as 15485va 15565va 15575va 17640va					
			17760as 17790as 17885af 17830af 21470af					
1200	1300		Ukraine, R Ukraine Intl	11825na	11840na	13590na	17760na	
1200	1300		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb 6458usb 10320usb	12579usb	12689usb	13362usb		
1200	1300		USA, KALJ Dallas TX	5755va				
1200	1300		USA, KIMF Otero NM	5835na				
1200	1300		USA, KTBN Salt Lk City UT	7505na				
1200	1300		USA, KWHR Naalehu HI	9930as	11565pa			
1200	1300		USA, Voice of America	6110va	9645va	9760va	11705va	11715va
			15250va 15425va 15455va					
1200	1300		USA, WEWN Birmingham AL	5825na	15745na			
1200	1300		USA, WHRI Noblesville IN	9495na	9840am			
1200	1300		USA, WINB Red Lion PA	13570am				
1200	1300		USA, WJIE Louisville KY	7490am	13595am			
1200	1300		USA, WRMI Miami FL	9955am				
1200	1300		USA, WRNO New Orleans LA	7395am				
1200	1300	mwh	USA, WSHB Cypress Creek SC	6095am	9880as			
1200	1300	a	USA, WSHB Cypress Creek SC	9455am	9880as			
1200	1300	tfs	USA, WSHB Cypress Creek SC	9880as				
1200	1300		USA, WTJC Newport NC	9370na				
1200	1300		USA, WWCR Nashville TN	5070na	5935na	7560na		
			15825na					
1200	1300		USA, WYFR Okeechobee FL	11970na	13695na			
1215	1300		Egypt, Radio Cairo	17775as				
1230	1257		Vietnam, Voice of	9840as	12020as			
1230	1300		Australia, Radio	17750as				
1230	1300		Austria, Radio Austria Intl	6155eu	13730eu			
1230	1300		Bangladesh, Bangla Betar	7185as	9550as			
1230	1300		Bulgaria, Radio	12000eu	15700eu			
1230	1300		Sri Lanka, SLBC	4940as	6005as	6075as	9770as	15745as
1230	1300		Sweden, Radio	17505va	18960na			
1230	1300		Thailand, Radio	9810va				
1230	1300		UAE, Gospel For Asia	15170as				
1245	1300	hfa	Seychelles, FEBA Radio	15535me				

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

1300	1306		New Zealand, Radio NZ Intl	15175pa				
1300	1310	mtwhfa	Turkmenistan, Turkmen Radio	5015as				
1300	1330		Australia, Radio	11880as				
1300	1330		Egypt, Radio Cairo	17775as				
1300	1330		UAE, AWR 17870as					
1300	1330		UAE, Gospel For Asia	15170as				
1300	1345		USA, WYFR Okeechobee FL	11970na				
1300	1356		China, China Radio Intl	9570na	11760pa	11900pa	11980as	15180as
1300	1356		North Korea, Voice of	4405as	7505eu	9335na	11335eu	
			11710am 13760eu					
1300	1400		Anguilla, Caribbean Beacon	11775am				
1300	1400		Australia, Radio	5995pa	6020pa	9580va	9660pa	11650va
			12080va 15240pa 15415as	17580pa	21725va	21820as		
1300	1400		Australia, Voice International	13690as				
1300	1400		Canada, CBC Northern Service	9625do				
1300	1400		Canada, CFRX Toronto ON	6070do				
1300	1400		Canada, CFVP Calgary AB	6030do				
1300	1400		Canada, CKZN St John's NF	6160do				
1300	1400		Canada, CKZU Vancouver BC	6160do				
1300	1400	mtwhf	Canada, Radio Canada Intl	9515am	13655am	17710am		
1300	1400		China, Voice of Hope	7485as				
1300	1400		Costa Rica, R for Peace Intl	15040am				
1300	1400		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as					
1300	1400		Ecuador, HCJB	12005am	15115am	21455usb		
1300	1400		Germany, Deutsche Welle	6140eu				
1300	1400		Germany, Overcomer Ministries	13810me				
1300	1400	as/vl	Italy, IRRS 13840va					
1300	1400		Jordan, Radio	11690eu				
1300	1400		Malaysia, Radio	7295do				
1300	1400		Poland, Radio Polonia	6095eu	9525eu			
1300	1400		Russia, University Network	17765as				
1300	1400		Singapore, R Singapore Intl	6150as	9600as			
1300	1400	as	South Africa, Channel Afrca	11720af	17725af	21760af		
1300	1400		South Korea, R Korea Intl	9570as	13670as			
1300	1400		UK, BBC World Service	6190af	6195va	9740as	11760va	11940af
			12095eu 15190va 15310as 15420af 15485va 15565va 15575va					
			17640va 17760as 17790as 17830af 17885af 21470af					
1300	1400		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb 6458usb 10320usb	12579usb	12689usb	13362usb		
1300	1400		USA, KALJ Dallas TX	5755va				
1300	1400		USA, KIMF Otero NM	5835na				
1300	1400		USA, KNLS Anchor Point AK	9615as				
1300	1400		USA, KTBN Salt Lk City UT	7505na				
1300	1400		USA, KWHR Naalehu HI	9930as	11565pa			
1300	1400		USA, Voice of America	6160va	9645va	9760va	11705va	15425va
			15480va					
1300	1400		USA, WBCQ Kennebunk, ME	7415na				
1300	1400	m-whf	USA, WBCQ Kennebunk, ME	17494na				
1300	1400		USA, WEWN Birmingham AL	9955na	15745na			
1300	1400		USA, WHRA Greenbush ME	17560va				
1300	1400		USA, WHRI Noblesville IN	9840am	15105va			
1300	1400		USA, WINB Red Lion PA	13570am				
1300	1400		USA, WJIE Louisville KY	7490am	13595am			
1300	1400		USA, WRMI Miami FL	15725na				
1300	1400		USA, WRNO New Orleans LA	7395am				
1300	1400	m-whas	USA, WSHB Cypress Creek SC	9430na	7460as			
1300	1400	tf	USA, WSHB Cypress Creek SC	9455am	7460as			
1300	1400	as	USA, WSHB Cypress Creek SC	7460as				
1300	1400		USA, WTJC Newport NC	9370na				
1300	1400		USA, WWCR Nashville TN	5935na	7560na	12160na		
			15685na					
1300	1400		USA, WYFR Okeechobee FL	11740na	11830na	11560as	17510as	
			17675na					
1306	1400	occasional	New Zealand, Radio NZ Intl	6095pa				
1330	1350		UAE, Emirates Radio	13630eu	13675eu	15400eu	21597eu	
1330	1357		Vietnam, Voice of	7145eu	9730eu			
1330	1400		Australia, Radio	11660as	17750as			
1330	1400		Austria, Radio Austria Intl		17855au			
1330	1400	mtwhf	Bosnia/Serbia, R. Yugoslavia		11835au			
1330	1400		Germany, Voice of Hope	15775as				
1330	1400		Guam, AWR/KSDA	11755as	15660as			
1330	1400		India, All India Radio	9690as	11620as	13710as		
1330	1400		Laos, Lao National Radio	7145as				
1330	1400		Sweden, Radio	9430va	18960na			
1330	1400		Turkey, Voice of	17690va	17815eu			
1330	1400		UAE, AWR 15385as					
1330	1400		Uzbekistan, Radio Tashkent	5060as	5975as	6025as	9715as	

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

1400	1420		Turkey, Voice of	17690va	17815va			
1400	1429		Czech Rep, Radio Prague Intl	21745va				
1400	1430		Ecuador, HCJB	12005am	15115am	21455usb		
1400	1430		Germany, Voice of Hope	15775as				
1400	1430		Thailand, Radio	9530va				
1400	1456	as	South Africa, Channel Afrca	11720af	17725af	21760af		
1400	1456		China, China Radio Intl	7405na	9700as	11675pa	11765as	13685af
			15125af 17720na					
1400	1456		Romania, R Romania Intl	15365eu	17790eu			
1400	1500		Anguilla, Caribbean Beacon	11775am				
1400	1500		Australia, Radio	9580va	9660pa	11650va	11660as	12080va
			15240pa 15415as 15515va	17580pa	17750as	21725va		
1400	1500		Australia, Voice International	13690as				
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	mtwhf	Canada, Radio Canada Intl	9515am	13655am	17710am		
1400	1500		Costa Rica, R for Peace Intl	15040am				
1400	1500		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as					
1400	1500		France Radio France Intl	7175af	9580af	17620af		
1400	1500		Germany, Deutsche Welle	6140eu				
1400	1500		Germany, Overcomer Ministries	13810me				

1400	1500		India, All India Radio	9690as	11620as	13710as		
1400	1500		Japan, Radio	7200as	9505na	9845as	11730as	
1400	1500		Jordan, Radio	11690eu				
1400	1500	occasional	New Zealand, Radio NZ Intl	6095pa				
1400	1500		Oman, Radio	15140eu				
1400	1500		Russia, University Network	17765as				
1400	1500		Singapore, SBC Radio One	6150do				
1400	1500		Taiwan, R Taipei Intl	15265as				
1400	1500		UAE, AWR	15385as				
1400	1500		UK, BBC World Service	6190af	6195va	9740as	11940af	12095va
			15190am	15310as	15485va	15565va	15575va	17640va	17830af
			21470af	21660af				
1400	1500		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb	6458usb	10320usb	12579usb	12689usb	13362usb	
1400	1500		USA, KAIJ Dallas TX	13815va				
1400	1500		USA, KIMF Otero NM	5835na				
1400	1500		USA, KJES Vado NM	11715na				
1400	1500		USA, KTBN Salt Lk City UT	7505na				
1400	1500		USA, KWHR Naalehu HI	9930as				
1400	1500		USA, Voice of America	6110va	7125va	9645va	9760va	11705va
			15205va	15395va	15425va	15480va		
1400	1500		USA, WBCQ Kennebunk, ME	17495na				
1400	1500		USA, WEWN Birmingham AL	9955na	15745na			
1400	1500		USA, WHRA Greenbush ME	17560va				
1400	1500		USA, WHRI Noblesville IN	9840am	15105va			
1400	1500		USA, WINB Red Lion PA	13570am				
1400	1500		USA, WJIE Louisville KY	7490am	13595am			
1400	1500		USA, WRMI Miami FL	15725na				
1400	1500		USA, WRNO New Orleans LA	7395am				
1400	1500		USA, WTJC Newport NC	9370na				
1400	1500		USA, WWCR Nashville TN	9475na	12160na	13845na		
			15685na					
1400	1500		USA, WYFR Okeechobee FL	11740na	11830na	11560as	17510as	
			17675na	17760na				
1415	1420		Nepal, Radio	3230as	5005as	6100as	7164as	
1430	1450	vl	Vatican City, Vatican Radio	9865as	13765as	15235as		
1430	1500		Australia, Radio	9475as				
1430	1500		Austria, Radio Austria Intl	6155eu	13730eu			
1430	1500		Myanmar, Radio	5040do	5985do			
1430	1500		Netherlands, Radio	9890as	11835as	12075as	15220na	
1430	1500		Sweden, Radio	17505va	18960na			
1445	1500		Guam, TWR/KTWR	15330as				

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

1500	1515	whf	Seychelles, FEBA Radio	15445as				
1500	1530		Mexico, Radio Mexico Intl	9705am	11770am			
1500	1530		Mongolia, Voice of	12015eu				
1500	1530		South Africa, Channel Africa	17725af				
1500	1530	as	UK, BBC World Service	11860af	21490af			
1500	1545		Guam, TWR/KTWR	15330as				
1500	1556		China, China Radio Intl	7405as	7160as	9785as	13685af	
			15125na	17720na				
1500	1556		North Korea, Voice of	4405as	7505eu	9335am	11335eu	
			11710am					
1500	1557		Canada, Radio Canada Intl	15360as	17870as			
1500	1559	mtwhf	Canada, Radio Canada Intl	9515am	13655am	17710am		
1500	1600		Anguilla, Caribbean Beacon	11775am				
1500	1600		Australia, Radio	9475as	9580va	9660pa	11650va	11660as
			12080va	15240pa	15415as	15515va	17580pa	17750as	21725va
1500	1600		Australia, Voice International	13690as				
1500	1600		Austria, Radio Afrika Intl	17895eu				
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, R for Peace Intl	15040am				
1500	1600		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am	13750na	17645as			
1500	1600		Germany, Deutsche Welle	6140eu				
1500	1600	a	Germany, Overcomer Ministries	6110eu				
1500	1600		Japan, Radio	7200as	9750as	9845as	11730as	
1500	1600		Jordan, Radio	11690na				
1500	1600		Myanmar, Radio	5040do	5985do			
1500	1600		Netherlands, Radio	9890as	11835as	12075as	15220na	
1500	1600	occasional	New Zealand, Radio NZ Intl	6095pa				
1500	1600		Russia, Voice of Russia	6205as	7315as	7350as	9590as	9875as
			11500as					
1500	1600		Singapore, SBC Radio One	6150do				
1500	1600		UK, BBC World Service	5975as	6190af	6195va	9410va	9740as
			11940af	12095va	15190am	15310as	15400af	15485va	15565va
			17640me	17790as	17830af	21470af	21660af		
1500	1600		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb	6458usb	10320usb	12579usb	12689usb	13362usb	
1500	1600		USA, KAIJ Dallas TX	13815va				
1500	1600		USA, KIMF Otero NM	5835na				
1500	1600		USA, KJES Vado NM	11715na				
1500	1600		USA, KTBN Salt Lk City UT	7505na				
1500	1600		USA, KWHR Naalehu HI	9930as				
1500	1600		USA, Voice of America	7125va	9575va	9645va	15205va	15395va
1500	1600		USA, WBCQ Kennebunk, ME	17495na				
1500	1600		USA, WEWN Birmingham AL	9955na	15745na			
1500	1600		USA, WHRA Greenbush ME	17650va				
1500	1600		USA, WHRI Noblesville IN	9840am	15105va			
1500	1600		USA, WINB Red Lion PA	13570am				
1500	1600		USA, WJIE Louisville KY	7490am	13595am			
1500	1600		USA, WRMI Miami FL	15725na				
1500	1600		USA, WRNO New Orleans LA	7395am				
1500	1600		USA, WTJC Newport NC	9370na				
1500	1600		USA, WWCR Nashville TN	9475na	12160na	13845na		
			15685na					
1500	1600		USA, WYFR Okeechobee FL	6280as	11830na	17760na		
1515	1530	mtwhf	Seychelles, FEBA Radio	11600as				
1530	1545		Bangladesh, Bangla Betar	4882as	15520as			
1530	1545		Seychelles, FEBA Radio	11600as				
1530	1550	as	Vatican City, Vatican Radio	9865va	13765af	15235af		
1530	1600		Germany, Voice of Hope	9860me				
1530	1600		Iran, VOIRI	7115as	7195eu	9610as	11640as	11775as	11835as
1530	1600		USA, Voice of America	6110va	9760va	9795va	11995va	15460va	
1540	1550		Turkmenistan, Turkmen Radio	4930as				
1545	1600	s h	Bangladesh, Bangla Betar	4882as	15520as			
1545	1600	smt hfa	Seychelles, FEBA Radio	11600as				

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

1600	1615		Pakistan, Radio	11570me	15070me	15530af	17725af	
1600	1625		Netherlands, Radio	9890as	11835as	12075as	15220na	
1600	1627		Vietnam, Voice of	7145eu	9730eu			
1600	1628	s	Hungary, Radio Budapest	6025eu	11680eu			
1600	1630		Guam, AWR/KSDA	11560as	15495as	17630as		
1600	1630		Mexico, Radio Mexico Intl	9705am	11770am			
1600	1630		South Africa, Channel Africa	9525af				
1600	1630		UAE, Gospel For Asia	9785as				
1600	1630		USA, KWHR Naalehu HI	9930as				
1600	1635		UAE, Emirates Radio	13630eu	13675eu	15400eu	21597eu	
1600	1645		Germany, Deutsche Welle	11695am	13605as	15455af	21840af	
1600	1645		USA, WYFR Okeechobee FL	17790na				
1600	1650	occasional	New Zealand, Radio NZ Intl	6095pa				
1600	1656		China, China Radio Intl	7190af	13650af			
1600	1656		North Korea, Voice of	3560as	9975af	11735af		
1600	1659	as	Canada, Radio Canada Intl	9515am	13655am	17710am		
1600	1700		Algeria, Radio Algiers Intl	11715eu	15160eu			
1600	1700		Anguilla, Caribbean Beacon	11775am				
1600	1700		Australia, Radio	9475as	9580va	9660pa	11650va	11660as
			11880as	12080va	15240pa	15415as	15515va	17580pa	21725va
1600	1700		Australia, Voice International	13690as				
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, R for Peace Intl	15040am				
1600	1700		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am	13750na				
1600	1700		Ethiopia, Radio	5990do	7110af	7165af	9560af	9704af	
			11800af					
1600	1700		France Radio France Intl	11615af	11995af	12015af	15605af	17850af	
1600	1700		Germany, Deutsche Welle	6140eu	6170as	7225as	9735af	
1600	1700	a	Germany, Overcomer Ministries	6015eu				
1600	1700		Jordan, Radio	11690na				
1600	1700		Russia, Voice of Russia	4940as	4965as	4975as	6005me	7305as	
			9590as	9830me				
1600	1700		South Africa, Radio Veritas	3230af				
1600	1700		South Korea, R Korea Intl	5975va	9515va	9870va		
1600	1700		Sri Lanka, SLBC	4940as				
1600	1700		Taiwan, R Taipei Intl	11560as				
1600	1700		UK, BBC World Service	3915as	5975as	6190af	6195va	7160as	
			9410va	9510as	9740as	11940af	12095va	15190am	15310as	
			15400af	15565va	17640me	17790as	17830af	21470af	21660af	
1600	1700		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb	6458usb	10320usb	12579usb	12689usb	13362usb	
1600	1700		USA, KAIJ Dallas TX	13815va				
1600	1700		USA, KIMF Otero NM	5835na				
1600	1700		USA, KJES Vado NM	11715na				
1600	1700		USA, KTBN Salt Lk City UT	15590na				
1600	1700		USA, Voice of America	6035af	6110va	7125va	9575va	9645va	
			13600va	13710af	15395va	15205va	15420af	15485af	15445va	

			17715af 17895af 17640va					
1600	1700		USA, WBCQ Kennebunk, ME	17495na				
1600	1700		USA, WEWN Birmingham AL	13615na	15745na			
1600	1700		USA, WHRA Greenbush ME	17650va				
1600	1700		USA, WHRI Noblesville IN	13760na	15105va			
1600	1700		USA, WINB Red Lion PA	13570am				
1600	1700		USA, WJIE Louisville KY	7490am	13595am			
1600	1700		USA, WMLK Bethel PA	9465eu				
1600	1700		USA, WRMI Miami FL	15725na				
1600	1700		USA, WRNO New Orleans LA	7395am				
1600	1700		USA, WSHB Cypress Creek SC	18910af				
1600	1700		USA, WTJC Newport NC	9370na				
1600	1700		USA, WWCR Nashville TN 15685na	9475na	12160na	13845nc		
1600	1700		USA, WWRB Manchester TN	9320na	12172na			
1600	1700		USA, WYFR Okeechobee FL 21455eu	6280as	11830na	17760nc	18980eu	
1600	1700		Zimbabwe, SWR Africa	6145do				
1630	1700		Australia, Radio	17750as				
1630	1700		Austria, AWR	9850af				
1630	1700		Austria, Radio Austria Intl	17865na				
1630	1700		Egypt, Radio Cairo	15255af				
1630	1700		Georgia, Georgian Radio	6180me				
1630	1700	s	Germany, Voice of Hope	9860me				
1630	1700		Guam, AWR/KSDA	11560as	11980as	15495as	17630as	
1630	1700		UAE, AWR	9890as				
1630	1700	as	UK, BBC World Service	15420af	21490af			
1645	1700		Tajikistan, Radio	7245as				
1650	1700	mtwhf	New Zealand, Radio NZ Intl	11980pa				

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

1700	1727		Czech Rep, Radio Prague Intl	5930va	17485va			
1700	1730		France Radio France Intl	11615af	11995af	12015af	15605af	17850af
1700	1730		Jordan, Radio	11690na				
1700	1730	w	Moldova, Radio Pridnestrovye	5960eu				
1700	1730	wha	Russia, Bible Voice BC	7435me				
1700	1730		South Africa, Channel Africa	17870af				
1700	1730		UK, BBC World Service	6005af	9630af			
1700	1750	mtwhf	New Zealand, Radio NZ Intl	11980pa				
1700	1756		China, China Radio Intl	7150af	9570af	9695as	11910af	
1700	1756		Romania, R Romania Intl	7155eu	9625eu	9690eu	11940eu	
1700	1800		Anguilla, Caribbean Beacon	11775am				
1700	1800		Australia, Radio 12080va	9475as	9580va	9660pa	9815pa	11880va
				15240pa	15515va	17580pa	21725pa	21820as
1700	1800		Australia, Voice International	11685as				
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, R for Peace Intl	15040am				
1700	1800		Costa Rica, University Network 11870am 13750na	5030am	6150am	7375am	9725sa	
				17645as				
1700	1800		Egypt, Radio Cairo	15255af				
1700	1800		Germany, Deutsche Welle	6140eu				
1700	1800	a	Germany, Overcomer Ministries	6015eu				
1700	1800		Germany, United Methodist Ch	11735va	13820va			
1700	1800	a	Greece, Voice of	9420eu	15725eu	17705na		
1700	1800		Japan, Radio	9505na	11970na	15355af		
1700	1800		Russia, Voice of Russia	9470me	9590as	9830me		
1700	1800		South Africa, Radio Veritas	3230af				
1700	1800		Sri Lanka, SLBC	4940as				
1700	1800		Taiwan, R Taipei Intl	11550as				
1700	1800		UK, BBC World Service 7160as 9410va 15565va	3255af	3915as	5975as	6190af	6195va
				9510as	12095va	15310as	15400af	15420af
				17640me	17830af	21470af		
1700	1800		USA, Armed Forces Network 6350usb 6458usb	3903usb	4278usb	4319usb	4993usb	
				10320usb	12579usb	12689usb	13362usb	
1700	1800		USA, KAIJ Dallas TX	13815va				
1700	1800		USA, KIMF Otero NM	5835na				
1700	1800		USA, KTBN Salt Lk City UT	15590na				
1700	1800		USA, Voice of America 13710af 15205va	6040va	6110va	7125va	9645va	9760va
				15395va	15240af	15445af	17895af	
1700	1800	mtwhf	USA, Voice of America 12005va 15255va	5990va	6045va	9525va	9795va	11955va
1700	1800		USA, WBCQ Kennebunk, ME	17495na				
1700	1800		USA, WEWN Birmingham AL	13615na				
1700	1800		USA, WHRA Greenbush ME	17650va				
1700	1800		USA, WHRI Noblesville IN	13760na	15105va			
1700	1800		USA, WINB Red Lion PA	13570am				
1700	1800		USA, WJIE Louisville KY	7490am	13595am			
1700	1800		USA, WMLK Bethel PA	9465eu	15265eu			
1700	1800		USA, WRMI Miami FL	15725na				
1700	1800		USA, WRNO New Orleans LA	7395am				
1700	1800	tha	USA, WSHB Cypress Creek SC	15190af				
1700	1800		USA, WTJC Newport NC	9370na				
1700	1800		USA, WWCR Nashville TN 15685na	9475na	12160na	13845na		
1700	1800		USA, WWRB Manchester TN	9320na	12172na			
1700	1800		USA, WYFR Okeechobee FL	18980eu	21455eu			
1700	1800		Zimbabwe, SWR Africa	6145do				
1704	1500	s	Austria, Radio Austria Intl	17865oa				
1715	1730	mtwhf	UK, BBC World Service	15390am				
1715	1730		Vatican City, Vatican Radio 15595eu	4005eu	5890eu	7250eu	9645eu	
1725	1745	vl,mtwhf	UK, United Nations Radio	7170af	15495af	17580eu		
1730	1745		Israel, Kol Israel	11605va	17545va			
1730	1745	vl	Libya, Voice of Africa	15435irr	21695irr			
1730	1745		UK, BBC World Service	3390va	7230va	9525va		
1730	1800		Australia, Radio	17750as				
1730	1800		Guam, AWR/KSDA	9385me				
1730	1800	vl,mtwhfa	Malta, VO Mediterranean	9850eu				
1730	1800		Netherlands, Radio	6020af	7120af	11655af		
1730	1800		Philippines, Radio Pilipinas	11730me	11890me	15190me		
1730	1800	swhfa	Russia, Bible Voice BC	7435me				
1730	1800		Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu		
1730	1800		Swaziland, TWR	3200af	9500af			
1730	1800		Switzerland, Swiss R Intl	9755va	13790af	15555va		
1730	1800		Vatican City, Vatican Radio	13765af	15570af	17515af		
1735	1745	vl,th	Paraguay, Radio Nacional	9739sa				
1745	1800		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu		
1745	1800		India, All India Radio 13605af 15155af	7410eu	9445af	9950eu	11620eu	11925af
				17670af				
1751	1800		New Zealand, Radio NZ Intl	15265pa				

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

1800	1815		Russia, Bible Voice BC	7435me				
1800	1815	as	Russia, Bible Voice BC	5880eu				
1800	1827		Czech Rep, Radio Prague Intl	5930va	7315va			
1800	1827		Vietnam, Voice of	5955eu	7145eu	9730eu		
1800	1830		Azerbaijan, Voice of	6110eu	9155eu			
1800	1830		Egypt, Radio Cairo	15255af				
1800	1830		Germany, Deutsche Welle	3995eu				
1800	1830	s	Germnay, Universal Life	11840af				
1800	1830		South Africa, Channel Africa	17870af				
1800	1830		UK, BBC World Service	5975as	9510as			
1800	1830		UK, RTE Radio	9895me				
1800	1900		Anguilla, Caribbean Beacon	11775am				
1800	1900		Australia, Radio 9710pa 9815pa 11880va	5995pa	6080pa	7240va	9475as	9580va
				12080va	15515va	17750as		
			21725pa 21820as					
1800	1900		Australia, Voice International	11685as				
1800	1900		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu		
1800	1900		Canada, CBC Northern Service	9625do				
1800	1900		Canada, CFRX Toronto ON	6070do				
1800	1900		Canada, CFVP Calgary AB	6030do				
1800	1900		Canada, CKZN St John's NF	6160do				
1800	1900		Canada, CKZU Vancouver BC	6160do				
1800	1900		Costa Rica, R for Peace Intl	15040am				
1800	1900		Costa Rica, University Network 11870am 13750na	5030am	6150am	7375am	9725sa	
				17645as				
1800	1900		Germany, Deutsche Welle	6140eu				
1800	1900		Germany, United Methodist Ch	11735va	13820va			
1800	1900		India, All India Radio 13605af 15155af	7410eu	9445af	9950eu	11620eu	11925af
				17670af				
1800	1900		Kuwait, Radio	11990as				
1800	1900		Libya, ELWA	4760do				
1800	1900		Liberia, R Liberia Intl	5100do				
1800	1900		Netherlands, Radio	6020af	7120af	11655af		
1800	1900		New Zealand, Radio NZ Intl	15265pa				
1800	1900		Philippines, Radio Pilipinas	11730me	11890me	15190me		
1800	1900		Poland, Radio Polonia	5995eu	7285eu			
1800	1900		Russia, University Network	9890as				
1800	1900		Russia, Voice of Russia 11510af	7290eu	7335af	7340eu	9590as	9830af
1800	1900	as	Russia, Voice of Russia	5950eu	6175eu			
1800	1900	s	South Africa, Radio League	3215af				
1800	1900		South Africa, Radio Veritas	3230af				
1800	1900		Sri Lanka, SLBC	4940as				
1800	1900		Swaziland, TWR	3200af	9500af			
1800	1900		Taiwan, R Taipei Intl	3955eu				
1800	1900		UK, BBC World Service 12095me 15310va	3255af	6190af	6195va	9410va	
				15400af	15420af	15565me	17830af	21470af
1800	1900		USA, Armed Forces Network 6350usb 6458usb	3903usb	4278usb	4319usb	4993usb	
				10320usb	12579usb	12689usb	13362usb	
1800	1900		USA, KAIJ Dallas TX	13815va				

1800	1900		USA, KIMF Otero NM	11885na				
1800	1900		USA, KTBN Salt Lk City UT	15590na				
1800	1900		USA, Voice of America	6035af	6040va	9760va	9885va	11975af
			13710af	15240af	15580af	17895af		
1800	1900		USA, WBCQ Kennebunk, ME	17495na				
1800	1900		USA, WEWN Birmingham AL	13615na				
1800	1900		USA, WHRA Greenbush ME	17650va				
1800	1900		USA, WHRI Noblesville IN	9495va	13760na			
1800	1900		USA, WINB Red Lion PA	13570am				
1800	1900		USA, WJIE Louisville KY	7490am	13595am			
1800	1900		USA, WMLK Bethel PA	9465eu	15265eu			
1800	1900		USA, WRMI Miami FL	15725na				
1800	1900		USA, WRNO New Orleans LA	7395am				
1800	1900	w	USA, WSHB Cypress Creek SC	18910af				
1800	1900		USA, WTJC Newport NC	9370na				
1800	1900		USA, WWCR Nashville TN	9475na	12160na	13845na		
			15685na					
1800	1900		USA, WWRB Manchester TN	9320na	12172na			
1800	1900		USA, WYFR Okeechobee FL	18980eu				
1800	1900		Yemen, Rep of Yemen Radio	9780me				
1800	1900		Zimbabwe, SWR Africa	6145do				
1815	1845	as	Russia, Bible Voice BC	7435me				
1815	1900	as	Russia, Bible Voice BC	5880eu				
1830	1855		Belgium, Radio Vlaanderen Intl	7465as	13650eu	13685eu		
1830	1900		Bulgaria, Radio	5800eu	7500eu			
1830	1900		Georgia, Georgian Radio	11910eu				
1830	1900		South Africa, AWR	5960af	6095af	11985af		
1830	1900		South Africa, AWR	11985af				
1830	1900	mtwhfa	Sweden, Radio	6065va				
1830	1900	s	Sweden, Radio	5840va				
1830	1900		UK, BBC World Service	6005af	9630af			
1830	1900		UK, RTE Radio	13640na	21630af			
1830	1900	vl/mtwhf	UK, United Nations Radio	9850me	13775af			
1845	1900	s	Russia, Bible Voice BC	7435me				
1845	1900	a	Russia, Bible Voice BC	7435eu				

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

1900	1927		Vietnam, Voice of	7145eu	9730eu			
1900	1930		Germany, Deutsche Welle	3995eu				
1900	1930	s	Greece, Voice of	7475eu	9420eu	17705na		
1900	1930		Philippines, Radio Pilipinas	11730me	11890me	15190me		
1900	1945		Germany, Deutsche Welle	11765af	13780af	15275af	17560af	
			17810af	21780af				
1900	1945		India, All India Radio	7410eu	9445af	11620eu	11925af	13605af
			15075af	15155af	17670af			
1900	1945		USA, WYFR Okeechobee FL	15115eu	18930eu			
1900	1956		China, China Radio Intl	9440af	9585af			
1900	1956		North Korea, Voice of	4405as	7505eu	11335eu		
1900	2000		Anguilla, Caribbean Beacon	11775am				
1900	2000	mtwhf	Argentina, RAE	11710eu				
1900	2000		Australia, Radio	6080pa	7240va	9475as	9500as	9580va
			9815pa	11880va	12080va	15240va	21820as	
1900	2000		Australia, Voice International	13770as				
1900	2000	vl	Botswana, Radio	3356do	4820do	7255do		
1900	2000		Canada, CBC Northern Service	9625do				
1900	2000		Canada, CFRX Toronto ON	6070do				
1900	2000		Canada, CFVP Calgary AB	6030do				
1900	2000		Canada, CKZN St John's NF	6160do				
1900	2000		Canada, CKZU Vancouver BC	6160do				
1900	2000		Costa Rica, R for Peace Intl	15040am				
1900	2000		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am	13750na	17645as			
1900	2000	mtwhf	Eqt Guinea, Radio Africa	15185af				
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do			
1900	2000		Kuwait, Radio	11990as				
1900	2000		Liberia, ELWA	4760do				
1900	2000		Liberia, R Liberia Intl	5100do				
1900	2000		Malaysia, Radio	7295do				
1900	2000		Namibia, NBC	3270af	3290af			
1900	2000		Netherlands, Radio	6020af	7120af	11655af		
1900	2000		New Zealand, Radio NZ Intl	15265pa				
1900	2000		Nigeria, Radio/Enugu	6025do				
1900	2000		Nigeria, Radio/Ibadan	6050do				
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1900	2000		Nigeria, Radio/Lagos	3326do	4990al			
1900	2000		Nigeria, Voice of	7255af	15150af			
1900	2000		Papua New Guinea, NBC	4890do	9675al			
1900	2000	a	Russia, Bible Voice BC	5880me				
1900	2000	s	Russia, Bible Voice BC	7435me				
1900	2000		Russia, University Network	9890as				
1900	2000		Russia, Voice of Russia	5950eu	6175eu	6235eu	7290eu	7335af
			7340eu	7360eu	7440af	9875af	11510af	
1900	2000		South Korea, R Korea Intl	5975va	7275va			
1900	2000		Sri Lanka, SLBC	4940as				
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	6195va	9410va
			9630af	12095af	15310va	15400af	17830af	
1900	2000		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb	6458usb	10320usb	12579usb	12689usb	13362usb
1900	2000		USA, KAIJ Dallas TX	13815va				
1900	2000		USA, KIMF Otero NM	11885na				
1900	2000		USA, KJES Vado NM	15385eu				
1900	2000		USA, KTBN Salt Lk City UT	15590na				
1900	2000		USA, Voice of America	4950af	6035af	7415af	9525va	9690va
			9760va	9785va	11870va	11975af	12015va	13640va	13710af
			15240af	15180va	15580af	17895af		
1900	2000		USA, Voice of America	5965va	9840va	11720va	11970va	15205va
			15410va					
1900	2000		USA, WBCQ Kennebunk, ME	17495na				
1900	2000	s	USA, WBCQ Kennebunk, ME	7415na				
1900	2000	mtwhf	USA, WBCQ Kennebunk, ME	9335na				
1900	2000		USA, WEWN Birmingham AL	13615na				
1900	2000		USA, WHRA Greenbush ME	17650va				
1900	2000		USA, WHRI Noblesville IN	9495va	13760na			
1900	2000		USA, WINB Red Lion PA	13570am				
1900	2000		USA, WJIE Louisville KY	7490am	13595am			
1900	2000		USA, WMLK Bethel PA	9495eu	15265eu			
1900	2000		USA, WRMI Miami FL	15725na				
1900	2000		USA, WRNO New Orleans LA	7395am				
1900	2000	th	USA, WSHB Cypress Creek SC	15665eu	18910af			
1900	2000	mwfa	USA, WSHB Cypress Creek SC	18910af				
1900	2000		USA, WTJC Newport NC	9370na				
1900	2000		USA, WWCR Nashville TN	9475na	12160na	13845na		
			15685na					
1900	2000		USA, WWRB Manchester TN	9320na	12172na			
1900	2000		USA, WYFR Okeechobee FL	3230af				
1900	2000	vl	Vanuatu, Radio	3945af	7260do			
1900	2000		Zambia, Christian Voice	4965do				
1930	2000		Austria, Radio Austria Intl	5945eu	6155eu			
1930	2000		Bosnia/Serbia, R. Yugoslavia	6100eu				
1930	2000		Georgia, Georgian Radio	11760eu				
1930	2000		Greece, Voice of	7475eu				
1930	2000	s	Greece, Voice of	9420eu	17705na			
1930	2000		Iran, VOIRI 6110eu	7215eu	7320eu	11695af	15140af	
1930	2000		Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu		
1930	2000	mtwhf/vl	Solomon Islands, SIBC	5020do	9545do			
1930	2000		Switzerland, Swiss R Intl	9755va	13660va	15485va	17660va	
1930	2000		Turkey, Voice of	9890eu				
1935	1955		Italy, RAI Intl	5970eu	9745eu			
1940	1945		Turkmenistan, Turkmen Radio	4930as				
1945	2000	mtwhfa	Albania, Radio Tirana Intl	7210na	9510na			

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

2000	2015	s/vl	Solomon Islands, SIBC	5020do	9545do			
2000	2020		Turkey, Voice of	9890eu				
2000	2025		Netherlands, Radio	6020af	7120af	11655af		
2000	2027		Iran, VOIRI 6110eu	7215eu	7320eu	11695af	15140af	
2000	2028		Hungary, Radio Budapest	6025eu	7135eu	7175eu		
2000	2030		Israel, Kol Israel	6280va	9435af	11605va	15640va	
2000	2030		Mongolia, Voice of	12015eu				
2000	2030	mtwhf/vl	Solomon Islands, SIBC	5020do	9545do			
2000	2030		Switzerland, Swiss R Intl	9755va	13660va	15485va	17660va	
2000	2030		Vatican City, Vatican Radio	7365af	9660af	11625af		
2000	2045		Germany, Deutsche Welle	6180eu				
2000	2045		Iraq, Radio Iraq Intl	9687irrg	11787eu			
2000	2050		New Zealand, Radio NZ Intl	15265pa				
2000	2056		China, China Radio Intl	5965eu	9440eu	9840eu	11640af	11790eu
			13630af					
2000	2100		Algeria, Radio Algiers Intl	11715eu	15160eu			
2000	2100		Anguilla, Caribbean Beacon	11775am				
2000	2100		Australia, Radio	7240va	9475as	9500as	9580va	9815pa
			11880va	12080va	15240va	21820as		
2000	2100		Australia, Voice International	13770as				
2000	2100	vl	Botswana, Radio	3356do	4820do	7255do		
2000	2100		Canada, CBC Northern Service	9625do				
2000	2100		Canada, CFRX Toronto ON	6070do				
2000	2100		Canada, CFVP Calgary AB	6030do				
2000	2100		Canada, CKZN St John's NF	6160do				
2000	2100		Canada, CKZU Vancouver BC	6160do				
2000	2100		Costa Rica, R for Peace Intl	15040am				
2000	2100		Costa Rica, University Network	5030am	6150am	7375am	9725sa	

Shortwave Guide

			11870am 13750na	17645as				
2000	2100		Ecuador, HCJB	11895eu				
2000	2100	mtwhf	Eqt Guinea, Radio Africa		15185af			
2000	2100	vl	Ghana, Ghana BC Corp		3366do	4915do		
2000	2100		Guam, AWR/KSDA	7160as	11700as			
2000	2100		Indonesia, Voice of	9525eu				
2000	2100		Kuwait, Radio	11990as				
2000	2100		Liberia, ELWA	4760do				
2000	2100		Liberia, R Liberia Intl	5100do				
2000	2100		Malaysia, Radio	7295do				
2000	2100	smtwha	Malta, VO Mediterranean		7445eu			
2000	2100		Namibia, NBC	3270af	3290af			
2000	2100		Nigeria, Radio/Enugu	6025do				
2000	2100		Nigeria, Radio/Ibadan	6050do				
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
2000	2100		Nigeria, Radio/Lagos	3326do	4990al			
2000	2100		Nigeria, Voice of	7255af	15150af			
2000	2100		Russia, University Network		9890as			
2000	2100		Russia, Voice of Russia	5950eu	6175eu	6235eu	7290eu	7340eu
			7390eu 15735am					
2000	2100		Slovakia, AWR	5955as				
2000	2100		South Africa, AWR	15295af				
2000	2100	mtwhf	Spain, R Exterior Espana	9595af	9680eu			
2000	2100		Uganda, Radio	4976do	5026do	7196do		
2000	2100		UK, BBC World Service	3255af	6005af	6190af	6195va	9410va
			9630af 12095af	15400af	17830af			
2000	2100		USA, Armed Forces Network		3903usb	4278usb	4319usb	4993usb
			6350usb 6458usb	10320usb	12579usb	12689usb	13362usb	
2000	2100		USA, KAIJ Dallas TX	13815va				
2000	2100		USA, KIMF Otero NM	11885na				
2000	2100		USA, KTBN Salt Lk City UT		15590na			
2000	2100		USA, Voice of America	6035af	6095va	7415af	9690va	9760va
			11855af 11975af	13710af	15240af	15580af	17885af	17895af
2000	2100	as	USA, Voice of America	4950af				
2000	2100		USA, WBCQ Kennebunk, ME		17495na			
2000	2100	s	USA, WBCQ Kennebunk, ME		7415na			
2000	2100		USA, WEWN Birmingham AL		13615na	17595af		
2000	2100		USA, WHRA Greenbush ME		17650va			
2000	2100		USA, WHRI Noblesville IN		5745va	9495va		
2000	2100		USA, WINB Red Lion PA	13570am				
2000	2100		USA, WJIE Louisville KY	7490am	13595am			
2000	2100		USA, WMLK Bethel PA	9495eu	15265eu			
2000	2100		USA, WRMI Miami FL	15725na				
2000	2100		USA, WRNO New Orleans LA		7395am			
2000	2100	mwf	USA, WSHB Cypress Creek SC		15665af			
2000	2100		USA, WTJC Newport NC	9370na				
2000	2100		USA, WWCR Nashville TN		9475na	12160na	13845na	
			15685na					
2000	2100		USA, WWRB Manchester TN		9320na	12172na		
2000	2100		USA, WYFR Okeechobee FL		3230af	17525sa		
2000	2100	vl	Vanuatu, Radio	3945af	7260do			
2000	2100		Zambia, Christian Voice	4965do				
2005	2100		Syria, Radio Damascus	12085eu	13610eu			
2025	2045		Italy, RAI Intl	6010af	9710af	11880af		
2030	2045	vl	Libya, Voice of Africa	15435irr	21695irr			
2030	2045		Thailand, Radio	9535eu				
2030	2055		Belgium, Radio Vlaanderen Intl		7465eu			
2030	2057		Vietnam, Voice of	7145eu	9730eu			
2030	2100	t	Belarus, Radio Belarus Intl		7105eu	7210eu		
2030	2100		Cuba, Radio Havana	13660usb	13750eu			
2030	2100		Egypt, Radio Cairo	15375af				
2030	2100		Poland, Radio Polonia	7165eu	7265eu			
2030	2100	vl	Solomon Islands, SIBC	5020do	9545do			
2030	2100		Sweden, Radio	6065va	9445va	9490as		
2030	2100		Uzbekistan, Radio Tashkent		5025eu	7105eu	11905eu	
2040	2100	mtwhfa	Armenia, Voice of	4810eu	9960eu			
2045	2100		India, All India Radio	7410eu	9445eu	9575au	9910au	9950eu
			11620va 11715au					
2050	2100		Vatican City, Vatican Radio		4005eu	5890eu	7250eu	
2050	2110	vl/ mvatican	City, Vatican Radio	4005eu	5890eu	7250eu		
2051	2100		New Zealand, Radio NZ Intl		17675pa			

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

2100	2115		Egypt, Radio Cairo	15375af				
2100	2127		Czech Rep, Radio Prague Intl		5930va	9430va		
2100	2127		Vietnam, Voice of	7145eu	9730eu			
2100	2130		China, China Radio Intl	5965eu	9840eu	11640af	11790eu	13630af
2100	2130		Cuba, Radio Havana	13660usb	13750eu			
2100	2130		Nigeria, Radio/Ibadan	6050do				
2100	2130		Thailand, Radio	9530va				
2100	2145		Germany, Deutsche Welle		11645af	11890va	15275va	15410va
			17765af					
2100	2156		North Korea, Voice of	4405as	7505eu	11335eu		
2100	2159		Canada, Radio Canada Intl	5850va	5995va	7235va	7425va	
			9770va 9805va	13650va				
2100	2200		Anguilla, Caribbean Beacon		11775am			
2100	2200		Australia, Radio	5995pa	6020pa	7240va	9500as	9580va
			9660pa 11880va	12080va	17715va	21740va	21820as	
2100	2200		Austria, AWR	9660af				
2100	2200	vl	Botswana, Radio	3356do	4820do	7255do		
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, R for Peace Intl		7455am	15040am		
2100	2200		Costa Rica, University Network		5030am	6150am	7375am	9725sa
			11870am 13750na	17645as				
2100	2200		Ecuador, HCJB	11895eu				
2100	2200	mtwhf	Eqt Guinea, Radio Africa		15185af			
2100	2200	vl	Ghana, Ghana BC Corp		3366do	4915do		
2100	2200		India, All India Radio	7410eu	9445eu	9575au	9910au	9950eu
			11620va 11715au					
2100	2200		Japan, Radio	6035oc	6055oc	6090eu	6180eu	
			11830eu 11850oc	11855af	11920oc	17825na	17860oc	
			21670na					
2100	2200		Liberia, ELWA	4760do				
2100	2200		Liberia, R Liberia Intl	5100do				
2100	2200		Malaysia, Radio	7295do				
2100	2200		Namibia, NBC	3270af	3290af			
2100	2200		Nigeria, Radio/Enugu	6025do				
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
2100	2200		Nigeria, Radio/Lagos	3326do	4990al			
2100	2200		Nigeria, Voice of	7255af	15150af			
2100	2200		Papua New Guinea, NBC		4890do	9675al		
2100	2200		Romania, R Romania Intl		5995eu	7105eu	7215eu	9690eu
2100	2200		Russia, University Network		9890as			
2100	2200		Russia, Voice of Russia	5950eu	6175eu	6235eu	7300eu	7340eu
			7390eu 15735am					
2100	2200	vl	Solomon Islands, SIBC	5020do	9545do			
2100	2200		South Korea, R Korea Intl		15575eu			
2100	2200		Sri Lanka, SLBC	4940as				
2100	2200		Syria, Radio Damascus	12085eu	13610eu			
2100	2200		UK, BBC World Service	3255af	3915as	5965as	5975va	6005af
			6110as 6190af	6195va	9410va	12095va	15400af	
			17830af					
2100	2200		USA, Armed Forces Network		3903usb	4278usb	4319usb	
			4993usb 6350usb	6458usb	10320usb	12579usb	12689usb	
			13362usb					
2100	2200		USA, KAIJ Dallas TX	13815va				
2100	2200		USA, KIMF Otero NM	11885na				
2100	2200		USA, KTBN Salt Lk 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	9335na	17495na	
2100	2200	mtwhf	USA, WBCQ Kennebunk, ME		9335na			
2100	2200		USA, WEWN Birmingham AL		13615na	17595na		
2100	2200		USA, WHRA Greenbush ME		17650va			
2100	2200		USA, WHRI Noblesville IN		5745va	9495va		
2100	2200		USA, WINB Red Lion PA	13570am				
2100	2200		USA, WJIE Louisville KY	7490am	13595am			
2100	2200		USA, WMLK Bethel PA	15265eu				
2100	2200		USA, WRMI Miami FL	15725na				
2100	2200		USA, WRNO New Orleans LA		7395am			
2100	2200	mwa	USA, WSHB Cypress Creek SC		11650eu			
2100	2200	f	USA, WSHB Cypress Creek SC		15665af			
2100	2200		USA, WTJC Newport NC	9370na				
2100	2200		USA, WWCR Nashville TN		7465na	9475na	12160na	
			13845na					
2100	2200		USA, WWRB Manchester TN		9320na	12172na		
2100	2200		USA, WYFR Okeechobee FL		15565eu	17575sa	21455eu	
2100	2200	vl	Vanuatu, Radio	3945af	7260do			
2100	2200		Zambia, Christian Voice	4965do				
2115	2200		Egypt, Radio Cairo	9990eu	15375af			
2130	2156		China, China Radio Intl	5965eu	9840eu	13630eu	13640eu	
2130	2200		Australia, ABC NT Alice Springs		2310do	4835irr		
2130	2200		Australia, ABC NT Katherine		5025do			
2130	2200		Australia, ABC NT Tennant Crk		4910do			
2130	2200		Australia, Radio	11660as				
2130	2200	th	Belarus, Radio Belarus Intl		7105eu	7210eu		
2130	2200		Guam, AWR/KSDA	11960as	11980as			
2130	2200		Iran, VOIRI	9780au	11740au			
2130	2200		Turkey, Voice of	9525va				
2130	2200	tt	UK, BBC World Service	11680sa				
2130	2200	f	UK, Wales Radio Intl	7325eu				
2130	2200		Uzbekistan, Radio Tashkent		5025eu	7105eu	11905eu	

Shortwave Guide

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

2200	2227		Iran, VOIRI 9780as	11740au				
2200	2228		Hungary, Radio Budapest	3975eu	6025eu	11825af		
2200	2229		Canada, Radio Canada Intl	5850va	6045va	9770va	9805va	
2200	2230		Bosnia/Serbia, R. Yugoslavia	6100eu				
2200	2230		India, All India Radio 7410eu	9445eu	9575au	9910au	9950eu	
			11620va 11715au					
2200	2230		South Korea, R Korea Intl	3955eu				
2200	2230		Turkey, Voice of 9525va					
2200	2230		USA, Voice of America 6035af	7215va	7415af	9770va	9890va	
			11655af 11760va 11975af	13710af	15185va	15290va		
			15305va 17735va 17820va					
2200	2245		Egypt, Radio Cairo 9990eu					
2200	2245		USA, WYFR Okeechobee FL	15565af				
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 Crk	4910do				
2200	2300		Australia, Radio 5995pa	6020pa	9580va	11650va		
			11660as 13620as 15230as	17715va	17795va	21740va		
2200	2300		Bulgaria, Radio 5800eu	7500eu				
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 Rica, R for Peace Intl	7445am	15040am			
2200	2300		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as					
2200	2300	mtwhf	Eqt Guinea, Radio Africa	15185af				
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do			
2200	2300		Guyana, Voice of 3290do	5950do				
2200	2300		Liberia, R Liberia Intl 5100do					
2200	2300		Malaysia, Radio 7295do					
2200	2300		Mexico, Radio Mexico Intl	9705am	11770am			
2200	2300		Namibia, NBC 3270af	3290af				
2200	2300		New Zealand, Radio NZ Intl	17675pa				
2200	2300		Nigeria, Radio/Enugu 6025do					
2200	2300		Nigeria, Radio/Kaduna 4770do	6090do	9570do			
2200	2300		Nigeria, Radio/Lagos 3326do	4990al				
2200	2300		Nigeria, Voice of 7255af	15150af				
2200	2300		Russia, University Network	9890as				
2200	2300	vl	Solomon Islands, SIBC 5020do	9545do				
2200	2300	as	Spain, R Exterior Espana 9595af	9680eu				
2200	2300		Sri Lanka, SLBC 4940as					
2200	2300		Taiwan, R Taipei Intl 9355eu					
2200	2300		UK, BBC World Service 5965as	5975va	6195va	7105as		
			11685as 12095va 15400af	17830af				
2200	2300		Ukraine, R Ukraine Intl 5905eu	6020eu	7240eu	9560eu		
2200	2300		USA, Armed Forces Network	3903usb	4278usb	4319usb		
			4993usb 6350usb 6458usb	10320usb	12579usb	12689usb		
			13362usb					
2200	2300		USA, KALJ Dallas TX 13815va					
2200	2300		USA, KIMF Otero NM 11885na					
2200	2300		USA, KTBN Salt Lk City UT	15590na				
2200	2300		USA, KWHR Naalehu HI 17510as					
2200	2300		USA, WBCQ Kennebunk, ME	7415na	9335na	17495na		
2200	2300		USA, WEWN Birmingham AL	9975na	17595na			
2200	2300		USA, WHRA Greenbush ME	7580va	17650va			
2200	2300		USA, WHRI Noblesville IN	5745va	9495va			
2200	2300		USA, WINB Red Lion PA 13570am					
2200	2300		USA, WJIE Louisville KY 7490am	13595am				
2200	2300		USA, WRMI Miami FL 15725na					
2200	2300		USA, WRNO New Orleans LA	7395am				
2200	2300	h	USA, WSHB Cypress Creek SC	7510eu				
2200	2300	w	USA, WSHB Cypress Creek SC	15285sa				
2200	2300		USA, WTJC Newport NC 9370na					
2200	2300		USA, WWCR Nashville TN	5070na	7465na	9475na		
			13845na					
2200	2300		USA, WWRB Manchester TN	9320na	12172na			
2200	2300		USA, WYFR Okeechobee FL	11740na				
2200	2300	vl	Vanuatu, Radio 3945al	7260do				
2200	2300		Zambia, Christian Voice 4965do					
2205	2230		Italy, RAI Intl 11895as					
2230	2255		Belgium, Radio Vlaanderen Intl	13700na				
2230	2257		Czech Rep, Radio Prague Intl	7345va	9435va			
2230	2300	mtwhfa	Albania, Radio Tirona Intl	7130eu	9540eu			
2230	2300		Australia, Radio 9475as					
2230	2300		Austria, Radio Austria Intl	5945eu	6155eu			
2230	2300		Cuba, Radio Havana 9550am					
2230	2300		Sweden, Radio 6065va					
2245	2300		India, All India Radio 9705as	9950as	11620as	13605as		

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

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 Crk	4910do				
2300	0000		Australia, Radio 9475as	9580va	9660pa	11650pa	11660as	
			12080va 13620as 15230as	17715va				
2300	0000		Bulgaria, Radio 9400na	11700na				
2300	0000		Canada, CBC Northern Service	9625do				
2300	0000		Canada, CFRX Toronto ON	6070do				
2300	0000		Canada, CFVP Calgary AB	6030do				
2300	0000		Canada, CKZN St John's NF	6160do				
2300	0000		Canada, CKZU Vancouver BC	6160do				
2300	0000		China, China Radio Intl 5990na	13680na				
2300	0000		Costa Rica, R for Peace Intl	7445am	15040am			
2300	0000		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as					
2300	0000		Egypt, Radio Cairo 9900am					
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do			
2300	0000		Guyana, Voice of 3290do	5950do				
2300	0000		India, All India Radio 9705as	9950as	11620as	13605as		
2300	0000		Liberia, R Liberia Intl 5100do					
2300	0000		Malaysia, Radio 7295do					
2300	0000		Mexico, Radio Mexico Intl	9705am	11770am			
2300	0000		Namibia, NBC 3270af	3290af				
2300	0000		New Zealand, Radio NZ Intl	17675pa				
2300	0000		Romania, R Romania Intl	7195eu	9510na	9570eu		
			11940na					
2300	0000		Russia, University Network	9890as				
2300	0000		Singapore, SBC Radio One	6150do				
2300	0000		Sri Lanka, SLBC 4940as					
2300	0000		UK, BBC World Service 3915as	5965as	5975va	6195va	7105as	
			11685as 11945as 11955as	12095va	15280as			
2300	0000		USA, Armed Forces Network	3903usb	4278usb	4319usb	4993usb	
			6350usb 6458usb 10320usb	12579usb	12689usb	13362usb		
2300	0000		USA, KALJ Dallas TX 13815va					
2300	0000		USA, KIMF Otero NM 11885na					
2300	0000		USA, KTBN Salt Lk City UT	15590na				
2300	0000		USA, KWHR Naalehu HI 17510as					
2300	0000		USA, Voice of America 6180va	7215va	7205va	9620va	9770va	
			9780va 11735va 11760va	11805va	13640va	15135va	15185va	
			15205va 15290va 15135va	17735va	17820va			
2300	0000		USA, WBCQ Kennebunk, ME	7415na	9335na	17495na		
2300	0000		USA, WEWN Birmingham AL	9975na	17595na			
2300	0000		USA, WHRA Greenbush ME	7580eu				
2300	0000		USA, WHRI Noblesville IN	5745va	9495va			
2300	0000		USA, WINB Red Lion PA 12160am					
2300	0000		USA, WJIE Louisville KY 7490am	13595am				
2300	0000		USA, WRMI Miami FL 15725na					
2300	0000		USA, WRMI Miami FL 15725na					
2300	0000		USA, WRNO New Orleans LA	7355am				
2300	0000	w	USA, WSHB Cypress Creek SC	7510af				
2300	0000		USA, WTJC Newport NC 9370na					
2300	0000		USA, WWCR Nashville TN	3210na	5070na	7465na		
			13845na					
2300	0000		USA, WWRB Manchester TN	5050na	5085na	6890na		
2300	0000		USA, WYFR Okeechobee FL	5985sa	11855sa	15170sa	15400sa	
2300	0000	vl	Vanuatu, Radio 3945al	7260do				
2300	0000		Zambia, Christian Voice 4965do					
2300	2329		Canada, Radio Canada Intl	5960am	9590am	11865am		
2300	2330		Cuba, Radio Havana 9550am					
2300	2330		Nigeria, Radio/Enugu 6025do					
2300	2330		Nigeria, Radio/Kaduna 4770do	6090do				
2300	2330		Nigeria, Radio/Lagos 3326do	4990al				
2300	2330	vl	Solomon Islands, SIBC 5020do	9545do				
2300	2345		Germany, Deutsche Welle	9470as	9815as	13690as	21790as	
2300	2345		USA, WYFR Okeechobee FL	11740na				
2300	2350		Turkey, Voice of 6020va	9655va				
2320	2330		Kyrghyz, Kyrghyz Radio 4010as	4795as				
2330	0000		Australia, Radio 11695as	15415as				
2330	0000		Canada, Radio Canada Intl	5960na	9590na			
2330	0000		Lithuania, R Vilnius 9875eu					
2330	0000		Netherlands, Radio 6165na	9845na				
2330	0000		Switzerland, Swiss R Intl 9885sa	11660sa				
2330	0000		UAE, Gospel For Asia 6145as					
2330	0000		UK, BBC World Service 6035as					
2330	2345	vl	Libya, Voice of Africa 15435irr	21695irr				
2330	2356		China, China Radio Intl 5990na	13680na				
2330	2357		Czech Rep, Radio Prague Intl	9745na	21455usb			
2330	2357		Vietnam, Voice of 9840as	12020as				

Notes regarding BBCWS Listings:

1. **BBCWS stream abbreviations: (am)**=Americas; **(eas)**=East Asia. At print deadline for this listing, the **BBCWS** had not yet released details of its schedule for the B02 season. Therefore, **BBCWS** listings this month are educated predictions based on seasonal changes the service has made previously.
2. Listings for the **BBCWS** this month also are limited to those recommended by the station to listeners in North America. Other than the Americas stream (am), the East Asia (eas) stream is recommended to listeners in western North America.

0000 UTC / 7pm E / 4pm P - Page 43 Freqs

NEWSCASTS (*extended)

0000	BBCWS(am)	M	World Briefing*
		T-S	News
	HCJB Ecuador	T-A	Latin American & World News
	R. Australia	D	World News
	R. Canada Int.	D	News
	R. Japan	D	World News
	R. New Zealand Int.	D	News
	Spanish Foreign R.	T-A	Ibero-American News*
	VOA News Now	T-A	News*
0030	BBCWS(am)	M	The World Today*

CURRENT AFFAIRS MAGAZINES/FEATURES

0005	BBCWS(am)	T-A	Outlook
	R. Canada Int.	T-A	As It Happens (from 2330)
0010	R. Australia	H	Background Briefing (documentaries)
0015	R. Japan	T-A	44 Minutes
	VOA News Now	T-A	Focus (one story in depth)
0030	R. Canada Int.	H	Dispatches

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0000	R. Netherlands	A	A Good Life (development issues)
0030	R. Netherlands	W	A Good Life

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0000	R. Netherlands	T	The Research File
0005	R. Canada Int.	S	Quirks & Quarks
	R. New Zealand Int.	A	Digital Life
0010	R. Australia	T	The Science Show
0030	R. Netherlands	F	The Research File
0034	R. Australia	S	Ockham's Razor

ARTS & CULTURE

0000	Spanish Foreign R.	M	Window on Spain
0005	R. New Zealand Int.	S	At the Movies
0010	R. Australia	M	Awaye! (Aboriginal)
0030	R. New Zealand Int.	S	Bookmarks
0035	Spanish Foreign R.	H	Entremeses (food & travel)

LOCAL LIVES & VIEWS

0000	R. Netherlands	M	Dutch Horizons
0010	HCJB Ecuador	T-A	Studio 9
	R. Australia	W	The National Interest
		F	Hindsight (social history)
	R. Japan	M	Weekend Square
0030	R. Australia	A	Country Breakfast (rural Australia)
	R. Netherlands	T	EuroQuest (Europe in context)
		H	Dutch Horizons
0033	VOA News Now	T-A	Coast to Coast

INFORMATIONAL FEATURES

0000	R. Netherlands	H	Documentary
		F	Sound Fountain (soundscapes)
0005	R. Australia	S	The Europeans
0030	HCJB Ecuador	F	Book & Spade (archaeology)
	R. Netherlands	S	Amsterdam Forum (discussion)
		M	Sound Fountain
		A	Documentary
0045	BBCWS(am)	W	Heart and Soul (religion)
		F	What's the Problem? (advice)
0047	Spanish Foreign R.	T-A	Spanish Language Course

MUSIC

0000	R. Netherlands	S/W	Music 52-15 (world/folk)
	WBCQ(7415kHz)	A	Lost Discs Radio Show
0005	R. Canada Int.	M	Global Village (world/folk)
	R. New Zealand Int.	M-F	Cadenza (light classics)
0030	HCJB Ecuador	T	Inspirational Classics
		H	Walkin' in the Sunshine (country)
		A	Musica del Ecuador (Andean)
0045	HCJB Ecuador	W	Wonderful Words of Life (hymns)

ENTERTAINMENT

0000	WBCQ	M	Le Show
0001	BBCWS(am)	S	Play of the Week (radio theatre)
		H/A	Westway (drama serial)

SWL, MEDIA & COMMUNICATIONS

0000	WBCQ Maine	S	Real Amateur Radio Show
		H	Off the Hook
	HCJB Ecuador	S	DX Partyline
	R. for Peace Int.	S	World of Radio
0030	WBCQ Maine	H	World of Radio
	R. for Peace Int.	M	World of Radio
		W	Counterspin
0035	Spanish Foreign R.	S/T	Radio Waves
0045	R. Bulgaria	A	R. Bulgaria Calling

LISTENER CONTACT/INTERACTIVE

0000	HCJB Ecuador	M	Musical Mailbag
0005	R. Australia	A	Feedback
0010	R. Japan	S	Hello from Tokyo
0030	HCJB Ecuador	S	Saludos Amigos
	R. Australia	A	Feedback
	R. for Peace Int.	S	RFPI Mailbag
0035	Spanish Foreign R.	A	Radio Club
0045	BBCWS(am)	T	Write On
	WWCR(9475kHz)	S	Ask WWCR

SPORT

0020	BBCWS(am)	M	Sports Roundup
0023	VOA News Now	T-A	Sports

0100 UTC / 8pm E / 5pm P - Page 43 Freqs

NEWSCASTS (*extended)

0100	BBCWS(am)	S/M	The World Today*
		T-A	News
	China R. Int.	D	News & Reports*
	Deutsche Welle	D	News
	R. Australia	D	News
	R. Habana Cuba	D	News
	R. Netherlands	S/M	News
	R. New Zealand Int	D	News
	R. Prague	D	News
	R. Ukraine Int.	D	News
	VOA News Now	T-A	News & Reports*
	Voice of Vietnam	D	News
0130	RTE, Ireland	T-S	The News at Six*
	VOA Spec. Eng.	T-A	News

CURRENT AFFAIRS MAGAZINES/FEATURES

0100	R. Netherlands	T-A	Newsline
0105	Deutsche Welle	M	Talking Point (journalists)
		T-A	Newslink
	R. Australia	S	Correspondents' Report
		A	Asia Pacific 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
0115	R. Habana Cuba	T-S	Viewpoint
0130	Deutsche Welle	T	Insight
0133	VOA News Now	A	VOA News Review
0140	R. Habana Cuba	A	Weekly Review
	VOA Spec. Eng.	A	In the News
0145	VOA News Now	T-F	Dateline

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0110	R. Prague	F	Economic Report
0115	Voice of Vietnam	F	Vietnam Economy
0130	BBCWS(am)	S	World Business Review
	China R. Int.	T	Biz China
0133	VOA News Now	T-F	Business News
0140	VOA Spec. Eng.	T	Development Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0105	R. New Zealand Int.	A	Eureka International
0115	China R. Int.	A	Cutting Edge
0130	Deutsche Welle	W	Man and Environment
	R. Australia	M	The Health Report
	R. New Zealand Int.	A	Health [or Environment] Matters
0140	VOA Spec. Eng.	W	Agriculture Today
		H	Health Report
		A	Environment Report
0145	VOA Spec. Eng.	W	Science in the News
		H	Explorations
0150	R. Habana Cuba	M	Breakthrough

ARTS & CULTURE

0105	BBCWS(am)	T	Meridian-Masterpiece (ideas)
		W	Meridian-Screen (cinema)
		H	Meridian-Writing (books)
		A	Arts in Action
0110	R. Prague	A	The Arts
0115	Deutsche Welle	M	Arts on the Air
	Voice of Vietnam	W	Culture & Society
0120	China R. Int.	S	In the Spotlight
	R. Prague	M	Readings from Czech Literature
		A	Away from Politics (poetry)
	Voice of Vietnam	A	Literature & Arts
0130	R. Australia	A	The Arts
	R. Ukraine Int.	M	Roots
0145	VOA Spec. Eng.	A	American Stories
		H	The Making of a Nation

LOCAL LIVES & VIEWS

0105	R. Netherlands	S	Europe Unzipped
	R. New Zealand Int.	M-F	In Touch with New Zealand
	R. Prague	S	Insight Central Europe
		M	Letter from Prague
T-A	Newsview		
	Voice of Vietnam	D	Current Affairs
0110	Deutsche Welle	S	Inside Europe
	R. Prague	T	One on One (interview)
		W	Witness (oral history)
	R. Ukraine Int.	T-A	Ukraine Today
	Voice of Vietnam	T	Vietnam: Land and People
		A	Rural Vietnam
0120	R. Prague	W	Talking Point
		H	Czechs in History [or] Spotlight (places)
0130	China R. Int.	M	People in the Know
		W	China Horizons
		H	Voices from Other Lands
		F	Life in China
	Deutsche Welle	H	Living in Germany
	HCJB Ecuador	S	Studio 9 Weekend
0140	R. Habana Cuba	T/H/F	Caribbean Outlook
0145	VOA Spec. Eng.	T	This is America
		F	Making of a Nation
		A	American Mosaic

INFORMATIONAL FEATURES

0105	Deutsche Welle	M	Religion and Society
0130	Deutsche Welle	A	German by Radio
	R. Australia	T	The Low Report
		W	The Religion Report
	R. for Peace Int.	S	Alternative Radio
0140	VOA Spec. Eng.	F	Education Report

MUSIC

0100	WBCQ Maine	S	A Different Kind of Oldies Show
0105	BBCWS(am)	F	The Music Biz
0110	R. Ukraine Int.	M	Music from Ukraine
0120	Voice of Vietnam	S	Vietnamese Music
0130	BBCWS(am)	T	Charlie Gillett (world)
		W	UK Top 20
		H	Revolver (artist's choice)
		F	John Peel (eclectic)
		A	Jazzmatazz
	R. Australia	S	Oz Sounds
	R. New Zealand Int.	S	The Band Programme (brass)
	RTE Ireland	M	Easy Sunday (light music)

ENTERTAINMENT

0100	WBCQ Maine	M	Radio NY International (to 0400)
		A	Allan Weiner Worldwide
0110	Voice of Vietnam	M	Sunday Show

SWL, MEDIA & COMMUNICATIONS

0100	HCJB Ecuador	S	Ham Radio Today
	R. for Peace Int.	W	World of Radio
		F	Far Right Radio Review
0115	R. Ukraine Int.	S	Whole World on Radio Dial
0130	R. Australia	H	The Media Report
	R. for Peace Int.	A	World of Radio
0140	R. Habana Cuba	S/W	DXers Unlimited

Shortwave Guide

LISTENER CONTACT/INTERACTIVE

0110	R. Prague	M	Mailbox
0115	Voice of Vietnam	H	Letterbox
0130	China R. Int.	A	Listeners' Garden
	R. for Peace Int.	W	RFPI Mailbag
	R. Ukraine Int.	S	Hello from Kiev
0140	R. Habana Cuba	M	Mailbag Show

SPORT

0105	R. Australia	S/A	Grandstand (live sport)*
0123	VOA News Now	T-A	Sports Report
0130	Deutsche Welle	F	Hard to Beat: The World of Sport
	R. Australia	F	The Sports Factor
	RTE Ireland	S	Sportsnews
0135	R. Habana Cuba	T-A	Time Out
0135	R. New Zealand Int.	S/A	Live Sport (occasional)

*special service on 9660, 12080, 17580, 21725 kHz.

0200 UTC / 9pm E / 6pm P - Page 44 Freqs

NEWSCASTS (*extended)

0200	BBCWS(am)	D	News
	R. Australia	D	News
	R Budapest	D	News
	R. Canada Int.	D	News
	R. Habana Cuba	D	News
	R. Korea Int.	D	News
	R. New Zealand Int.	D	News
	R. Prague	D	News
	R. Taipei Int.	D	News
	Voice of Russia	D	News
0230	Voice of Vietnam	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

0205	R. Australia	A	Background Briefing (documentaries)
0210	R. Australia	M-F	The World Today
0211	Voice of Russia	S	News and Views
		M	Sunday Panorama
		T-A	Commonwealth Update
0215	R. Korea Int.	T-A	Seoul Calling
0230	R. Austria Int.	T-A	Report from Austria
	R. Sweden	T-A	60 Degrees North
0235	R. Canada Int.	S/A	Canada in the World
		T	Media Zone

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0205	R. Budapest	M	Europe Unlimited (trade-monthly)
	R. Canada Int.	S	Business Sense
0210	R. Prague	F	Economic Report
0235	R. Canada Int.	F	Business Sense
0245	Voice of Vietnam	F	Vietnam Economy

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0205	BBCWS(am)	T	Health Matters
		W	Go Digital
		H	Discovery (research)
		F	One Planet (ecology)
		A	Science in Action
0245	R. Sweden	F	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)

ARTS & CULTURE

0205	R. Budapest	M	Spotlight (monthly)
0210	R. Prague	A	The Arts
0215	R. Taipei Int.	T	Culture Express
0220	R. Prague	M	Readings from Czech Literature
		A	Away from Politics (poetry)
0230	R. Sweden	S	Spectrum (3rd wk.)
0235	R. Canada Int.	M/H	Spotlight
0245	Voice of Vietnam	W	Culture & Society
0250	Voice of Vietnam	A	Literature and Arts

LOCAL LIVES & VIEWS

0205	R. Budapest	S	Insight Central Europe
		M	Heading for Hungary (monthly)
		T-A	Hungary Today
	R. Canada Int.	T-A	Canada Today
	R. New Zealand Int.	M-F	In Touch with New Zealand
	R. Prague	S	Magazine (local color)
		M	Letter from Prague
		T-A	Newsview
0210	R. Prague	T	One on One (interview)
		W	Witness (oral history)
0215	R. Taipei Int.	S	Great Wall Forum (mainland issues)
		W	Taiwan Today
		H	Discover Taiwan
		F	Taipei Magazine
0224	Voice of Russia	M	Russia: People & Events
0230	R. Austria Int.	S	Insight Central Europe
		M	Letter from Austria
	R. Sweden	S	Weekend (Europe magazine-1st wk.)
			Sweden Today (2nd wk)
			Studio 49 (topical discussion-4th wk.)
0232	Voice of Russia	S	Moscow Yesterday and Today
0235	R. Austria Int.	M	Network Europe
0245	R. Sweden	W	Close Up (profiles-1st/3rd wk)
		F	Nordic Report (1st wk.)
			The S-Files (things Swedish-4th wk)
		A	Review of the Newsweek
	Voice of Vietnam	T	Vietnam: Land & People
		A	Rural Vietnam
0254	Voice of Russia	H	Russia: People and Events

INFORMATIONAL FEATURES

0200	R. for Peace Int.	M	New Dimensions
0205	R. New Zealand Int.	S	RPM (international documentaries)
0230	BBCWS(am)	T	Everywoman (magazine)
		W	Omnibus (documentaries)
		F	The Way We Are
		A	Documentaries
0232	Voice of Russia	A	Christian Message from Moscow
0235	R. Habana Cuba	S	The World of Stamps
0245	R. Taipei Int.	M-F	Let's Learn Chinese

MUSIC

0205	BBCWS(am)	S	Composer of the Month
	R. New Zealand Int.	A	The Mix
0210	R. Habana Cuba	M	From Habana
	R. Prague	S	Saturday Music (a mix)
0215	R. Taipei Int.	M	Jade Bells and Bamboo Pipes (traditional)
0230	BBCWS(am)	S	Music Review (classical)
	R. Habana Cuba	M	The Jazz Place [ar] Top Tens
	R. Sweden	M	Sounds Nordic (exc. 1st wk.)
0232	Voice of Russia	T	Folk Box
		W	Jazz Show
		H	Musical Portraits
		F	Music Around Us
0246	Voice of Russia	F	Music At Your Request
0250	Voice of Vietnam	S	Music (Vietnamese)

ENTERTAINMENT

0200	WBCQ Maine	S	Marion's Attic (vintage recordings)
0205	BBCWS(am)	M	Wright Around the World (pop requests)
	R. Australia	S	Margaret Throsby Interview
0230	BBCWS(am)	H	Pick of the World (BBC's best)
0232	Voice of Russia	M	Timelines
0240	Voice of Vietnam	M	Sunday Show

SWL, MEDIA & COMMUNICATIONS

0200	R. for Peace Int.	W	Continent of Media
0220	R. Budapest	A	DX Corner
0230	R. for Peace Int.	S	Far Right Radio Review

LISTENER CONTACT/INTERACTIVE

0205	R. Budapest	M	And the Gotepost (monthly)
	R. Canada Int.	M	Maple Leaf Mailbag
0210	R. Korea Int.	S	Friendship Unlimited
	R. Prague	M	Mailbox
0230	R. for Peace Int.	A	RFPI Mailbag
	R. Sweden	M	In Touch with Stockholm (1st wk.)
	R. Taipei Int.	S	Mailbag Time
0235	R. Canada Int.	W	Maple Leaf Mailbag
0245	Voice of Vietnam	H	Letterbox
0250	R. Austria Int.	S	Postbox

SPORT

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

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

0300 UTC / 10pm E / 7pm P - Page 44 Freqs

NEWSCASTS (*extended)

0300	BBCWS(am)	D	World Briefing*
	China R. Int.	D	News & Reports
	Deutsche Welle	D	News
	HCJB Ecuador	T-A	Latin American & World News
	R. Australia	D	News
	R. Habana Cuba	D	News
	R. New Zealand Int.	S/A	News
		M-F	Pacific Regional News
	R. Taipei Int.	D	News
	Voice of Russia	D	News
0330	R. Budapest	D	News
	Voice of Vietnam	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

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

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0311	Voice of Russia	W/A	Newmarket
0315	R. Taipei Int.	M	Taiwan Economic Journal
0330	BBCWS(am)	T-A	World Business Report
	China R. Int.	T	Biz China
	R. New Zealand Int.	W	Tradewinds
0335	R. Budapest	M	Europe Unlimited (trade-monthly)
0345	Voice of Vietnam	F	Vietnam Economy

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0311	Voice of Russia	T/F	Science & Engineering
0315	China R. Int.	A	Cutting Edge
	Deutsche Welle	S	Spectrum
0330	Deutsche Welle	W	Man & Environment
	R. Australia	A	In Conversation
0345	R. Sweden	F	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)
0350	R. Habana Cuba	M	Breakthrough

ARTS AND CULTURE

0310	R. New Zealand Int.	M	Tagata o te Moana (Pacific culture)
0315	Deutsche Welle	M	Arts on the Air
	R. Taipei Int.	F	Taiwan Gourmet
0320	China R. Int.	S	In the Spotlight
0330	HCJB Ecuador	F	Book & Spade (archaeology)
	R. Sweden	S	Spectrum (3rd wk.)
0335	R. Budapest	M	Spotlight (monthly)
0345	Voice of Vietnam	W	Culture and Society
0350	Voice of Vietnam	A	Literature & Arts

LOCAL LIVES & VIEWS

0305	R. Australia	A	Rural Reporter (outback)
0310	HCJB Ecuador	T-A	Studio 9
0315	R. Taipei Int.	S	Great Wall Forum (mainland issues)
		H	Taipei Magazine
		A	Koleidoscope
0320	R. Australia	M-F	Pacific Focus
0330	China R. Int.	M	People in the Know
		W	China Horizons
		H	Voices from Other Lands
		F	Life in China
	Deutsche Welle	H	Living in Germany
	R. Sweden	S	Network Europe (magazine-1st wk)
			Sweden Today (2nd wk)
			Studio 49 (topical discussion-4th wk)
	R. Taipei Int.	F	Discover Taiwan
0332	Voice of Russia	M	This is Russia
		T	Koleidoscope (events)
		H	Moscow Yesterday and Today
0335	R. Budapest	S	Insight Central Europe
		M	Heading for Hungary (monthly)
		T-A	Hungary Today
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

Shortwave Guide

0354 Voice of Russia W Russia: People & Events

INFORMATIONAL FEATURES
0330 BBCWS(am) S Reporting Religion
Deutsche Welle A German by Radio
R. Australia S All in the Mind (the brain)
0332 Voice of Russia F Russian by Radio
0345 R. Taipei Int. M-F Let's Learn Chinese

MUSIC
0305 R. New Zealand Int. A Home Grown (NZ artists)
0310 R. New Zealand Int. T Top 5 & New Releases (pop/rock)
0315 R. Taipei Int. T Jade Bells & Bamboo Pipes (traditional)
0330 HCJB Ecuador S Inspirational Classics
H Walkin' in the Sunshine (country)
A Musica del Ecuador (Andean)
R. New Zealand Int. T New Releases
A Musical Chairs (NZ artist profile)
R. Sweden M Sounds Nordic (rock-exc. 1st wk.)
0332 Voice of Russia S Songs from Russia
W Musical Portraits
0340 R. Australia M Australian Music Show (modern rock)
T Music Deli (international)
W Blacktracker (Aboriginal)
H Australian Country Style
F Jazz Notes
0345 HCJB Ecuador W Wonderful Words of Life (hymns)
0350 Voice of Vietnam S Music (Vietnamese)

ENTERTAINMENT
0305 R. New Zealand Int. S Sunday Drama (radio theatre)
0332 Voice of Russia A Audio Book Club
0340 Voice of Vietnam M Sunday Show

SWL, MEDIA & COMMUNICATIONS
0300 HCJB Ecuador S DX Partyline
KWHR Hawaii M DXing with Cumbre
WBCQ Maine S Pocket Calculator
0310 R. New Zealand Int. H RNZI Talk (biweekly)
0330 WHRA Maine S DXing with Cumbre (7580 kHz)
WHRI Indiana M DXing with Cumbre (5745 kHz)
WWCR Tennessee S World of Radio (5070 kHz)
0340 R. Habana Cuba S/W DXers Unlimited
0345 R. Bulgaria S R. Bulgaria Calling
0350 R. Budapest A DX Corner

LISTENER CONTACT/INTERACTIVE
0300 HCJB Ecuador M Musical Mailbag
0305 R. Australia S Feedback
0310 R. New Zealand Int. H Mailbox (biweekly)
0311 Voice of Russia S/M/H Moscow Mailbag
0330 China R. Int. A Listeners' Garden
HCJB Ecuador S Saludos Amigos
R. Sweden M In Touch with Stockholm (1st wk.)
R. Taipei Int. A Mailbag Time
0335 R. Budapest M And the Gatepost (monthly)
0340 R. Habana Cuba M Mailbag Show
0345 Voice of Vietnam H Letterbox
0346 Voice of Russia S You Write to Moscow

SPORT
0300 R. Australia S/A Grandstand (live action)*
R. New Zealand Int. S/A Live Sport (occasional)
0310 R. Australia M-F Regional Sports Report
0320 BBCWS(am) D Sports Roundup
0330 Deutsche Welle F Hard to Beat: The World of Sport
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 / 11pm E / 8pm P - Page 45 Freqs

NEWSCASTS (*extended)
0400 BBCWS(am) S/M The World Today*
T-A News
China R. Int. O News & Reports
R. Australia D News
R. Habana Cuba D News
R. New Zealand Int. D News
R. Prague D News
RVi Belgium T-S News
Voice of Russia D News
0430 R. Netherlands S/M News

CURRENT AFFAIRS MAGAZINES/FEATURES
0400 R. for Peace Int T-A Democracy Now!
0405 R. New Zealand Int. M-F Checkpoint
0410 China R. Int. S Report on Developing Countries
0411 Voice of Russia M Sunday Panorama
T-A News & Views
0430 R. Netherlands T-A Newsline
0455 R. Netherlands S Insight (commentary)

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
0410 R. Prague F Economic Report
0413 RVi Belgium F Economics
0430 BBCWS(am) S Global Business
China R. Int. T Biz China

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0413 RVi Belgium W Green Society (ecology)
0415 China R. Int. A Cutting Edge
0430 R. Australia A The Buzz (technology)

ARTS AND CULTURE
0405 R. Australia S Pacific Focus-Arts
0410 R. Prague A The Arts
0413 RVi Belgium H/A Around the Arts
0420 China R. Int. S In the Spotlight
R. Prague M Readings from Czech Literature
A Away from Politics (poetry)
0430 R. Australia S The Arts
Voice of Russia W/F Russian history/culture program

LOCAL LIVES & VIEWS
0404 RVi Belgium T-A Flanders Today
0405 R. Prague S Magazine (local color)
M Letter from Prague
T-A Newsview
0408 RVi Belgium M Tourism in Flanders
0410 R. Prague T One on One (interview)
W Witness (oral history)
0413 RVi Belgium T Focus on Europe
0418 RVi Belgium H Around Town
A Tourism in Flanders
0420 R. Prague H Czechs in History or Spotlight (places)
0424 Voice of Russia M Russia: People and Events
0430 China R. Int. M People in the Know
W China Horizons
H Voices from Other Lands
F Life in China
HCJB Ecuador S Studio 9 Weekend
0432 Voice of Russia S Kaleidoscope (Russian events)
0435 R. Netherlands S Europe Unzipped

INFORMATIONAL FEATURES
0410 R. New Zealand Int. S Feature on religion/spirituality
0418 RVi Belgium F International Report
0430 BBCWS(am) T Development Management
H Heart and Soul (spiritual matters)
F Campaigning for Health
A Patterns of Faith (belief systems)
0432 Voice of Russia T/H/A 20th Century
0435 R Habana Cuba S The World of Stamps

MUSIC
0400 RVi Belgium S Music from Flanders
WBCQ(7415 kHz.) S Zombo's Mondo Record Party
0405 BBCWS(am) T Jazzmatazz
W Charlie Gillett (world)
H John Peel (eclectic)
F Composer of the Month
R. New Zealand Int. A Home Grown (NZ artists)
0410 R. Habana Cuba M From Habana
R. Prague S Saturday Music (a mix)
0424 RVi Belgium M-A Soundbox (Flemish rock/folk)
0430 R. Habana Cuba M The Jazz Place (or) Top Tens
0440 R. New Zealand Int S Jazz Spotlight

ENTERTAINMENT
0405 BBCWS(am) A Quote, Unquote (or other game or quiz)
WWCR Tennessee A Golden Age of Radio Theatre (3215 kHz)
0410 R. Australia M-F Margaret Throsby Interview
0430 BBCWS(am) M Westway Omnibus (drama serial)
0432 Voice of Russia M Audio Book Club
0445 BBCWS(am) T-A Off the Shelf (book readings)

SWL, MEDIA & COMMUNICATIONS
0400 HCJB Ecuador S Ham Radio Today
R. for Peace Int. S Counterspin
RVi Belgium M Radio World
WWCR Tennessee S Spectrum (5070 kHz)
0430 WHRI Indiana M DXing with Cumbre (7315 kHz)

LISTENER CONTACT/INTERACTIVE
0410 R. Prague M Mailbox
0414 RVi Belgium M Brussels 1043

0430 BBCWS(am) W Write On
China R. Int. A Listeners' Garden
0435 R. Netherlands M Sincerely Yours

SPORT
0400 R. Australia S/A Grandstand (live action)*
041B RVi Belgium T Sports
(*special on 9660, 12080, 17580, 21725 kHz. only.)

0500 UTC / 12am E / 9pm P - Page 45 Freqs

NEWSCASTS (*extended)
0500 BBCWS(am) S News
M-A The World Today*
China R. Int. D News & Reports
Deutsche Welle D News
R. Australia D News
R. Habana Cuba D News
R. Japan D News
R. New Zealand Int. D News
Voice of Russia D News
0530 Voice of Nigeria S/A News
0545 R. New Zealand Int. M-F Pacific News

CURRENT AFFAIRS MAGAZINES/FEATURES
0505 Deutsche Welle S Talking Point (journalists)
T-A Newslink
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
0530 Deutsche Welle T Insight (international affairs)
R. New Zealand Int. M-F Worldwatch
Voice of Nigeria M-F VON Scope
0540 R. Habana Cuba T/H/F Caribbean Outlook
A Weekly Review
0545 BBCWS(am) A Letter from America

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
0500 R. Netherlands A A Good Life (development)
0505 R. Australia A Pacific Focus-Business
0511 Voice of Russia H Newmarket
0515 Deutsche Welle S Money Talks
0530 BBCWS(am) A World Business Review
China R. Int. T Biz China
0545 R. Australia A Business Weekend

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0500 R. Netherlands T Research File
0511 Voice of Russia W/A Science and Engineering
0515 China R. Int. A Cutting Edge
0530 Deutsche Welle W Man and Environment
0550 R. Habana Cuba M Breakthrough

ARTS AND CULTURE
0505 R. New Zealand Int. M-F What's Going On?
0520 China R. Int. S In the Spotlight

LOCAL LIVES & VIEWS
0500 R. Netherlands S Amsterdam Forum (discussion)
M Dutch Horizons
0505 R. New Zealand Int. S Whenua (Maori magazine)
A Tagata o te Moana (Pacific magazine)
0530 China R. Int. M People in the Know
W China Horizons
H Voices from Other Lands
F Life in China
Deutsche Welle H Living in Germany
0532 Voice of Russia W Moscow Yesterday and Today

INFORMATIONAL FEATURES
0500 R. Netherlands H Documentary
F The Sound Fountain (soundscapes)
R. for Peace Int. H Alternative Radio

Shortwave Guide

0505	Deutsche Welle	M	Religian and Society
0515	Deutsche Welle	M	Cool! (youth magazine)
0530	Deutsche Welle	A	German by Radio
	HCJB Ecuador	T-A	Family Life Today
	R. Australia	A	Lingua Franca (about language)

MUSIC

0500	R. Netherlands	W	Music 52-15 (world/folk)
	Voice of Nigeria	M-F	Wave Train
		A	African Safari
0505	Voice of Nigeria	S	Link-Up (requests)
0510	R. Japan	S	Pop Joins the World
0511	Voice of Russia	S/M	Musical Portraits
0530	R. Australia	S	Fine Music Australia (classical)
0532	Voice of Russia	M	Jazz Show
		T	Music Around Us
		H	Folk Box
0547	Voice of Russia	T	Music At Your Request

ENTERTAINMENT

0500	WBCQ Maine	M-A	Amos 'n Andy (classic comedy)
0505	BBCWS(am)	M	Wright Round the World (requests)
0532	Voice of Russia	F	Audio Book Club
		S/A	Timelines

SWL, MEDIA & COMMUNICATIONS

0500	WBCQ Maine	S	Tom & Darryl
	WWCR Tennessee	S	Cyber Line (digital)
0515	WBCQ Maine	M	World of Radio
0530	WHRA Maine	A	DXing with Cumbre (7580 kHz)
	R. for Peace Int.	S	Continent of Media
0540	R. Habana Cuba	S/W	DXers Unlimited

LISTENER CONTACT/INTERACTIVE

0510	R. Japan	A	Hello from Tokyo
0511	Voice of Russia	T/F	Moscow Mailbag
0530	China R. Int.	A	Listeners' Garden
0540	R. Habana Cuba	M	Mailbag Show

SPORT

0500	R. Australia	S/A	Grandstand (live actian)*
0505	R. Australia	A	Pacific Focus-Sport
0530	Deutsche Welle	F	Hard to Beat: The World of Sport
0535	R. Habana Cuba	T-A	Time Out
	R. New Zealand Int.	S/A	Live Sport (an occasian)

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

0600 UTC / 1am E / 10pm P - Page 46 Freqs

NEWSCASTS (*extended)

0600	R. Australia	0	News
	R. Habana Cuba	0	News
	R. Japan	0	News
	R. New Zealand Int.	0	News
0630	Voice of Nigeria	M-F	News*

CURRENT AFFAIRS MAGAZINES/FEATURES

0615	R. Japan	M-F	Asian Tap News (region's radio)
0630	Voice of Nigeria	S/A	Weekly Analysis

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0615	Voice of Nigeria	W	Wheel of Progress

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0605	R. New Zealand Int.	M	Eureka International
0630	R. New Zealand Int.	M	Health [or] Environment Matters
		T	Digital Life
0635	R. Australia	S	Ockham's Razor (science opinian)

ARTS AND CULTURE

0600	Voice of Nigeria	F	African Writers
0630	R. New Zealand Int.	H	Bookmarks
	Voice of Nigeria	H	World of the Arts

LOCAL LIVES & VIEWS

0600	Voice of Nigeria	W	Nigerian Newsletter
		H	West African Scene
0605	R. New Zealand Int.	T-H	Today in Parliament
		F	Country Life
0610	R. Japan	S	Weekend Square
0615	Voice of Nigeria	M	Nigeria & Politics
		T	Nigerian Scene
		F	Images of Nigeria
0620	R. Australia	M-F	Pacific Focus
0635	R. New Zealand Int.	S	This Week in Parliament

INFORMATIONAL FEATURES

0605	R. Australia	S	The Europeans
	R. New Zealand Int.	S	One in Five (disabilities)
0625	R. Japan	T	Let's Try Japanese
		H	Brush Up Your Japonese
0635	R. Habana Cuba	S	World of Stamps

MUSIC

0605	R. New Zealand Int.	W	Musical Chairs (artist feature)
0610	R. Habana Cuba	M	From Havana (Cuban musicians)
	R. Japan	A	Pop Joins the World
0625	R. Japan	M	Japan Music Log
		W	Japan Musical Treasure Box
		F	Music Beat (pop)
0630	R. Australia	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 Maine	S	Juliet's Wild Kingdom
0605	R. New Zealand Int.	A	Saturday Night (variety)

SWL, MEDIA & COMMUNICATIONS

0600	KWHR Hawaii	A	DXing with Cumbre (17780 kHz)
	R. for Peace Int.	S	World of Radio
	WHRI Indiana	A	DXing with Cumbre
0630	R. for Peace Int.	M	World of Radio
		W	Counterspin

LISTENER CONTACT/INTERACTIVE

0605	R. Australia	S	Feedback
0615	Voice of Nigeria	S	Listeners' Letters
0630	R. for Peace Int.	S	RFPI Mailbag

SPORT

0600	R. Australia	S/A	Grandstand (live action)*
0610	R. Australia	M-F	Regional Sports Report
0630	R. New Zealand Int.	F	Sports Story
0635	R. New Zealand Int.	S/A	Live Sport (on occasion)

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

1000 UTC / 5am E / 2am P - Page 48 Freqs

NEWSCASTS (*extended)

1000	BBCWS(am)	S/A	World Briefing*
		M-F	World Update*
	R. Australia	0	News
	R. New Zealand Int.	0	News
	VOA News Now	0	News & Reports*

CURRENT AFFAIRS MAGAZINES/FEATURES

1005	R. Australia	M-F	Asia Pacific
1030	BBCWS(am)	A	Agenda (trends)
1034	VOA News Now	F/A	On the Line (US foreign policy)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1005	R. Australia	S	The Buzz (technology issues)
1030	R. Australia	M	Health Report

LOCAL LIVES & VIEWS

1005	R. Australia	A	Pacific Review
1030	R. Australia	S	Rural Reporter
1034	VOA News Now	S-H	Main Street

INFORMATIONAL FEATURES

1030	BBCWS(am)	S	Reporting Religion
	R. Australia	T	Law Report
		W	Religian Report
		A	Small & Medium Business (13-part series)

MUSIC

1005	R. New Zealand Int.	S	Nightcap
		M	Jazz Profiles
		T/A	Music Ôtil Midnight
		W	In a Mellow Tone
		H	Beale Street Caravan (jazz)
		F	The Mix

ENTERTAINMENT

1030	WWCR Tennessee	M	The Old Record Shop (vintage recordings)

LISTENER CONTACT/INTERACTIVE

1045	WWCR Tennessee	F	Ask WWCR

SWL, MEDIA & COMMUNICATIONS

1000	KWHR Hawaii	A	DXing with Cumbre (11565 kHz)
1030	R. Australia	H	Media Report
	WWCR Tennessee	W	World of Radio (9475 kHz)
1040	VOA News Now	S	Kim Elliott (w/in *Main St.*, time approx.)

SPORT

1020	BBCWS(am)	S/A	Sports Roundup
1030	R. Australia	F	Sports Factor

1100 UTC / 6am E / 3am P - Page 48 Freqs

NEWSCASTS (*extended)

1100	BBCWS(am)	0	World Briefing*
	BBCWS(eas)	M-F	News
		S/A	World Briefing*
	R. Australia	D	News
	R. Japan	D	News
	R. New Zealand Int.	0	News
1120	BBCWS(am)	0	British News
	BBCWS(eas)	S/A	British News
1130	HCJB Ecuador	M-F	Latin American & World News
	R. Korea Int.	D	News
	R. Netherlands	S/A	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1105	BBCWS(am)	M-F	Caribbean Morning Report
	R. Australia	S	Correspondents' Report
		M-F	Asia Pacific
	R. New Zealand Int.	M-H	Nine to Noon
1115	R. Japan	M-F	Asian Tap News (region's radio)
1130	BBCWS(am)	S	Assignment
	BBCWS(eas)	A	Analysis
	R. Netherlands	M-F	Newsline
1135	R. Netherlands	S	Wide Angle (one topic examined)
1145	R. Korea Int.	M-F	Seoul Calling

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

1130	BBCWS(am)	M-F	World Business Report
		A	World Business Review
	R. Australia	S	Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1105	BBCWS(eas)	M	Health Matters
		T	Go Digital
		W	Discovery (research)
		H	One Planet (ecology)
		F	Science in Action

LOCAL LIVES & VIEWS

1105	R. New Zealand Int.	S/A	NZ Forces Radio
1110	WWCR Tennessee	S	A View from Europe (5070 kHz)
1115	BBCWS(am)	M-F	Caribbean Magazine
1135	R. Australia	M-F	Bush Telegraph (rural life)
	R. Netherlands	A	Europe Unzipped
1155	R. Netherlands	A	Insight (commentary)

INFORMATIONAL FEATURES

1125	R. Japan	T	Let's Learn Japonese
		H	Brush Up Your Japanese
1130	BBCWS(eas)	M	Everywoman
		T	Omnibus (documentary)
		H	The Way We Are [or] Documentary
		F	Documentaries

MUSIC

1110	R. Japan	A	Pop Joins the World
1125	R. Japan	M	Japan Music Log
		W	Japan Musical Treasure Box
		F	Music Beat (pop)
1130	R. Australia	A	Fine Music Australia (classical)
	R. New Zealand Int.	F	Top 5
1140	R. Korea Int.	S	Korean Pop Interactive

ENTERTAINMENT

1130	BBCWS(eas)	S	Play of the Week (radio theatre)
1130	HCJB	M-F	Morning in the Mountains

Shortwave Guide

LISTENER CONTACT/INTERACTIVE

1110	R. Japan	S	Hello From Tokyo
1115	WWCR Tennessee	S	Ask WWCR (15825 kHz)
1140	R. Korea Int.	A	Friendship Unlimited

SPORT

1105	R. New Zealand Int.	F	Sports Story
1110	BBCWS(am)	M-F	Caribbean Sport
1130	BBCWS(eas)	W	Sports International
	R. Australia	M-F	Regional Sports Report
1145	BBCWS(am)	M-H/A	Sports Roundup
	BBCWS(am)	F	Football Extra
	BBCWS(eas)	S	Sports Roundup

1200 UTC / 7am E / 4am P - Page 48 Freqs

NEWSCASTS (*extended)

1200	BBCWS(am)	D	Newshour*
	BBCWS(eas)	M-A	News
	HCJB Ecuador	M-F	Latin American & World News
	R. Australia	D	News
	R. New Zealand Int.	S/A	News
		M-F	Late Edition*
1230	HCJB Ecuador	M-F	Latin American & World News

CURRENT AFFAIRS MAGAZINES/FEATURES

1205	BBCWS(eas)	M-F	Outlook (magazine)
1210	BBCWS(am)	M-F	Caribbean Morning Report
1230	BBCWS(eas)	S	Assignment
	R. Sweden	M-F	60 Degrees North

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

1200	R. Netherlands	T	A Good Life (development issues)
1205	BBCWS(am)	M-F	Caribbean Business
1230	R. Netherlands	F	A Good Life (development issues)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1200	R. Netherlands	H	Research File
1230	R. Netherlands	M	Research File
1245	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (3rd wk.)

ARTS AND CULTURE

1230	R. Sweden	A	Spectrum (3rd wk.)

LOCAL LIVES & VIEWS

1200	R. Netherlands	M	EuroQuest
		W	Dutch Horizons
1205	R. Australia	M-H	Late Night Live (discussion)
	R. New Zealand Int.	A	NZ Forces Radio
1210	WWCR Tennessee	A	A View from Europe (15825 kHz)
1230	R. Netherlands	S	Dutch Horizons
	R.Sweden	A	Network Europe (Europe magazine-1st wk.)
			Sweden Today (2nd)
			Studio 49 (discussion-4th)
1245	R. Sweden	T	Close-Up (profiles-1st/3rd wk)
		H	Nordic Report (1st)
			The S-Files (things Swedish-4th)
		F	Review of the Newsweek

INFORMATIONAL FEATURES

1200	R. Netherlands	S	The Sound Fountain
		F	Documentary
		A	Amsterdam Forum (discussion)
1205	R. Australia	A	The Spirit of Things (spiritual matters)
1220	HCJB Ecuador	M-F	Mission Network News
1230	R. Netherlands	W	Documentary
		H	The Sound Fountain
1245	BBCWS(eas)	T	Heart & Soul (spiritual matters)
		H	What's the Problem? (advice)

MUSIC

1205	R. Australia	S	Nocturne (night music)
		F	Sound Quality (innovative)
	WWCR Tennessee	A	Rock the Universe (Christian rock)
1230	R. Netherlands	T/A	Music 52-15 (international)
	R. Sweden	S	Sounds Nordic (rock-exc. 1st wk.)

ENTERTAINMENT

1200	BBCWS(eas)	S	Play of the Week (from 1130)
	HCJB Ecuador	M-F	Morning in the Mountains (from 1130)
		A	Adventures in Odyssey (children's stories)
1205	BBCWS(eas)	A	Quote, Unquote (or other game/quiz)
1230	BBCWS(eas)	A	Pick of the World
1245	BBCWS(eas)	W/F	Westway (drama serial)

SWL, MEDIA & COMMUNICATIONS

1200	R. for Peace Int.	S	World of Radio
1230	R. for Peace Int.	M	World of Radio
		W	Counterspin

LISTENER CONTACT/INTERACTIVE

1230	R. Sweden	S	In Touch with Stockholm (1st wk.)
1245	BBCWS(eas)	M	Write On

SPORT

1205	HCJB	M-F	Sports News
	R. New Zealand Int	S	Sportsworld (weekend review)
1245	R. Sweden	M	Sportscan

1300 UTC / 8am E / 5am P - Page 48 Freqs

NEWSCASTS

1300	BBCWS(am)	O	News
	BBCWS(eas)	D	Newshour*
	China R. Int.	D	News & Reports*
	R. Australia	O	News
	R. Canada Int.	M-F	News
	R. Netherlands	S/A	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1300	R. Netherlands	M-F	Newsline
1305	BBCWS(am)	M-F	Outlook
	R. Canada Int.	M-F	The Current
1310	China R. Int.	S	Report on Developing Countries
1330	R. Sweden	M-F	60 Degrees North

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

1315	R. Australia	M-F	Dust & Dollars (market report)
1330	China R. Int.	T	Biz China
1350	BBCWS(eas)	M-F	World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1305	R. Australia	A	The Science Show
1315	China R. Int.	A	Cutting Edge
1345	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)

Arts/Culture

1320	China R. Int.	S	In the Spotlight
1330	R. Sweden	A	Spectrum (3rd Sat.)

LOCAL LIVES & VIEWS

1305	R. Netherlands	A	Europe Unzipped
1330	China R. Int.	M	People in the Know
		W	China Horizons
		H	Voices from Other Lands
		F	Life in China
	HCJB Ecuador	A	Studio 9 Weekend
	R. Sweden	A	Network Europe (magazine-1st wk)
			Sweden Today (2nd wk.)
			Studio 49 (discussion-4th wk.)
1345	R. Sweden	T	Close Up (profiles - 3rd wk.)
		H	Nordic Report (1st wk.)
			The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek

INFORMATIONAL FEATURES

1300	R. for Peace Int.	T	Disability Radio Worldwide
1330	BBCWS(am)	S	In Praise of God (religious service)
	HCJB Ecuador	M-F	Family Life Today
	R. for Peace Int.	S	Alternative Radio

MUSIC

1305	BBCWS(am)	S	Composer of the Month
	R. Australia	S	Nocturne (from 1205)
	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 Tennessee	S	Rock the Universe (Christian rock-5070 kHz)
1320	R. Australia	M-F	The Planet (international)
1330	BBCWS(am)	S	The Music Feature
	R. Sweden	S	Sounds Nordic (rock/pop-exc. 1st wk.)
	WWCR Tennessee	T	Musical Memories (15825 kHz)

ENTERTAINMENT

1345	BBCWS(am)	M-F	Off the Shelf (book readings)

SWL, MEDIA & COMMUNICATIONS

1300	R. for Peace Int.	W	World of Radio
		F	Far Right Radio Review
		A	Continent of Media
	WHRI Indiana	A	DXing with Cumbre (9840 kHz)
1330	R. for Peace Int.	A	World of Radio
	WHRI Indiana	A	DXing with Cumbre (15105 kHz)

LISTENER CONTACT/INTERACTIVE

1305	R. Netherlands	S	Sincerely Yours
1330	China R. Int.	A	Listeners' Garden
	R. for Peace Int.	W	RFPI Mailbag
	R. Sweden	S	In Touch with Stockholm (1st wk.)

SPORT

1305	BBCWS(am)	A	World Football (magazine)
1310	R. Australia	M-F	Regional Sports Report
1345	R. Sweden	M	Sportscan

1400 UTC / 9am E / 6am P - Page 48 Freqs

NEWSCASTS (*extended)

1400	BBCWS(am)	D	News
	BBCWS(eas)	S/A	News
	China R. Int.	O	News & Reports*
	R. Australia	D	News
	R. Canada Int.	D	News
	R. Japan	D	News
	R. Prague	D	News
1430	BBCWS(eas)	M-F	British News
	R. Netherlands	S/A	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1400	BBCWS(eas)	M-F	East Asia Today
1410	China R. Int.	S	Report on Developing Countries
1415	R. Japan	M-F	44 Minutes
1430	R. Netherlands	M-F	Newsline
	R. Sweden	M-F	60 Degrees North

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

1410	China R. Int.	T	Biz China
	R. Prague	H	Economic Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1415	China R. Int.	A	Cutting Edge
1445	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)

ARTS AND CULTURE

1405	BBCWS(am)	M	Meridian-Masterpiece (ideas)
		T	Meridian-Screen (cinema)
		W	Meridian-Writing (books)
		F	Arts in Action
	R. Australia	S	Books & Writing
1410	R. Prague	F	The Arts
1420	China R. Int.	S	In the Spotlight
	R. Prague	S	Readings from Czech Literature
		F	Away from Politics (poetry)
1430	R. Sweden	S	Spectrum (3rd wk.)

LOCAL LIVES & VIEWS

1405	HCJB Ecuador	A	Studio 9 Weekend (from 1330)
	R. Canada Int.	S	The Sunday Edition (interviews/documentaries)
		M-F	Sounds Like Canada
		A	The House (Parliament)
	R. Prague	S	Letter from Prague
		M-F	Newsview
		A	Insight Central Europe
1410	R. Japan	A	Weekend Square
	R. Prague	M	One on One (interview)
		T	Witness (oral history)
1420	R. Prague	W	Czechs in History [or] Spotlight (places)
1430	China R. Int.	M	People in the Know
		W	China Horizons
		H	Voices from Other Lands
		F	Life in China
	R Canada Int.	W	C'est la Vie (French Canada)
	R Sweden	A	Network Europe (Europe magazine-1st wk.)
			Sweden Today (2nd wk.)
			Studio 49 (discussion-4th wk.)

Shortwave Guide

1435	R. Netherlands	A	Europe Unzipped
1445	R. Sweden	T	Close Up (profiles-1st/3rd wk.)
		H	Nordic Report (1st wk.)
			The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek
1455	R. Netherlands	A	Insight (commentary)

INFORMATIONAL FEATURES

1400	R. for Peace Int.	S	Alternative Radio (from 1330)
		M	New Dimensions
		F	Disability Radio Worldwide
1405	BBCWS(am)	H	The Music Biz
	R. Australia	A	New Dimensions

MUSIC

1400	WWCR Tennessee	M-F	World Wide Country Radio (15825 kHz)
1405	R. Australia	M-F	The Planet (from 1320)
	R. Japan	S	Pop Joins the World
1430	BBCWS(am)	M	Charlie Gillett (world)
		T	UK Top 20
		W	Revolver (artist's choice)
		H	John Peel (eclectic)
		F	Jazzmatazz
	R. Sweden	S	Sounds Nordic (rock/pop-exc.1st wk.)

ENTERTAINMENT

1430	WWCR Tennessee	S	The Old Record Shop (vintage recordings)

SWL, MEDIA & COMMUNICATIONS

1400	R. for Peace Int.	W	Continent of Media
1430	R. for Peace Int.	S	For Right Radio Review

LISTENER CONTACT/INTERACTIVE

1400	R. for Peace Int.	A	RFPI Mailbag
1405	BBCWS(am)(eas)	S	Talking Point (current events call-in)
1410	R. Prague	S	Mailbox
1430	China R. Int.	A	Listeners' Garden
	R. Sweden	S	In Touch with Stockholm (1st wk.)
1435	R. Netherlands	S	Sincerely Yours

SPORT

1405	BBCWS(am)(eas)	A	Sportsworld (live action)
1445	R. Sweden	M	Sportscan
	BBCWS(eas)	M-H	Sports Roundup
		F	Football Extra

1500 UTC / 10am E / 7am P - Page 50 Freqs

NEWSCASTS

1500	BBCWS(am)	D	News
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1505	BBCWS(am)	S	From Our Own Correspondent
	R. Australia	M-F	Asia Pacific
1510	China R. Int.	S	Report on Developing Countries

BUSINESS/FINANCE (also in NEWSCASTS & Current Affairs)

1500	R. Netherlands	F	A Good Life (development issues)
1530	China R. Int.	T	Biz China
	R. Netherlands	T	A Good Life
1555	R. Australia	S	Business Weekend

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1500	R. Netherlands	M	Research File
1505	BBCWS(am)	M	One Planet (ecology)
		T	Science in Action
		W	Health Matters
		H	Go Digital
		F	Discovery (research)
1515	China R. Int.	A	Cutting Edge
1530	R. Australia	M	The Health Report
	R. Netherlands	H	Research File

ARTS AND CULTURE

1520	China R. Int.	S	In the Spotlight

LOCAL LIVES & VIEWS

1500	R. Netherlands	S	Dutch Horizons
1505	R. Canada Int.	S	The Sunday Edition (from 1405)
		M-F	Sounds Like Canada
1530	BBCWS(am)	S	People & Politics
	China R. Int.	M	People in the Know
		W	China Horizons
		H	Voices from Other Lands
		F	Life in China
	R. Australia	T	The Law Report
		W	The Religion Report
	R. Netherlands	M	EuroQuest
		W	Dutch Horizons

INFORMATIONAL FEATURES

1500	R. Netherlands	W	Documentary
		H	The Sound Fountain
1505	R. Australia	S	Encounter (spiritual beliefs)
	R. Canada Int.	M	Workology (about working)
		T-F	Out Front (first person views)
1530	BBCWS(am)	M	The Way We Are [or] Documentary
		T	Documentaries
		W	Everywoman
		H	Omnibus (documentary)
	R. Netherlands	S	The Sound Fountain
		F	Documentary

MUSIC

1500	R. Netherlands	T/A	Music 52-15 (international)
1505	R. Australia	A	Nocturne (night music)

ENTERTAINMENT

1505	R. Canada Int.	A	Vinyl Cafe (music/humor)

SWL, MEDIA & COMMUNICATIONS

1500	R. for Peace Int.	S	For Right Radio Review

LISTENER CONTACT/INTERACTIVE

1530	China R. Int.	A	Listeners' Garden

SPORT

1505	BBCWS(am)	A	Sportsworld (from 1405)
1530	BBCWS(am)	F	Sports International (magazine)
	R. Australia	F	The Sports Factor

1600 UTC / 11am E / 8am P - Page 50 Freqs

NEWSCASTS (*extended)

1600	BBCWS(am)	S	News Summary
		M-F	World Briefing*
		A	News
	R. Australia	D	News
	R. Canada Int	S/A	News
	R. Netherlands	S/A	News
1620	BBCWS(am)	M-F	British News

CURRENT AFFAIRS MAGAZINES/FEATURES

1600	R. Netherlands	M-F	Newsline
	R. for Peace Int.	M-F	Democracy Now!
1605	R. Netherlands	S	Wide Angle (one topic focus)
1630	BBCWS(am)	M/T/H/F	News Analysis
		W	From Our Own Correspondent
	R. Austria Int.	D	Report from Austria

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1605	R. Canada Int.	A	Quirks and Quarks

LOCAL LIVES & VIEWS

1605	R. Australia	S	The National Interest
		W	Verbatim (oral histories)
		H	Hindsight (history)
		F	Awaye! (Aboriginal culture)
	R. Canada Int.	S	The Sunday Edition (from 1405)
	R. Netherlands	A	Europe Unzipped
1630	R. Australia	W	Street Stories (Australian voices)
	R. Austria Int.	S	Letter from Austria
		A	Insight Central Europe
1635	R. Austria Int.	S	Network Europe

INFORMATIONAL FEATURES

1605	R. Australia	T	The Comfort Zone (homes/gardens/food)

MUSIC

1601	BBCWS(am)	S	Concert Hall
1605	R. Australia	A	Nocturne (from 1505)

ENTERTAINMENT

1605	R. Australia	M	Margaret Throsby (interviews)

SWL, MEDIA & COMMUNICATIONS

1600	KWHR Hawaii	A	DXing with Cumbre (9930 kHz)
	R. for Peace Int.	A	Counterspin
	WHRI Indiana	A	DXing with Cumbre (13760 kHz)

LISTENER CONTACT/INTERACTIVE

1650	R. Austria Int.	A	Postbox

SPORT

1605	BBCWS(am)	S/A	Sportsworld (live action)
1645	BBCWS(am)	M-F	Sports Roundup

1700 UTC / 12pm E / 9am P - Page 51 Freqs

NEWSCASTS (*extended)

1700	R. Australia	D	News
	R. Japan	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1700	R. Africa Int.	D	Reports, features, music
1715	R. Japan	M-F	44 Minutes

LOCAL LIVES & VIEWS

1705	R. Australia	M-F	Bush Telegraph (rural life)

INFORMATIONAL FEATURES

1700	R. for Peace Int.	W	Alternative Radio
1705	R. Australia	S	The Spirit of Things (spiritual matters)
		A	New Dimensions

MUSIC

1704	R. Austria Int.	S	My Music with Paul Cotty
1710	R. Japan	A	Pop Joins the World
1730	VOA Africa	S	Music Time in Africa
	WWCR Tennessee	A	Ken's Country Classics

SWL, MEDIA & COMMUNICATIONS

1730	R. for Peace Int.	A	Continent of Media

LISTENER CONTACT/INTERACTIVE

1706	VOA Africa	M-F	Talk to America (listener phone-in)
1710	R. Japan	S	Hello from Tokyo

2100 UTC / 4pm E / 1pm P - Page 53 Freqs

NEWSCASTS (*extended)

2100	BBCWS(am)	S/A	Newshour*
		M-F	News
	R. Australia	D	News
	R. Japan	D	News
	R. Prague	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

2110	R. Australia	S-H	AM (morning news magazine)
2115	R. Japan	M-F	Asian Top News (region's radio)
2130	WWCR Tennessee	A	Presidential Radio Address/Response (15825 kHz)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2105	BBCWS(am)	M	Science in Action
		T	Health Matters
		W	Go Digital
		H	Discovery (research)
		F	One Planet (ecology)
2130	R. Australia	M	Health Report
		T	Innovations

ARTS & CULTURE

2110	R. Prague	F	The Arts
2120	R. Prague	F	Away from Politics (poetry)

LOCAL LIVES & VIEWS

2105	BBCWS(am)	M-F	Caribbean Report*
	R. Australia	A	Australia All Over
	R. Prague	S	Letter from Prague
		M-F	Newsview
		A	Magazine (local color)
2110	R. Japan	A	Weekend Square
	R. Prague	M	One on One (interview)
		T	Witness (oral history)
2120	R. Prague	T	Talking Point
		W	Czechs in History [or] Spotlight (places)

Shortwave Guide

2130	BBCWS(am)	T/F	Calling the Falklands ^
	R. Australia	H	Rural Reporter

(*special service on 5975, 11675, 15390 kHz. only.)
(^ special service on 11680 kHz.)

INFORMATIONAL FEATURES

2115	R. Japan	T	Let's Learn Japanese
		H	Brush Up Your Japanese
2130	BBCWS(am)	M	Documentaries
		T	Everywoman
		W	Omnibus (documentary)
		F	The Way We Are [or] Documentary
	R. Australia	S	Small & Medium Business (13-part series)
		W	Religion Report

MUSIC

2100	WBCQ Maine	H-S	Radio Caroline
2105	R. Japan	S	Pop Joins the World
	VOA News Now	S/A	Jazz America
		M	American Gold (oldies)
		T	Roots & Branches (folk)
		W	Classic Rock
		H	Top 20
		F	Country Hits
2110	R. Prague	A	Saturday Music (a mix)
2125	R. Japan	M	Japan Music Log
		W	Japan Musical Treasure Box
		F	Music Beat
2130	R. Australia	F	Oz Sounds

ENTERTAINMENT

2100	WBCQ(7415kHz)	H-S	Radio Caroline

SWL, MEDIA & COMMUNICATIONS

2130	WWCR Tennessee	H	World of Radio (15825 kHz)

LISTENER CONTACT/INTERACTIVE

2105	R. Australia	F	Feedback
2130	WWCR Tennessee	F	Ask WWCR (15825 kHz)

SPORT

2130	BBCWS(am)	H	Sports International (magazine)

2200 UTC / 5pm E / 2pm P - Page 54 Freqs

NEWSCASTS (*extended)

2200	BBCWS(am)	S/A	The World Today*
		M-F	News
	R. Australia	O	News
2220	BBCWS(am)	M-F	British News
2230	R. Prague	D	News
	RVi Belgium	M-F	News

CURRENT AFFAIRS MAGAZINES/FEATURES

2200	R. for Peace Int.	M-F	Democracy Now!
2205	R. Australia	F	Asia Pacific
		A	Correspondents' Report
2210	R. Australia	S-H	AM (morning news magazine)
2230	BBCWS(am)	S	Agenda (trends)
	BBCWS(am)	A	From Our Own Correspondent
2243	RVi Belgium	M	Focus on Europe
2245	BBCWS(am)	M/T/H/F	Analysis
		W	From Our Own Correspondent
224B	RVi Belgium	H	International Report

BUSINESS/FINANCE (also in Newscasts & Current Affairs)

2205	BBCWS(am)	M-F	World Business Report
2243	RVi Belgium	H	Economics

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2243	RVi Belgium	T	Green Society (ecology)

ARTS AND CULTURE

2240	R. Prague	F	The Arts
2243	RVi Belgium	W/F	Around the Arts
2250	R. Prague	S	Readings from Czech Literature
		F	Away from Politics (poetry)

LOCAL LIVES & VIEWS

2234	RVi Belgium	M-F	Flanders Today
2235	R. Prague	S	Letter from Prague
		M-F	Newsview
		A	Insight Central Europe
223B	RVi Belgium	S	Tourism in Flanders
2240	R. Prague	M	One on One (interview)
		T	Witness (oral history)
224B	RVi Belgium	W	Around Town
		F	Tourism in Flanders
2250	R. Prague	T	Talking Point (Czech issues)
		W	Czechs in History [or] Spotlight (places)

MUSIC

2230	RVi Belgium	A	Music from Flanders
2240	R. Australia	S	Australian Music Show (rock)
		M	Music Deli (international)
		T	Blacktracker (Aboriginal contemporary)
		W	Australian Country Style
		H	Jazz Notes
2254	RVi Belgium	S-F	Soundbox

ENTERTAINMENT

2200	WBCQ(7415kHz)	S	Radio Free Euphoria
		M	Jean Shepherd
		F	Pan Global Wireless
		A	HorvZower
2230	WBCQ(7415kHz)	F	The Pab Sungenis Project

SWL, MEDIA & COMMUNICATIONS

2200	R. for Peace Int.	A	Counterspin
	WHRA Maine	F	DXing with Cumbre (17650 kHz)
	WHRI Indiana	S	DXing with Cumbre (5745 kHz)
2230	RVi Belgium	S	Radio World
	WHRA Maine	A	DXing with Cumbre (17650 kHz)

LISTENER CONTACT/INTERACTIVE

2240	R. Prague	S	Mailbox
2244	RVi Belgium	S	Brussels 1043

SPORT

2230	BBCWS(am)	M-F	Sports Roundup
224B	RVi Belgium	M	Sports

2300 UTC / 6pm E / 3pm P - Page 54 Freqs

NEWSCASTS (*extended)

2300	BBCWS(am)	D	The World Today*
	China R. Int.	D	News & Reports*
	R. Australia	D	News
	R. Canada Int.	M-F	The World at Six*
	R. New Zealand int.	S-H	Midday Report*
		F/A	News
2330	R. Netherlands	S/A	News
	R. Prague	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

2300	R. Canada Int.	S/A	The World This Weekend
2310	China R. Int.	A	Report on Developing Countries
	R. Australia	S-H	Asia Pacific
2330	R. Canada Int.	M-F	As It Happens
	R. Netherlands	M-F	Newsline

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

2330	BBCWS(am)	F	Global Business
	China R. Int.	M	Biz China
	R. Australia	A	Innovations
2340	R. Prague	H	Economic Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2305	R. Australia	A	Ockham's Razor (opinion)
2315	China R. Int.	F	Cutting Edge
2330	R. Australia	S	Earthbeat (ecology)
		M	The Buzz (technology)
		F	In Conversation

ARTS AND CULTURE

2320	China R. Int.	A	In the Spotlight
233D	R. Australia	T	The Arts on RA
2340	R. Prague	F	The Arts
2350	R. Prague	S	Readings from Czech Literature
		F	Away from Politics (poetry)

LOCAL LIVES & VIEWS

2312	R. New Zealand Int.	F	Focus on Politics
		A	This Week in Parliament
2330	China R. Int.	S	People in the Know
		T	China Horizons
		W	Voices from Other Lands
		H	Life in China
	R. Australia	W	Rural Reporter (outback)
	R. New Zealand Int.	A	Spectrum (life in NZ)
2335	R. Netherlands	A	Europe Unzipped
	R. Prague	S	Letter from Prague
		M-F	Newsview
		A	Magazine
2340	R. Prague	M	One on One (interview)
		T	Witness (oral history)
2350	R. Prague	T	Turning Point (Czech issues)
		W	Czechs in History [or] Spotlight (places)
2355	R. Netherlands	A	Insight (commentary)

INFORMATIONAL FEATURES

2300	R. for Peace Int.	W	Alternative Radio
2305	R. Australia	F	Lingua Franca (about language)
		A	All in the Mind (the brain)

MUSIC

2330	R. New Zealand Int.	F	The Sampler (latest CDs)
2340	R. Prague	A	Saturday Music (a mix)

ENTERTAINMENT

2300	WBCQ Maine	A	Radio Timtron Worldwide
2330	BBCWS(am)	A	Pick of the World
	R. Canada Int.	A	Madly Off in All Directions (comedy/satire)
	WBCQ Maine	W	Goddess Irina I Music Show
		H	Uncle Ed's Musical Memories
		F	WDCD

SWL, MEDIA & COMMUNICATIONS

2300	WBCQ Maine	W	World of Radio
2330	R. Australia	H	Media Report
	R. for Peace Int.	A	Continent of Media
	WWRI Indiana	A	DXing with Cumbre (9495 kHz)

LISTENER CONTACT/INTERACTIVE

2330	China R. Int.	F	Listeners' Garden
2335	R. Netherlands	S	Sincerely Yours
2340	R. Prague	S	Mailbox

SPORT

2330	R. Canada Int.	S	The Inside Track

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Bob Fraser, Cohasset, MA; Harold Frodge, Midland, MI; Glenn Hauser, Enid, OK; Bob Thomas, Bridgeport, CT; Harold Sellers, *BBC On Air; BCL News; BCDXC; Cumbre DX; DXA; DX Listening Digest; ODXA/DX Ontario; Fineware; Hard Core DX ; HFCC; ILG; NASWA; NASWA Flash Sheet; RFPI; World of Radio; Worldwide DX Club.*

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Monitoring the German Military

The United States isn't the only military service that has a large presence in the shortwave radio spectrum. Several countries (especially European) have extensive High Frequency (HF) frequency networks in use by their military services.

One of the larger HF radio networks is used by the "Bundeswehr" or Federal Republic Armed Forces of Germany.

In the summer of 1955, ten years after the Nazi surrender and the end of World War II, the West German Bundestag (lower house of parliament) voted to authorize the recruitment of volunteers for the initial formation of the Bundeswehr (Federal Armed Forces). Later in the year, a cadre of about 100 officers and noncommissioned officers (NCOs) were sworn in at a ceremony in Bonn. Most of the initial volunteers were veterans of the World War II Wehrmacht who had been serving in the Federal Border Force (Bundesgrenzschutz - BGS) since the inception of that lightly armed organization in 1951.

Training facilities and equipment were made available by the United States Army, and 1,500 volunteers reported for the first training cycle, which began in January 1956. The Bundestag soon promulgated compulsory military service. By the end of the year, the force numbered about 65,000, including 10,000 volunteers from the BGS, almost all of whom were war veterans. The reappearance of a German armed force, which would have been inconceivable a decade earlier, had become a reality as a direct result of the Cold War.

❖ German Air Force

The German Air Force (Luftwaffe) has faced dramatic changes in structure and strategic concepts in recent years as a result of the diminished threat in Central Europe and shrinking budgetary resources for modernized weapons systems. Prior to the demise of the Warsaw Pact, the air force had as its primary mission the air defense of Central Europe in conjunction with other NATO air forces.

The new security environment in Europe has brought a change in tasks for the Luftwaffe. With the absorption of the former East Germany, the national airspace that had to be patrolled increased substantially. With a major confrontation in Central Europe now only a slight possibility, the Luftwaffe has had to adjust its missions to take account of the possibility of involvement in conflict beyond the borders of Europe and in unstable regions within Europe.

The frequencies below are used by station DHM91 – Munster German Air Force Transport Command headquarters in northern Germany. The primary frequency in this network appears to be Echo on 5687.0 kHz. Stations have been heard discussing frequencies AA, AC, AF and AJ, which carry encrypted RTTY transmissions. The net below uses the upper sideband (USB) mode.

Station DHO37 (LTrspGeschw 62 FüGrp 1 – Wunstorf) has been reported on 5687.0 and 11217.0 kHz.

Freq (kHz)	Designation
3107.0	Alpha
3143.0	Bravo
3903.0	Charlie
4721.0	Delta
5687.0	Echo (Primary)
5717.0	Foxtrot
6700.0	Golf
6715.0	Hotel
6730.0	India
6751.0	Juliet
8965.0	Kilo
9025.0	Lima
11217.0	Mike
11265.0	November
13203.0	Oscar
13233.0	Papa
15073.0	Quebec
17973.0	Romeo
17991.0	Sierra
18012.0	Tango
23201.0	Uniform
23215.0	Victor
23255.0	Whisky
23318.0	X-ray
23341.0	Yankee
23345.0	Zulu
29724.0	Alpha-Bravo

Digital Systems

Two digital systems associated with the German Air Force have been discovered in the HF spectrum. The 2400 baud PSK digital transmission system below was uncovered by famed utility monitor Leif Dehio in Germany

DASA/EADS-MAHRS 2400 bd burst PSK/STANAG 4285:
6949.0 6958.5 7543.0 7630.0 7729.0 7810.0 7814.0 7823.0 7995.0 8070.0 8139.0 9051.0 10926.5 11136.5 12273.0 13502.0 14613.5 kHz

There have been several reports on the WUN newsgroup reflector of an ARQ-E teleprinter system associated with the Luftwaffe. Three frequencies have been reported – 3858.5 4782.5 4798.0 kHz

❖ German Navy

The primary areas of operation of the navy (Bundesmarine) in the event of war are the Baltic Sea and the North Sea. Until 1990 the navy's mission had been to block the Baltic approaches on behalf of NATO to prevent the deployment of the Soviet Baltic Fleet in the North Sea and the Atlantic Ocean.

Although lacking large surface units, the navy was well equipped to carry out intelligence and reconnaissance, mine countermeasure operations, and antisubmarine and antiship warfare. The navy regularly participated in NATO exercises as part of the Standing Naval Force Atlantic and Standing Naval Force Channel.

The political changes that unfolded in 1990 enabled the navy to reduce its concentration on the Baltic Sea and northern flank, shifting from defending against a tangible Warsaw Pact threat to preparing for a broader spectrum of maritime defense missions and tasks beyond home waters. The deployment of mine countermeasure vessels to the Mediterranean for NATO during the Persian Gulf crisis in 1990 and to the Persian Gulf after hostilities broke out in 1991, as well as Germany's participation in monitoring the naval blockade against Serbia in 1992, undoubtedly foreshadow other possible requirements distant from German coastal waters.

Although the navy is preparing for possible involvement in future multilateral and humanitarian missions, its primary task will continue to be to prevent attacking forces from controlling German territorial and adjacent waters.

Freq (kHz)	*Mode/Station/Frequency Designators*	
53.0	RTTY (75 bd/80 Hz shift)-DHJ59	
68.9	RTTY (75 bd/80 Hz shift)-DHJ58 (CINCGERFLEET)	
2265.9	RTTY-DHJ58	
2625.0	USB-DHJ59	MRL 59/02
3056.0	USB/RTTY-DHJ78/DHJ59	MATELO ARCN
3116.0	USB-DHJ59	MATELO ARCN
3122.0	USB/RTTY-DHJ58/DHM42 (Glücksburg Rescue)	
3590.0	RTTY-DHJ58	
3653.0	RTTY-DHJ58	
3718.6	RTTY-DHJ58	
4047.9	RTTY-DHJ58	
4154.3	USB/RTTY-DHJ59	MRL 59/04
4356.6	USB/RTTY-DHJ58	
4424.4	RTTY-DHJ58	
6727.0	USB/RTTY-DHJ59	MATELO ARCN
6730.0	USB/RTTY-DHJ59	MATELO ARCN 405
6779.0	USB-DHJ59	MRL 59/06
8335.3	USB/RTTY-DHJ59	MRL 59/08 (3 channel VFT)
10192.5	USB/RTTY-DHJ59	MRL 59/10
10206.2	USB/Stanag 4285 2400bd PSK-DHJ58	MRL 58/10
10711.0	USB/RTTY	
10722.0	USB/RTTY-DHJ59	MRL 59/11
11090.0	USB/RTTY	F-63
11235.0	USB-DHJ78	
11256.0	USB/RTTY-DHJ59	MATELO ARCN
12178.0	USB/RTTY-DHJ59	MRL 59/12
12415.3	USB-DHJ59	MRL 59/13
14722.0	RTTY PSK 600 baud	
15929.0	USB/RTTY-DHJ59	MRL 59/15
16129.0	USB/RTTY-DHJ58	MRL 58/16
17544.0	USB-DHJ59	MRL 59/17
17994.0	USB/RTTY-DHJ59	MATELO ARCN
22238.5	USB-DHJ59	MRL 59/23
23744.0	USB-DHJ59	MRL 59/25

Unidentified Frequencies

The following frequencies have been identified as German military, but little else has been established regarding the branch, location or frequency usage.

3166.5	German military ARQ-E 85.6/160 enciphered (probably German Air Force)
5836.0	JDQ6 working KK4V and 4QLD with practice messages via voice and data.
10312.0	Possible German navy net, USB/STANAG 4285 2400 baud PSK, KG-84 crypto traffic to station using 75 bps plus long interleaving.
10597.5	German military net MAHRS 2400 baud PSK system using EPM-mode.
10778.0	Unidentified German military station RS-ARQ 228.65Bd/ 170Hz exchanging lengthy traffic using KG-84 device 5 bit mode.

◆ German Coast Guard

The German coast guard on HF uses primarily the SITOR-A mode on the following frequencies: 2505.0 2671.3 2840.7 3829.3 4555.2 kHz. The primary coastal radio station appears to be located in Cuxhaven. Below is a listing of some of the German coast guard vessels that have been recently monitored

Callsign	*Ship*
DBEO	Bremen 3
DBFM	Meerkatze
DBFO	Seefalke
DBGL	Niedersachsen
DBIG	Bad Dueben
DBJM	Neuwerk
DLGQ	Neustadt
DLGU	Eschwege
DLGV	Alsfeld
DLGZ	Bredstedt
DLVB	Schleswig-Holstein
DLVF	Glückstadt
DLVG	Oldenburg
DLVH	Emden
DLVP	Kniepsand
DLVY	Hamburg

We have a very comprehensive list of German ground/shore military callsigns in Table 1.

Finally, I would like to thank Andreas Heymann, Leif Dehio, and several folks who wish to remain anonymous for their assistance in presenting this profile.

Until next time - 73 and good hunting.

Table 1- German Military Callsigns

Callsign	*Unit*	*Base*
DHJ23	NORTHAG	Mönchengladbach
DHJ36	NORTHAG	Mönchengladbach
OHJ37	CENTAG	Heidelberg
DHJ38	Fm/EloAufklRgt 220	Donauwörth
OHJ39	Heeresamt	Köln
DHJ40	HFlgBrig 3	Mendig
DHJ41	LTG 61 FÜGrp 1	Landsberg
DHJ42	LTG 61 FÜGrp 2	Landsberg
OHJ43	JaBoG 32	Lechfeld
DHJ44	III. Korps	Koblenz
DHJ46	I CATAC et FAFA	Lahr
DHJ47	2 ATAF	Mönchengladbach
DHJ48	4 ATAF	Ramstein
DHJ49	BMVg	Bonn/Berlin
DHJ50	I Korps	Münster
DHJ51	AfWG	St. Adelgund - Hochheid
DHJ53	MstpKdo	Warnemünde
DHJ54	MarA Landtestanlage	Bremen-Vegesack
DHJ55	HQ 7th (US) Army	Heidelberg
DHJ56	FüUstBrig 900	Rheinbach
DHJ57	Range Naval Radio	Schönhagen
DHJ58	MFmZ - MFmGrp 11	Glücksburg
DHJ59	MFmZ - MFmGrp 21	Wilhelmshoven - Seagwarden
OHJ60	KdoTrpVersM Abt FüMi	Eckernförde
DHJ61	MfmS	Flensburg
DHJ62	Naval Port Radio	Neustadt i.H.
DHj63	Range Naval Radio	Todendorf
DHJ64	DTA MND (C)	Mönchengladbach
DHJ65	UKdo 8	Zweibrücken
DHJ66	Submarine Naval Radio	Eckernförde
DHJ67	HöhKdoBeh LW GefSt	Köln
DHJ68	HQ CINCUSAFE	Wiesbaden
DHJ69	JaBoG 31	Nörvenich
DHJ70	MUKdo	Wilhelmshaven
DHJ72	4 ATAF	Kindsbach
DHJ73	II GE/US Korps	Ulm
DHJ74	Kdo 2 LwDiv	Birkenfeld
DHJ75	WBK IIL/7 PzDiv	Düsseldorf
DHJ76	MFG 5 Airbase	Kiel-Holtenau
OHJ77	HfFlgRgt 35	Mendig
DHJ78	MFG 3 Airbase	Nordholz
DHJ80	WBK IV/5 PzDiv	Mainz
DHJ81	PzLehrBrig 9	Munster
DHJ82	Naval Port Radio	Parow
OHJ83	HöhKdoBeh LW GefSt	Köln
DHJ84	Naval Radio	Wangerooge
DHJ85	PiBrig 20	Minden
DHJ86	Deutscher Wetterdienst - MilZentr	Offenbach
DHJ87	TerKdo Nord	Mönchengladbach
DHJ88	AfWG	Limsdorf
DHJ89	PzBrig 23	Augustdorf
DHJ90	LwUstGrpKdo Nord	Münster
DHJ91	British Army Of The Rhine (BAOR)	Mönchengladbach
DHJ92	CCFFA	Baden - Oos
DHJ93	CENTAG	Pirmosens
DHJ94	4. RCAF Fighter Wing	Sällingen
OHJ95	WBK VI/1 GebDiv	München
DHJ96	3. RCAF Fighter Wing	Zweibrücken
DHJ97	Sammelruf ALLE Funkstellen des aktuellen	Kreises
DHJ98	JaBoG 33	Büchel
DHJ99	KdoTrpVersM - Testsendungen	
DHM21	Naval Radio	Staberhuk
DHM22	MOS	Bremerhaven
OHM23	HFlgRgt 26	Roth
DHM24	FüUstBrig 4	Berlin
OHM25	LTrspKdo - FüUstGrp	Münster
DHM27	PzGrenBrig 41	Eggesin
DHM30	SOC	Brokzetel
OHM31	Naval Radio	List/Sylt
DHM33	MarsBetrb	Kiel
OHM35	Jochmannbrücke Radio (MarsBetrb)	Wilhelmshaven
DHM36	KdoMFüSys	Wilhelmshaven
OHM37	SOC	Uedem - Kalkar
DHM39	PzGrenBrig 38	Weißenfels
OHM41	MwaS	Kappeln Elleaberg
DHM42	Naval Radio	Glücksburg
DHM43	IV. Korps	
DHM44	GeophysBLtSt Süd	Fürstenfeldbruck
DHM45	MFmStab 70	Flensburg
DHM46	WBK V/10 PzDiv	Sigmoringen
DHM47	2. ATAF Air Base	Weeze - Laarbruch
DHM49	LogBrig 4	Unna
OHM50	LogBrig 2	Germersheim
DHM52	SanBrig 4	Fritzlar
OHM53	HFlgRgt 36	Fritzlar
DHM54	LwKdo Süd	Meßstetten
DHM55	W8K II/1. PzDiv	Hannover
DHM56	WBK VII/13 PzGrenDiv	
DHM57	HFlgRgt 15	Rheine
DHM58	1.CanAirDiv	Lahr
DHM60	KLK/4 Div	Regensburg
OHM61	PzGrenBrig 1/VBK 22	Hildesheim
DHM62	CINCENT	Erbeskopf
DHM64	Naval Radio	Darßer Ort
DHM65	MFuSSt	Dallerup
DHM66	MFuSSt	Friedrichsort
OHM67	MFuSSt	Hürup
DHM68		Frankenberg
DHM70	MFuSSt	Schortens
DHM71	PzBrig 18	Oldenburg
DHM72	GeophysBltSt Nord	Niederselk
DHM74	LLBrig 31	Oldenburg
DHM75	MFuESt	Lütjenholm
DHM76	MFuESt	Wittmund-Harlesiel
DHM79	Sammelanruf I. D/NL Korps	
DHM82	Forschungsanstalt der Bw für Wasserschall u. Geophys Kiel	
DHM85	MFuSSt	Marlow
DHM88	FmABw bzw. AfmISBw	Rheinbach
DHM89	2 ATAF Air Base	Brüggen - Brocht
DHM90	Comms Group	Lahr
DHM91	LTrspKdo - beitfunkstelle	Münster
DHM92	Sammelanruf II. Korps	
DHM95	1 Wing RCAF	Lahr
DHM97	NL Army	Dillingen
DHN21	2 ATAF	Rheindohlen
DHN22	2 ATAF	Rheindohlen
DHN23	WBK VIII/14 PzGrenDiv	
DHN24	PiBrig 40/VBK 41	Lohnstein
DHN31	Jagdgeschwader 71	Wittmundhafen
DHN41	GebJgBrig 23 Bad	Reichenholl
DHN43	PzGrenBrig 37	Frankenberg
DHN44	Jagdgeschwader 74	Neuburg
OHN45	PzGrenBrig 32	Schwonewede
DHN46	SanBrig 2	Ulm
DHN49	KrVtlSt bei MUKdo	Wilhelmshaven
DHN51	HFlgRgt 30	Niederstetten
DHN53	Naval Port Radio	Wilhelmshaven
DHN54	Fm/EloAufklRgt 320	Frankenberg
DHN55	UKdo 9	Philippsburg
OHN60	LwFüKdo	Köln-Wohn
DHN61	DTA LANDCENT	Heidelberg
DHN62	DTA ARRC	Mönchengladbach
DHN63	PzGrenBrig 19/VBK 33	Ahlen
DHN64	PzBrig 12	Amberg
DHN65	FmBtl 950 "Radio Andernoch"	Andernach
DHN66	MATO AEW Force Command	Geilenkirchen
DHN67	FmRgt 920	Kostellaun
DHN68	St/FmRgt 310	Koblenz
DHN69	NFlgRgt 16	Celle
DHN70	FmRgt 990 LANDCENT	Essen
DHN71	HFlgRgt 25	Laupheim
DHN72	HFlgRgt 6	Hohenlockstedt
DHN79	Erprobungsstelle der Bundeswehr 61	Monching
DHN81	PzGrenBrig 30	Ellwangen
OHN82	Marineunterwasserortungsstelle Marienleuchte	Fehmarn
OHN83	HFlgRgt 10	Fassberg
DHN84	PzBrig 14	Neustadt
OHN85	PzGrenBrig 5	Homberg - Efze
DHN90	PzGrenBrig 40/VBK 86	Schwerin
DHN92	LwKdo Nord	Kolkar
DHN95	PzBrig 39/VBK 71	Erfurt
DHN99	Fm/EloAufklRgt 940	Daun
DHO21	LLBrig 26	Saarlouis
DHO22	Aufklärungsgeschwader 51 Jagel - Krapp (Schleswig)	
DHO23	LTrspGeschw 51	Landsberg
OHO24	LTrspGeschw 63 FüGrp	Hahn (Rendsburg)
DHO27	JaBoG 49	Fürstenfeldbruck
OHO28	JaBoG 35	Pferdsfeld
DHO31	JaBoG 34	Memmingen
DHO32	LTrspGeschw 62	Wunstorf
DHO35	MFG 2 Funkstelle	Eggebeck (Torp)
DHO36	Flugbereitschaft der Lw beim BMVg	Bonn/Berlin
DHO37	LTrspGeschw 62 FüGrp 1	Wunstarf
DHO38	MFuSSt	Saterland-Ramsloh
OHO39	LTrspGeschw 62 FüGrp 2	Wunstarf
DHO41	NL Air Staff HQ	Hesepe
DHO42	Fm/EloAufklBrig 94	Daun
DHO43	Kdo. 4. LwDiv	Aurich
DHO45	PiBrig 10	Schleswig
DHO46	Naval Radio	Olpenitz
DHO47	SanBrig 1	Leer
OHO48	LogBrig 1	Lingen/Ems
DHO49	PiBrig 30	Hilden
DHO54	Fernmeldebereich 70	Trier
DHO59	PzBrig 36/VBK 64	Veitshöchheim
DHO60	LTrspGeschw 63	Hahn (Rendsburg)
OHO61	Pionierschule FSH Baut	Percha
DHO63	4 NLDiv	Bergen-Hahne
DHO64	PiBrig 50	Bogen
DHO65	LLBrig 25	Colw
DHO66	Naval Air Operations Center	Glücksburg
DHO67	PiLehrBrig 60	Ingolstadt
DHO69	Naval Radio	Eckernförde
DHO70	PzBrig 34	Diez
DHO71	Naval Radio	Arkona
OHO73	Naval Radio	Marienleuchte
DHO74	1 NL Korps	Seedorf (Zeven)
DHO75	Sammelrufzeichen Lufttransportkommando (Collective callsign for all the three Air Transport Wings)	
DHO76	DTA LANDJUT	Rendsburg
DHO77	JaBoG 36	Rheine - Hapsten
DHO78	Kdo 3 LwDiv /GAFSC "N"	Gatow
DHO79	Naval Radio	Helgoland
DHO80	Naval Port Radio	Olpenitz
DHO81	Naval Radio	Borkum
DHO82	PzBrig 42/VBK 84	Potsdam
DHO83	WBK I/6 PzGrenDiv	Kiel
DHO85	UKdo 4	Diez
DHO91	Kdo 1 LwDiv / GAFCSC "S"	Karlsruhe
DHO92	FüUstBrig 2	Ulm
DHO95	Naval Radio	Sahlenburg
DHO99	I BEL Corps	Köln-Weiden

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Tropical Trunking: Puerto Rico and Florida

With winter still covering much of the continental United States, this month we open the mailbag and start off with a letter from Puerto Rico. For those readers unfamiliar with this Caribbean island, Puerto Rico is a U.S. Commonwealth with a population of nearly four million people located about 1,000 miles southeast of Miami. Besides numerous trunked radio systems and a military listening post, Puerto Rico is home to the world's largest radiotelescope, located near the town of Arecibo.

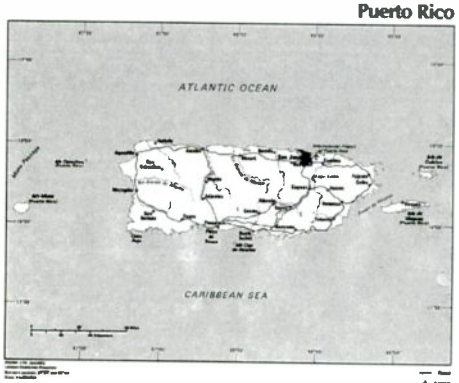
Hi! Let me first congratulate you for your website and also for your recent article in MT. Here in Puerto Rico there are no APCO-25 radio systems operating, but recently I was monitoring a frequency that was used by the Border Patrol and it looks like they have switched to digital. I compared the sound with the sound samples that are available on the web and the sound is the same. I have not heard of any Federal agencies that are APCO-25, do you have any information of this?

Thanks... Rafael

Puerto Rico does not currently have any municipal public safety agencies using APCO Project 25 (P-25) systems; however, it would not be surprising to hear a federal system down there.

As I reported in this column last November, the Department of Justice and the Department of the Treasury announced contract awards under a $3 billion program to provide APCO Project 25 equipment to federal law enforcement agencies. This Federal Project 25 Network will provide radio equipment and service for the Bureau of Alcohol, Tobacco and Firearms (BATF), the Customs Service, the Drug Enforcement Agency (DEA), the Federal Bureau of Investigation (FBI), the Immigration and Naturalization Service (INS), the Secret Service and the U.S. Marshals Service.

Puerto Rico



The INS has been involved in Project 25 systems for many years. They were the first to install and operate an encrypted P-25 voice and data system, put in place in May of 1998. Their Encrypted Voice Radio Program (EVRP) currently supports more than 32,000 radios and 1,400 repeater sites. Although EVRP uses the P-25 common air interface (CAI), it also uses Rapid Access Trunking (RAT) – a different method that does not require a separate control channel.

The INS has an operational EVRP in Puerto Rico, in what the INS refers to as their San Juan district. Unfortunately for scanner listeners, the system uses DES (Data Encryption Standard) encryption to protect the traffic channel contents.

Despite the lack of open P-25 systems, Puerto does have a few analog radio networks that are accessible.

The Puerto Rican government operates an M/A-COM (formerly Ericsson) LTR-MultiNet trunked radio system in several municipalities across the island. Towns and the associated frequencies (in logical channel order) are as follows:

Aguada	856.7125, 857.7125, 858.7125, 859.7125 and 860.7125 MHz
Aguas Buenas	856.4625, 857.4625, 858.4625, 859.4625 and 860.4625 MHz
Bayamon	854.9875, 855.2375, 855.4875, 855.7375, 855.9875, 856.7125, 856.7625, 857.7625, 858.7625, 859.7625 and 860.7625 MHz
Guayama	856.4875, 857.4875, 858.4875, 859.4875 and 860.4875 MHz
Gurabo	855.2125, 855.4625, 856.2625, 856.7375, 856.9375, 857.2625, 857.7375, 857.9375, 858.2625, 858.7375, 858.9375, 859.2625, 859.7375, 859.9375, 860.2625, 860.7375 and 860.9375 MHz
Jayuya	856.2625, 856.7375, 857.2625, 857.7375, 858.2625, 858.7375, 859.2625, 859.7375, 860.2625 and 860.7375 MHz
Luquillo	856.2375, 857.2375, 858.2375, 859.2375 and 860.2375 MHz
Maricao	856.4375, 857.4375, 858.4375, 859.4375 and 860.4375 MHz
San Juan	866.1500, 866.1750, 866.6625, 866.7250, 867.2250, 867.3875, 867.6625, 867.8875, 868.1375, 868.4125, 868.6375, 868.9125, and 868.9375 MHz
Santurce	856.2125, 857.2125, 858.2125, 859.2125, 860.2125 MHz

The Puerto Rico Electric Power Authority operates an EDACS system in a number of areas:

Cayey	854.9125, 855.1875, 855.4125, 855.6625 and 855.9375 MHz
Luquillo	856.3125, 856.4125, 857.3125, 857.4125, 858.3125, 858.4125, 859.3125, 859.4125, 860.4125, 860.4125 MHz
Maricao	856.4125, 857.4125, 858.4125, 859.4125 and 860.4125 MHz
Orocovis	856.2875, 857.2875, 858.2875, 859.2875 and 860.2875 MHz
Ponce	855.3625, 856.3625 and 857.3625 MHz
Rio Piedras	855.3625, 856.3625, 857.3625, 858.3625, 859.3625 and 860.3625
Rincon	856.3125, 857.3125, 858.3125, 859.3125 and 860.3125 MHz
Salinas	858.3625, 859.3625 and 860.3625 MHz
Villalba	855.3875, 856.3875, 857.3875, 858.3875, 859.3875 and 860.3875 MHz

The Department of the Navy has an installation near the town of Ceiba, on the eastern end of the island. Roosevelt Roads Naval Station operates a five-channel EDACS system in the UHF band, but I do not have any frequency listings or talkgroups for it.

◆ Future Uniden Product?

Enjoy the info you present on Digital Modulation and products to monitor same in MT.

Re Dec. 2002, page 73 - the new Bearcat 785D scanner with BCi25D digital card is not capable of monitoring ASTRO (et al) digital transmissions. Per your article on page 18, the scanner and card with 3600 baud rate does not support the 9600 baud rate for the ASTRO system

The Connecticut State Police are using the ASTRO system with digital voice and recently added MDTs. Do you anticipate Uniden will eventually produce a new plug in card for the 785 scanner that will accommodate 9600 baud, and/or 3600 and 9600? If so, is there a schedule date for product release?

Thanks, Dave

This is a common question on Internet discussion boards. Uniden's official position is presented in this statement:

APCO P-25 digital scanner will monitor three of the four types of APCO Project 25 systems: Conventional, Trunked at 3600 baud and Mixed Mode at 3600 baud. The APCO P-25 trunked system at 3600 baud is the most common P-25 system in operation today.

There are a few agencies using the APCO P-25 trunked system operating at 9600 baud deployed in the states of Michigan, Colorado, Minnesota, and the city of Austin, Texas. The ability to monitor these pure digital systems is still in development. Therefore, the first generation of APCO

P-25 scanners, BC250D, BC785D, and BCi25D will not monitor these systems.

Rest assured that the BC250D and BC785D are just the first in a family of Bearcat digital capable scanners to be produced by Uniden. As we continue to grow the family in this series, so will their coverage of various other digital signal systems.

Jennifer Ainsworth, Media & Trade Show Manager, Uniden America Corporation

The suspicion is that the scanner itself performs the trunk-tracking duties while the BCi25D card only converts the transmitted digital voice into an audible analog signal. If that is true, a new scanner (or an update to the scanner firmware) would be required to trunk-track 9600-baud P-25 systems.

So, to answer your questions, it appears Uniden will have a future product that can trunk track the 9600-baud P-25 control channel, but there is no schedule for when such a scanner would be available.

❖ Philadelphia, Pennsylvania

Philadelphia continues their transition to a new $51 million digital P-25 system, funded though a telephone surcharge of $1 per customer per month as well as additional tax money from the Philadelphia International Airport and the Water Revenue Department.

While most other cities have taken a generally positive and enlightened view toward scanner listeners, the Philadelphia radio system decision-makers have made public their distrust and contempt for anyone who might want to overhear their conversations. This attitude was recently expressed by Deputy Police Commissioner Charles Brennan, who was quoted as saying, "We have 600 radios that are encrypted, the rest of the stuff you should be able to hear. However, if it were up to me, I would encrypt everything. The police do not exist for people's amusement."

Even more incredible is Philadelphia's distinction of being the only city in the United States to encrypt their fire department transmissions.

The city's radio network is actually made up of two different systems, operating from ten towers. Interestingly, there are no in-vehicle radios – every user has a portable radio, although police cruisers will continue to operate mobile data terminals.

System One:
866.2875, 866.3625, 866.8375, 867.0625, 867.0875, 867.5625, 867.5875, 867.8625, 868.0625, 868.0875, 868.2875, 868.5875, 868.7875 and 868.8375 MHz.

Talkgroups:
3792 Fire, North (simulcast on 154.145)
3824 Fire, South (simulcast on 154.235)

System Two:
866.1000, 866.3375, 866.5875, 866.6875, 866.7875, 866.8125, 867.1125, 867.3500, 867.8125, 867.8375, 867.9375, 868.3125, 868.3375 and 868.5625 MHz.

Talkgroups:
16 Police, Far Northeast (simulcast on 453.40 MHz)
48 Police, Northeast (simulcast on 453.95 MHz)
112 Police, Central (simulcast on 453.15 MHz)
144 Police, South (simulcast on 453.65 MHz)
176 Police, East (simulcast on 453.30 MHz)
208 Police, North (simulcast on 453.05 MHz)
240 Police, Northwest (simulcast on 453.80 MHz)
368 Police, Alerts (simulcast 453.75 MHz)
400 Police, Traffic (simulcast on 453.25 MHz)

❖ Palm Beach County, Florida

Just got my copy of the December 2002 issue and read your article on trunking systems. Great idea!

Regarding Palm Beach County, the entire system is a Motorola Astro-CAI SmartZone system with four SmartZone cells. The sites you listed are all part of Cell #1's 10-site simulcast system, and is used only by County departments. Cell #2 is used by the city of Boca Raton, Cell #3 is used by the city of Boynton Beach, and Cell #4 is used by the city of Delray Beach.

Everything on Cell #1 is analog with the exception of SWAT, SRT, and OCB, all of whom also use Astro-CAI digital plus encryption for operations (they sometimes leave encryption turned off). On Cells 2 - 4, Police and Fire is all Astro-CAI digital except for Local Government, which is analog.

On all cells, talkgroups 16 to 8176 are Astro-CAI digital, while 8192 to 65520 are analog.

Also, Martin County, Florida, just went on the air with their new Motorola Astro-CAI system, which replaced their Multi-Net 2 system. Their frequencies:

866.0375, 866.2250, 866.2625, 866.3750, 866.5375, 866.5625, 866.6625, 866.7875, 867.1750, 867.6375, 867.6750, 867.8875, 868.1750, 868.3250, 868.5375, 868.5750

Police and Fire are Astro-CAI digital with Local Government analog. The city of Stuart is also on the system. Callsign is WPKX912, three sites.

Hope that helps! Brian in Florida

The four cells in the Palm Beach County system are:

Cell One
(Primary, 10 repeater sites)
856.3125, 856.3375, 857.3125, 857.3375, 858.3125, 858.3375, 859.3125, 859.3375, 860.3125, 860.3375, 866.1000, 866.1250, 866.3250, 866.3500, 866.6000, 866.6250, 866.7500, 866.8250, 867.1000, 867.3250, 867.3750, 867.5750, 867.7625, 868.2250, 868.3750, 868.6500, 868.7000 and 868.7250 MHz.

Cell Two
(Former Boca Raton 800 MHz conventional)
852.5625, 852.5875, 852.6125, 853.6375, 853.6625, 853.7875, 853.8125, 854.5875, 854.6625 and 854.6875 MHz.

Cell Three
(Former Boynton Beach Type 1)
856.2875, 857.2875, 858.2875, 859.2875 and 860.2875 MHz.

Cell Four
(Former Delray Beach UHF)
866.3750, 866.7750, 867.0750, 867.6750 and 868.1500 MHz.

Talkgroups:
5840 Boca Raton Police dispatch
6480 Boca Raton Fire dispatch
6512 Boca Raton Fire, Tacticol-1
6544 Boca Raton Fire, Tactical-2
55952 Boca Raton Lifeguards
7120 Boynton Beach Police Dispatch
7184 Boynton Beach Police car-to-car
7760 Boynton Beach Fire Dispatch
57328 Boynton Beach Lifeguards
3216 Delray Beach Police Dispatch
3280 Delray Beach Police Operations
3312 Delray Beach Police Operations
3824 Delray Beach Fire Dispatch
60176 Highland Beach Police
34192 Palm Beach County Fire, Main 1C
34224 Palm Beach County Fire Command 2A (North Tactical)
34416 Palm Beach County Fire Command 8A (South Tactical)
34608 Palm Beach County Fire Command 2B
34800 Palm Beach County Fire Command 8B
35568 Palm Beach County Fire Command 2C
63760 Palm Beach County Fire Law Enforcement Calling (Interagency)
63920 Palm Beach County Fire Common 1 (Interagency)
40080 Palm Beach County Lifeguards, North
40112 Palm Beach County Lifeguards, South
40368 Palm Beach County Public Works
26704 Palm Beach County Sheriff Dispatch, North (simulcast on 154.845 MHz)
26768 Palm Beach County Sheriff Dispatch, Central (simulcast on 154.725 MHz)
26832 Palm Beach County Sheriff Dispatch, South (simulcast on 154.785 MHz)
26928 Palm Beach County Sheriff Dispatch, West (simulcast on 154.815 MHz)
41296 Palm Transportation Buses Dispatch
61104 South Bay Police

That's all for this month. I welcome your questions and comments via e-mail at *dan @ signalharbor.com*, and I've got more information and links on my website at **http://www.signalharbor.com**. Until next month, happy monitoring!

PLANE TALK

Jean Baker
jeanbaker@monitoringtimes.com

Aero Frequencies and AirNav Live

Welcome aboard everyone. We have a lot of frequencies to look at and a new product to examine. Let's go!

KMSY (Louis Armstrong New Orleans International Airport)
APPROACH: 120.100 (Final), 123.850 (Southeast & South), 125.500 (West), 133.150 (North & East), 256.900 (Southeast & South), 290.300 (North & East), 256.900 (Southeast & South), 350.300 (West)
ATIS: 127.550
CLEARANCE DELIVERY: 127.200
DEPARTURE: 123.850 (Southeast & South), 125.500 (West), 133.150 (North & East), 256.900 (Southeast & South), 290.300 (North & East), 350.350 (West)
EMERGENCY: 121.500/243.000
GROUND CONTROL: 121.900/273.525
TOWER: 119.50/254.300
UNICOM: 122.950

KDEN (Denver International)
APPROACH: 119.300, 120.350, 307.300 (North), 120.350, 381.500 (South)
ATIS: 125.600 (Arr.), 132.025 (Dep.)
CLEARANCE DELIVERY: 118.750
DEPARTURE: 127.050/363.250 (North), 128.450/251.075 (South), 128.250/371.950 (East),
126.100/360.750 (West)
EMERGENCY: 121.500/243.000
GROUND CONTROL: 121.850, 127.500, 377.100, 380.300,
TOWER: 124.300, 133.300, 135.300, 239.275, 322.450

KZDV (Denver Center)
(R)* Ainswarth -127.950, 132.700, 338.200, 397.850;
Alamosa -128.375, 354.155, 377.050, 379.950;
Aspen – 119.850, 125.350, 132.850, 134.500, 306.900, 327.800, 354.050, 363.150;
Brush – 133.950, 317.550;
Casper – 133.675, 135.600, 322.500, 385.600;
Cherokee – 132.100, 254.350,
Cheyenne – 125.900, 132.100, 133.175, 134.575, 284.700, 307.100, 319.800, 350.300;
Colby – 127.650, 132.750, 288.050, 360.650;
Cortez – 118.575, 134.700, 348.700, 363.050;
Crawford – 127.950, 135.025, 239.050, 338.200;
Denver – 119.850, 125.950, 126.500, 125.875, 128.650, 132.850, 133.400, 225.400, 282.200, 306.900, 353.650, 363.150, 371.850, 387.150;
Durango – 118.575, 348.700;
Eastonville – 134.975, 263.000;
Farmington – 125.675, 128.125, 128.400, 132.650, 118.575, 134.850, 135.700, 290.400, 291.700, 307.800, 307.900, 319.000, 348.700, 352.000,380.159, 386.800;
Goodland – 132.500, 379.150,
Grand Island West – 132.700, 397.850;
Grand Junction – 134.500, 327. 800;
Grand Mesa – 125.350, 125.675, 125.725, 134.275, 134.500, 135.125, 275.300, 323.250, 327.800, 354.050, 380.150, 316.125;
Gunnisan – 125.350, 133.525, 319.000, 354.050;
Hanksville – 125.550, 133.600, 271.299m 343,950;
Hayden – 128.325, 134.500, 327.800, 397.875;
Hayes Center – 127. 025, 288.350;
Hill City – 132.500, 379.150;
Kremmling – 128.650, 132.850, 282.200. 306.900,
La Junta – 132.225, 128.375, 133.400. 134.125, 346.250, 354.150, 379.950, 387.150;
Laramie – 125.900, 284.700;
Lusk – 135.600, 385.600;
Medicine Bow – 126.500, 132.100, 133.175, 285.500, 254.350, 350.300;
Montrose – 125.350, 354.050;
North Platte – 132.700, 397.850,
Ogallala – 126.325, 132.700, 381.550, 397.850, 240.300, 269.600;
O'Neill – 128.000, 132.700, 135.025, 239.050, 385.500,397.850;
Pueblo – 128.375, 132.225, 135.450, 354.150, 377.050, 379.950;
Rapid City – 127.950, 338.200;
Rock Springs – 125.750, 128.500, 132.400, 327.800, 346.400, 380.200;
Sterling - 135.925, 225.400;
Sundonce – 133.675, 135.600, 322.500, 385.600;
Tuba City – 118.225, 127.550, 132.875, 296.700, 343.950, 353.950, 386.800;
Walton Peak – 126.500, 371.850

KATL (William B. Hartsfield Atlanta International Airport)
APPROACH: 126.900 (270-089), 127.900 (090-269, 118.350 (090-269), 127.250 (270-089)
ATIS: 119.650 (Arr), 125.550 (Dep)
CLEARANCE DELIVERY: 121.650
DEPARTURE: 125.000 (090-269), 125.700 (270-089)
EMERGENCY: 121.500/243.000
GROUND CONTROL: 121.750 (RWYS 9L & 27R &9R/27L, 121.900 (RWYS 8R/26L & 8L/26R) 381.600
TOWER: 119.100(RWYS 9R/27L & 9L/27R), 119.500(RWYS 08R/26L & 08L/26R, 123.850 (RWYS 09R/27L & 09L/27R), 125.325 (RWYS 08R/26L & 08L/26R), 381.6
RAMP SERVICE: RAMP #1-131.450, RAMP #2 – 131.850, RAMP #3 – 129.270, RAMP #4 – 129.370, RAMP #5 – 131.250
UNICOM: 122.95

KHOU (Houston Hobby Airport)
APPROACH: 120.050 (East), 124.350 (West), 134.45 (South)
ATIS: 124.600
CLEARANCE DELIVERY: 125.450
EMERGENCY: 121.500/243.000
FINAL: 119.100
GROUND CONTROL: 121.900
TOWER: 118.700/256.900

KDFW (Dallas – Fort Worth International Airport)
REGIONAL APPROACH: 119.875 (West), 125.025 (East), 284.650 (West), 319.250 (East), 133.525 (East), 133.625 (West)
ATIS: 123.775 (ARR), 135.925 (DEP)
CLEARANCE DELIVERY: 128.250
REGIONAL DEPARTURE: 118.550 (East), 124.825 (North), 125.125 (South), 126475 (West), 290.350 (East), 319.850 (South), 323.050 (North), 363.150 (West)
EMERGENCY: 121.500/243.000
GROUND:121.650 (East), 121.800 (East), 121.850 (West)
TOWER: 124.150 (West), 126.550 (East), 127.500 (East), 134.900 (West)
UNICOM: 122.950

KSTL (Lambert-St. Louis International Airport)
ANG OPS: 297.900
APPROACH: 132.150 (N/E), 128.100 (S/W), 338.25 (S/W), 360.6 (N/E)
ATIS: 119.925
CLEARANCE DELIVERY: 119.5/363.1
DEPARTURE: 119.150 (N/E), 128.10 (S/W), 307.050 (S/W), 335.5 (N/E), 124.250, 126.550, 270.350
GROUND CONTROL: 121.900, 348.600, 121.650, 306.200
TOWER: 118.500 (SOUTH), 120.050 (NORTH), 257.700 (SOUTH), 284.600 (NORTH).

KDSM (Des Moines International Airport)
ANG OPS:138.150/252.900
APPROACH: 123.900, 135.200, 307.150, 360.700, 118.600, 350.3
ATIS: 119.550/251.050
CLEARANCE DELIVERY: 134.150/317.550
DEPARTURE: 123.900, 135.200, 307.150, 360.700,
EMERGENCY: 121.500/243.000
GROUND CONTROL: 121.900/348.600
TOWER: 118.300/257.800

AirNav Live Flight Tracking

I have been an admirer of AirNav Systems for a long time, and I've really enjoyed using their products to enhance our aero monitoring hobby. Recently they released their latest program, AirNav Live Flight Tracking, and I couldn't wait to try it. I was not disappointed, to say the least. This is realtime flight tracking at its best – no one does it better.

You can track any flight over the USA, Canada, and other regions of the world with only an internet connection ad a few clicks of your mouse; it's that easy to use. Multi-win-

dow capability doubles and triples the tracking action! You can also see the layout of all the runways of any airport selected; this enables you to see just how approaches are accomplished.

Just look at some of the features this software brings home to you:

- Airline and General Aviation flights tracked
- Track an individual flight from origin to destination
- Airport Information Window
- Superior graphics and interface (*they're outstanding-jb*)
- Realtime flight tracking of all flights over the USA, Canada, Atlantic, Pacific, and other geographical regions
- Fastest and least expensive application on the market
- View photos of tracked aircraft
- Information on all traffic – not yet departed and that which has already arrived – not only airborne flights
- Unlimited number of tracked flights available
- Online help
- Least bandwidth requirement requirement/faster downloads of data

Some of the most fascinating features are the very sophisticated filters. For instance, you can choose to view all B767s airborne, or filter flights by origin, destination, or company. Viewing in realtime any airport flight status panel with updated flight details (origin, destination, aircraft time, status) is another feature only available from AirNav.

The program comes with 20 preset views for the main airports and areas; the Quick Map panel can easily set the view to any preset or saved view.

Bottom line: This program is a must-have for any aviation communications hobbyist. Just think how intriguing it will be to listen to the flight on your scanner or communications receiver that you're also tracking on your computer. It doesn't get much better than that.

Best of all, the cost of Live Flight Tracking is nominal, compared with what you get. Here's how it works: AirNav Live Flight Tracking requires a permanent connection to AirNav Systems server, from where it permanently downloads flight data. Because of this, the license to use the software has limitations. All three options below are valid for 6 months after registration date. After this period, if you want to continue to use the software, you will need to renew your registration.

If you want to use the program for up to 15 hours per month for 6 months, you pay $64.95(US). If you want to use it for 30 hours per month for 6 months, the cost is $124.95(US). And $239.95(US) will buy you 60 hours per month for 6 months.

Personally, I think this is more than reasonable. Compared to other flight tracking tools I've used, it's really inexpensive. You pay approximately $0.70 per hour of use – 40% cheaper than the common cost for this kind of program.

For more information, go to **http://www.airnavsystems.com** and click on AirNav Live Flight Tracking. Believe me, this is a must-have program – you won't be sorry!

From the Land Down Under

Our Australian Correspondent, Bob Bell, who writes the column "On The Airbands" for *Australian Aviation*, sends the following humor and information:

The frequency in use was 122.9 at NZHN, and there was a female trainee controller on the radio, with her male instructor occasionally heard talking to her in the background. The controller had a Cessna 206 transiting the Control Zone to the south (we'll call it ZK-ABC), and a Cessna 152 (we'll call it ZK-DEF) on the ground. She wanted to check the position of the departed C206 before clearing a SAAB on the ground for takeoff. In doing so, she mixed up the callsign of the Cessna 206 with that of the non-airborne Cessna 152.

TRAINEE ATCO: "Delta Echo Foxtrot, report level and position."

ZK-DEF (152 on ground): "One seventy two feet (aerodrome elevation) at Holding Point Charlie!"

TRAINEE ATCO: "Oh....roger, thanks. (Sounds of raucous laughter from her instructor in the background)

Every time the poor girl spoke in the next few minutes, the instructing ATCO lost control and started laughing again. Must have helped her confidence a great deal.

It was 1st of April, pre 9/11, and amongst thousands of other flights also aloft at that time, a flight from Los Angeles International Airport (LAX) to John F. Kennedy International in New York (JFK) was progressing normally. (We are deliberately not naming the airline involved.)

The female flight purser was eager to arrive a bit early. Her boyfriend, a pilot with the same airline, was only going to be able to connect with her flight and meet her on a short stopover at the destination airport. The lady had told all her friends working on the flight with her that this was happening, and subsequently the captain had become aware of it. As it was April Fools Day, he decided to have some fun at her expense.

Several hours out of JFK Airport he made the following contrived announcement: "Ladies and gentleman, the captain speaking. A bit of bad news. Thunderstorms at our destination have led to them closing the airport, and they don't expect it to re-open for thirty minutes to one hour. As you may expect, this is creating quite a backlog of flights and very long delays. As we have come all the way from the West Coast, we don't have more than one hour's additional fuel to keep holding, once we have arrived in New York airspace. So we are diverting to Cleveland, and we'll be on the ground there in about thirty minutes. We'll take on some additional fuel there, and then get you back on your way to our original destination, John F. Kennedy Airport. I'm terribly sorry for the delay, but we'll get you home as soon as absolutely possible."

The purser literally flew up the aisle to the flight deck, entered, and was talking almost incoherently to the captain, with the basic message.. "this can't be happening!" The captain then activated his intercom to the cabin: "Ladies and Gentlemen, April Fools!"

(If anyone in his position tried that one here in Australia, he probably wouldn't be working in the airline industry too long thereafter.)

Thanks Bob – good to hear from you! If you would like to monitor aircraft using a VHF or shortwave radio, or perhaps even listen to worldwide VHF airport activity using your internet computer and its audio system, have I got good news for you! Bob's new e-book, produced on CD-ROM in PDF (Adobe Acrobat) format is just what you need, with 153 pages of vital monitoring information.

Monitoring Aircraft Radio is aimed squarely at newcomers aviation radio buffs, whether or highly experienced. It has something for everyone interested in aviation monitoring. The concepts are very easy to follow and understand, and you can print it out if you wish.

Monitoring Aircraft Radio is available only from Bob's company, Helicopter Utilities at E-mail: *helicopterutes@aol.com*. Major credit cards accepted (Visa or MasterCard). Total cost including airmail charges is $24.00 Australian. (Keep in mind that the US dollar is worth double in Australia, so the total price works out to $12.00 US! Believe me, this book is terrific and totally up-to-date! jb)

That's all for February. See you in April with some more aero news and views. Until then, stay warm and safe.

Doug Smith, W9WI
dougsmith@monitoringtimes.com

Playing the AM Cheatin' Game

As most listeners know, AM signals carry much further at night than they do during the day. For that reason, the FCC requires that the vast majority of AM stations reduce power and/or switch to a directional antenna at sunset. Some stations are required to go off the air altogether.

Nobody ever violates FCC regulations. (Uh, right...)

Over the last few years, DXers have noticed a growing number of AM stations apparently ignoring the rules and operating with daytime power all night. Indeed, the AM DX community has coined two new terms over the last year or so. "Cheaters" are AM stations operating with daytime facilities at night, when they shouldn't be. The "High School Football Exemption" is an imaginary FCC regulation that, if it existed, would allow stations to stay on daytime facilities while broadcasting the local high school football games. Neither practice is legal, but both can bring new and interesting entries to your DX log.

Especially in the South, high school football is almost a religion. In some Texas towns, the majority of the town's population will show up for the Friday night game. Virtually every local business in the county will buy advertising in the game broadcasts.

Unfortunately for the stations, these games are played at night. Many of these stations don't cover their counties on night facilities. The station that carries the games in my county is limited to 35 watts at night. Most stations in surrounding counties aren't allowed to operate at night at all. Playing by the rules – reducing power or going off the air at sunset – denies these stations a huge source of revenue. More than a few stations succumb to temptation.

Football isn't the only reason for cheating, though. Stations are often heard cheating with continuous music, with national talk shows, simulcasting FM stations, or even with "dead air" – broadcasting absolutely nothing. Whatever the motivation, cheating stations can do wonders for the DXer's totals.

These stations are required to reduce power, because if they didn't, they'd interfere with other stations. If the victim of the interference is a nearby station, the interference can easily represent a new and distant logging. Recently, I've logged new stations on 1110, 1150, 1510, and 1580 as a result of cheating. Other DXers have reported signals on 810, 1090, 1190, and 1560 that really shouldn't have been there. On a Friday night, you can expect to hear something strange on just about any frequency. High school sports broadcasts can be particularly productive for DXing, as there will be plenty of local ads.

How do you know that a station *is* cheating? That's not so easy. Most AM stations have "post-sunset authorization." This allows daytime-only stations to operate at reduced power for as long as two hours after sunset. Note also that as far as the FCC is concerned, "sunset" on the 15th of the month is "sunset" for the entire month. In February, when the days are getting longer, "FCC sunset" is "too late" in the first half of the month, and "too early" in the second half. Stations may legally operate with day facilities after sunset for the first fifteen days of this month.

In general, the DXer probably shouldn't be worrying about whether his targets are operating legally. Just sit back and enjoy the unusual loggings. But don't count on getting a verification QSL from a daytime-only station operating at 10pm!

Doesn't the FCC do anything about this? Yes, they do. In the last year, at least three stations (KZEE-1220, WQSV-790, KCLF-1500) have been fined for illegally high nighttime powers. I think one can reasonably assume other stations have voluntarily complied with the rules after being warned. Common sense is not universal, though; one station is *still* occasionally heard cheating even after receiving a $10,000 Notice of Apparent Liability!

Low-powered stations like this one can still be easy DX catches.

❖ Height versus efficiency

I received a couple of messages regarding the November "Moving Day" column. I wrote that a low-powered station low on the dial has better coverage than a high-powered station near 1600. Roland Stiner NK2U asks whether the more-efficient antennas possible at the top of the dial would more than make up for the poorer propagation. A 1/4 wavelength antenna for 540 kHz would be 433 feet high; a 5/8 wavelength antenna would be some 1,140 feet. "Since it is impractical to make antennas the 'correct' length, is it not more 'efficient' to move up in frequency and use an antenna cut to the "correct" length?"

Most stations don't find the taller antennas impractical. The FCC establishes minimum heights of AM antenna towers. The minimum height depends on the class of station and its frequency – it can be as great as 167 meters (550 ft) for a Class A station on 640 kHz. Or, as short as 44 meters (145 ft) for Class C stations. FM and TV stations frequently use towers as high as 2,000 feet; 550 feet for AM is not impossible.

You can look up the height of an AM station's towers on the FCC website. Go to **http://www.fcc.gov/mb/audio/amq.html**, type in the call letters of the station, and click on "Submit Data." Click on the call letters, and you'll get a list of technical information. You're looking for "Electrical Height."

Electrical height is measured in degrees. 360° = one wavelength; one wavelength=300,000/frequency in kHz. If you look up WEBS-1030, you find the "electrical height" of their single tower is 92.3°. The tower is 92.3/360 = 0.2564 of a wavelength in height. One wavelength at 1030 is 300,000/1030 = 291 meters. 291*0.2564 = 74.7 meters. One meter = 3.28 feet; 74.7*3.28 = 245 ft. The WEBS tower is 245 feet tall.

❖ Bits and Pieces

Kraig Krist, KG4LAC, near Washington, D.C. logged WDHP-1620 from the Virgin Islands on November 1st between 0210 and 0303 UTC. The announcer was "DJ Mister D"; the programming included a lot of country music. Kraig says it was a lucky catch; the next day the Virginia Department of Transportation started testing travelers' information station WPNU747 on the same frequency, blocking 1620 at Kraig's location. I'm envious; I have yet to log WDHP here!

Are you hearing anything interesting on the dials? 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

Pirate Broadcasting Nixed by FCC

Once again this month *Monitoring Times* received loggings of North American and European shortwave pirate broadcasters, along with inquiries about how these stations manage to operate. As should be well known, no North American or European government permits broadcasting by individuals or corporations who do not have legitimate broadcasting licenses from communications authorities. As a result, from time to time these stations are subject to enforcement actions by governmental authorities. Every year the FCC shuts down several pirate broadcasters in the United States. All pirate radio operators should be very aware of this situation.

Neither *Monitoring Times* magazine nor Grove Enterprises endorses or encourages unlicensed broadcasting. In fact, few (if any) publications in North America do this. However, as we see once again this month, dozens of pirate stations run this enforcement risk every month. Some of these stations are among the most entertaining DX catches that any of us can hear. All quality DX publications cover the antics of unlicensed broadcasters, since these activities are genuine news.

Because of the risk of enforcement raids, virtually all shortwave pirate stations in Europe and North America operate on a sporadic and unscheduled basis, most commonly on weekend evenings. As a result of these operating patterns, 2002 was the first year in quite some time that the FCC failed to "bust" even a single shortwave pirate in the United States. But, that pattern could change immediately, even before the ink is dry in this magazine.

Even though pirate broadcasting activity is not legal, it is completely legal to listen to the pirate broadcasts that are on the air and to communicate with pirate stations through maildrops and e-mail addresses that we mention every month in this column.

Most pirates do not consider themselves to be lawbreakers. Instead, the large majority of them feel that they are protesting excessive corporate domination of the broadcasting industry.

All of this may seem so obvious that it does not need to take up space in this publication. But, as many new pirate and clandestine radio listeners are confused by the situation, we need to mention the obvious from time to time. In fact, the government itself routinely broadcasts without a license, as do a variety of political opposition groups on a worldwide basis. The political "clandestine" and "numbers" stations that are the prime examples of this emanate from political groups, governments, and intelligence agencies all over the world. It is well known that the United States government frequently transmits broadcasts of this nature, particularly during times of war and conflict.

What We Are Hearing

Our readers heard all of these North American pirate broadcasters this month. Most stations still transmit in the vicinity of 6955 kHz, although frequencies can vary up and down a little bit, often to avoid the **Peruvian La Voz de Campesimo** after sunset, which can frequently be heard in North America on 6956.5 kHz. Pirate broadcasting increases noticeably on weekends and around major holidays.

Black Rock Radio- They say that their rock and pop music shows are transmitted from the "high desert," but not much else is known about them. (None)

Captain Morgan- Claiming to broadcast from "the pirate zone," the Captain has been active again with rock music programming. (None, asks for reports on the Free Radio Network)

Free Dylan Experience- Pirate Pete's shows often don't match the ID from the station, since he does not exclusively program Bob Dylan, or even folk music. (None)

Happy Hanukkah- As is evident from the station name, this one generally (but not exclusively) pops up around the holidays, normally with narrative stories appropriate for the season. (Merlin)

KMUD- Best heard on the West Coast, this veteran rock music pirate is a superb DX catch elsewhere. Their slogan of the "muddy sounds of KMUD" has been consistent over the years. They claim to transmit from the Mojave Desert. (Belfast)

Montana Audio Relay Service- This one has returned to the air with novelty music and promotions for obscure towns and famous people like the unibomber in Montana. (Merlin)

Radio Azteca- Bram Stoker's DX parody station remains atop the list for humorous pirate radio content. Nothing in the radio hobby is safe from Bram's sharp barbs and top ten lists. (Blue Ridge Summit)

R.O.Z- This Europirate has been getting in reasonably well to North America at times. They program rock and pop music for the most part. (Herten)

Radio Toronto- Rock music and discussions about Ontario are the normal fare on this pirate. (Merlin)

Ragnar Radio- This new operation features right wing politics in opposition to gun control and the Federal Reserve bank. There is some possibility that they might be a relay of a program produced for domestic commercial stations, but this is not yet certain. (None; has responded to loggings posted on the Free Radio Network web site)

Seattle Free Radio- Their shows have been similar to the old **Voice of Bob**, which has nothing to do with Bob Grove, but instead features J. R. "Bob" Dobbs' Hour of Slack from the Church of the Subgenius in Dallas, Texas. (Uses *seattlefreeradio@yahoo.com* e-mail)

Shadow Radio- Some pirates, such as this one, relay old time radio programs like "the Shadow." (Uses *shadow6950@hotmail.com* e-mail)

WHYP- The James Brownyard memorial station broadcasts actual clips of a historic medium wave station in North East, PA, mixed with humor and pirate radio news. (Providence)

WHYP-The James Brownyard Memorial Station

WMPR- The normal format at this one is "dance party" techno rock, with a "micropower radio" slogan. But, well in advance of the holidays, they started running Christmas special shows of holiday music. (Still none; occasionally verifies loggings in pirate DX bulletins)

WRAS- Not much is known yet about this new rock music station. (Gives a hotmail.com e-mail address that is not yet confirmed)

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 14711; PO Box 28413, PO Box 68022; Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 293, Merlin, Ontario N0P 1W0, Canada, and PO Box 2702, 6049-ZG Herten, Netherlands.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for sending pirate loggings with a hope that pirates might QSL them 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**.

Thanks

Your loggings and news 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: Kirk Baxter, North Canton, OH; Jerry Berg, Lexington, MA; Ralph Brandi, Tinton Falls, NJ; Artie Bigley, Columbus, OH; Rudy Elsen, Castro Valley, CA; Harold Frodge, Midland, MI; William Hassig, Mount Prospect, IL; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Bill McClintock, Wellington, OH; Mark Morgan, Cincinnati, OH; Adrian Peterson, Indianapolis, IN; Lee Reynolds, Lempster, NH; Martin Schoech, Merseburg, Germany; Richard Weil, St Paul, MN; Niel Wolfish, Toronto, Ontario, and Joe Kenneth Wood, Gray, TN.

SATELLITE SERVICES

MT TRANSPONDER GUIDE *www.monitoringtimes.com/mtssg.html*

All Frequencies MHz

Robert Smathers
robertsmathers@monitoringtimes.com

SES Americom Americom-7

C-Band - 137 degrees West longitude

1(H)	3720	(none)
2(V)	3740	KMGH-TV, Denver ABC affiliate (VC2+) 7.50 C-band Talk - Dana Pretzer
3(H)	3760	(none)
4(V)	3780	Data Transmissions
5(H)	3800	KDVR-TV, Denver FOX affiliate (VC2+) 5.58 Colorado Talking Book Network 7.50 WOKIE Satellite Radio Network
6(V)	3820	KCNC-TV, Denver CBS affiliate (VC2+)
7(H)	3840	fX - East (VC2+) 8.00 Cable Radio Network
8(V)	3860	NBC (digital)
9(H)	3880	Data Transmissions
10(V)	3900	(none)
11(H)	3920	(none)
12(V)	3940	(none)
13(H)	3960	(none)
14(V)	3980	KUSA-TV, Denver NBC affiliate (VC2+)
15(H)	4000	(none)
16(V)	4020	(none)
17(H)	4040	(nane)
18(V)	4060	Data Transmissions
19(H)	4080	FoxNet (VC2+)
20(V)	4100	(none)
21(H)	4120	(none)
22(V)	4140	(none)
23(H)	4160	KWGN-TV, Denver WB affiliate (VC2+)
24(V)	4180	(none)

SES Americom Americom-8

C-Band - 139 degrees West longitude

1(V)	3720	(none)
2(H)	3740	Data Transmissions
3(V)	3760	Data Transmissions / SCPC analog audio services 1404.60 55.40 Wyoming News Network / Northern Ag Network / Northern Sports Network 1396.60 63.40 Kansas Information Network / Kansas AgNet 1396.20 63.80 Missourinet / Learfield Communications 1395.90 64.10 Western Montana Radio Network / Red River Farm Network 1395.70 64.30 Missourinet / Learfield Communications 1383.80 76.20 Liberty Works Radio Network 1382.10 77.90 Missourinet / Learfield Communications
4(H)	3780	Data Transmissions
5(V)	3800	Data Transmissions

6(H)	3820	(none)
7(V)	3840	Data Transmissions
8(H)	3860	(none)
9(V)	3880	Data Transmissions
10(H)	3900	Data Transmissions
11(V)	3920	Data Transmissions
12(H)	3940	(none)
13(V)	3960	Data Transmissions
14(H)	3980	Data Transmissions
15(V)	4000	Westwood One / CBS Radio / CNN Radio (digital) Janes Radio Networks (digital)
16(H)	4020	Data Transmissions
17(V)	4040	Data Transmissions / Learfield Communications (digital)
18(H)	4060	Data Transmissions
19(V)	4080	(none)
20(H)	4100	(none)
21(V)	4120	Premiere Radio Networks (digital) Clear Channel Radio (digital)
22(H)	4140	Data Transmissions
23(V)	4160	ABC Radio Satellite Services (digital)
24(H)	4180	Aloskon Rural Communication Service (digital)

SES Americom Americom-6

C-Band - 72 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	(none)
4(H)	3780	(none)
5(V)	3800	(none)
6(H)	3820	(none)
7(V)	3840	(none)
8(H)	3860	(none)
9(V)	3880	(none)
10(H)	3900	(none)
11(V)	3920	Data Transmissions
12(H)	3940	(none)
13(V)	3960	(none)
14(H)	3980	(none)
15(V)	4000	(none)
16(H)	4020	(none)
17(V)	4040	(none)
18(H)	4060	(none)
19(V)	4080	(none)
20(H)	4100	(none)
21(V)	4120	(none)
22(H)	4140	(none)
23(V)	4160	Occasional video
24(H)	4180	La Cadena de Milagro - Spanish-language religious channel

SES Americom Americom-6

Ku-Band - 72 degrees West longitude

1(V)	11720	Data Transmissions
2(H)	11740	Data Transmissions
3(V)	11760	Data Transmissions
4(H)	11780	Data Transmissions
5(V)	11800	Data Transmissions
6(H)	11820	Data Transmissions
7(V)	11840	Data Transmissions
8(H)	11860	Occasional video
9(V)	11880	(none)
10(H)	11900	Data Transmissions
11(V)	11920	Data Transmissions
12(H)	11940	(none)
13(V)	11960	Data Transmissions
14(H)	11980	Data Transmissions
15(V)	12000	Data Transmissions
16(H)	12020	Data Transmissions
17(V)	12040	(none)
18(H)	12060	(none)
19(V)	12080	(none)
20(H)	12100	Data Transmissions
21(V)	12120	Americom-6 ID Slate
22(H)	12140	Occasional video
23(V)	12160	Data Transmissions
24(H)	12180	Data Transmissions
25(V)	11535	South American-beamed
26(H)	11535	South American-beamed
27(V)	11655	South American-beamed
28(H)	11655	South American-beamed

Panamsat Galaxy 3R

C-Band - 74 degrees West longitude

1(H)	3720	(none)
2(V)	3740	(none)
3(H)	3760	(none)
4(V)	3780	(none)
5(H)	3800	(none)
6(V)	3820	(none)
7(H)	3840	(none)
8(V)	3860	(nane)
9(H)	3880	(none)
10(V)	3900	(none)
11(H)	3920	(none)
12(V)	3940	(none)
13(H)	3960	(none)
14(V)	3980	(none)
15(H)	4000	(none)
16(V)	4020	(none)
17(H)	4040	(none)
18(V)	4060	(none)
19(H)	4080	(none)
20(V)	4100	(none)
21(H)	4120	Occasional video
22(V)	4140	Occasional video
23(H)	4160	(none)
24(H)	4180	(none)

Panamsat SBS-6

Ku-Band - 74 degrees West longitude

T01(H)	11725.0	Data Transmissions / Ascent Media (digital)
T02(V)	11749.5	CONUS Communications (analog and digital feeds)
T03(H)	11774.0	CONUS Communications (analog and digital feeds)
T04(V)	11798.5	Occasional video
T05(H)	11823.0	CONUS Communications (analog and digital feeds)
T06(V)	11847.5	Occasional video
T07(H)	11872.0	Occasional video
T08(V)	11896.5	Occasional video
T09(H)	11921.0	Occasional video
T10(V)	11945.5	CONUS Communications (analog and digital feeds)
T11(H)	11970.0	Occasional video
T12(V)	11994.5	MSNBC and CNBC feeds (digital)
T13(H)	12019.0	Occasional video
T14(V)	12043.5	Occasional video
T15(H)	12068.0	Occasional video
T16(V)	12092.5	Occasional video
T17(H)	12110.0	Occasional video
T18(V)	12141.5	Occasional video
T19(H)	12166.0	Occasional video

Hughes Global Systems HGS-5

Ku-Band - 77 degrees West longitude

T01(H)	11725	(none)
T02(H)	11774	(none)
T03(H)	11823	(none)
T04(H)	11872	(none)
T05(H)	11921	(none)
T06(H)	11970	(none)
T07(H)	12019	(none)
T08(H)	12068	(none)
T09(H)	12117	(none)
T10(H)	12166	(none)

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DGPS De-mystified

We don't normally cover UHF frequencies in this column, especially ones extending as high as 1500 MHz! However, this month we'll discuss a longwave link to a well-known UHF system – the satellite-based Global Positioning System (GPS).

Today, recreational GPS units are available for as low as $99 in department stores, but it was not long ago that getting equipped for GPS meant laying out $500 or more at a specialty supplier. Today's lower prices make it possible for just about anyone – boaters, hikers, or motorists – to justify getting a GPS unit for their activities. Units are even built into some of today's higher end cars.

As remarkable as GPS is, it is not perfect. The accuracy of standard GPS is subject to several variables, including ionospheric delays of satellite signals, multipath fading, and receiver clock variables. In addition, the military may, at any time, introduce intentional error rates to prevent the system from being used by hostile forces against the United States or its allies. This intentional "dithering" is known as Selective Availability (SA), and although it was disabled in May of 2000, it can be reactivated with little or no advance notice.

Standard GPS units are capable of accuracies within 10 to 20 meters (30 to 65 feet) under ideal conditions. Nevertheless, some users require a level of precision beyond this to do their work. These users include surveyors, cartographers, and mariners operating in tightly restricted harbors. When precision counts, a supplemental system known as Differential GPS (DGPS) comes into play.

DGPS – How it Works

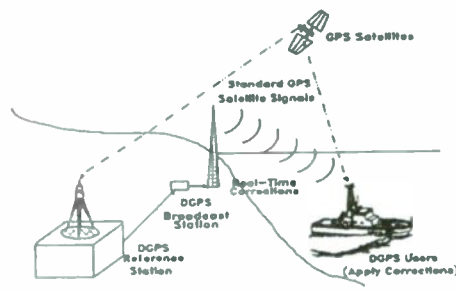
DGPS greatly improves the accuracy of standard GPS. It works on the principle that the latitude and longitude coordinates for fixed transmitting stations, such as longwave beacons, can be determined with extreme accuracy using existing U.S. Geological Survey information. This data is then compared to the *claimed* position reported by a 1500 MHz GPS receiver installed at the beacon site, and an error factor is generated based on the difference between the two readings.

The error factor is broadcast by the beacon in the form of a data stream, which is received by DGPS-equipped users in the vicinity of the station. The corrections are automatically applied to GPS receivers, and they allow users to achieve highly accurate positioning. Accuracies of 1 to 3 meters are the norm with DGPS, and in some cases sub-meter accuracy is possible. The drawing below shows how the Coast Guard DGPS system operates.

The Coast Guard maintains a vast network of DGPS-enabled beacons in the 285 to 325 kHz band. These frequencies used to be the domain of marine beacons (remember those?), some of which operated in a sequenced fashion – especially those around the Great Lakes in cooperation with Canada. Rather than tear these stations down when they became obsolete, the Coast Guard re-tooled a number of them for DGPS service, probably saving millions of taxpayer dollars in the process.

You can tell a DGPS station when you hear it by listening for the warbling note on its carrier (CW or SSB receiving mode required). There are scores of these stations operating in North America today, and many more are planned.

BASIC DIFFERENTIAL GPS CONCEPT



The DGPS system combines satellite technology with the time-proven reliability of longwave beacons. (Drawing from USCG publication).

Copying DGPS

Interested in trying to view some DGPS signals on your computer? This can be an interesting diversion to "conventional" beacon chasing with Morse Code. With DGPS, a wealth of information is provided in text form, including transmission frequency (kHz), position coordinates, ID number, service range, equipment health and more.

To view the signals, you'll need a software program that works in conjunction with your computer's soundcard. A currently popular tool for DGPS reception is *RadioRaft*, now at version 3.21. It decodes a number of other digital modes as well as DGPS. For more information on this software, visit **http://perso.wanadoo.fr/radioraft/**. A simple hardware interface is also required with the program, but one is clearly described on the website.

Another essential website for DGPS enthusiasts is the Coast Guard's "navcen" section at **http://www.navcen.uscg.gov/dgps/default.htm**. Here, you'll find a wealth of information on these stations, including a list of active sites and their identification numbers. A third site worth visiting is the one presented by Starlink Inc., a major manufacturer of DGPS equipment. The URL is **http://www.starlinkdgps.com**. Happy surfing, and if you have some DGPS intercepts you'd like to share, please forward them to me for use in a future column.

Remote Listening, Other News

Did you ever wish you could set up your monitoring station at a prime radio-quiet location, such as a weekend cottage and then listen to it remotely from home? The September-October 2002 edition of the AMRAD Newsletter describes just such a system in an article written by A. Maitand Bottoms, AA4HS. The article, titled *Internet Remote LF Receiver*, uses readily available software to link a remote receiver over the Internet. This could be an interesting solution to the noise-challenged DXers among us. The article gives a website where controller packages for some popular receivers may be downloaded. The URL is **http://www.debian.org/distrib/packages**. For more information on AMRAD and their LF activities, visit **http://www.amrad.org**.

An interesting piece was forwarded to me by Ed Defreitas, W1WEA about how VLF radio might be used to detect Gamma Ray Bursts (GRB) and their effects on the ionosphere. One of the key questions is whether or not these bursts occur in conjunction with Solar Ionspheric Disturbance (SID) events, which are known to cause enhancement of VLF radio signals. The original article appeared in the Society of Amateur Radio Astronomers (SARA) newsletter. If you have an interest in this sort of project, you can contact the author, Rodney Howe (Fort Collins, CO) at *ahowe@frii.com*.

I received a note from Pete Carron (PA), who has recently gotten back into the longwave hobby after a long absence. I was especially pleased to hear from Pete, because he authored *The World Below 500 kHz*, an informative book that served as my introduction to this hobby back in the mid 1980s. Recently, I had the honor of creating some new content for an expanded edition of this book. Look for more details here when the new book becomes available.

That's it for this month. 73, and best LW DX!

T.J. "Skip" Arey, N2EI
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DIY QSL Cards

If you have followed this column for more than about ten sentences over the years, you know that Old Uncle Skip is an unrepentant home-brewer. All things being equal, I'd rather get on the air with a piece of gear that was soldered together out of parts garnered from the depths of my junk box than use the latest and greatest commercially produced rig. Now would it surprise you that this attitude extends beyond the internals of transceivers as well? I do my logging in a program I wrote myself. I design and string all my antennas. I built the essential furniture and shelving in my shack. For that matter, I remodeled the house the shack is in, including most of the wiring. Not too long ago I extended this do-it-yourself model to the world of QSL cards.

Modern personal computers, printers, and graphics scanners allow anybody to create everything from passable QSL cards (like Uncle Skip's) to true works of art worthy of a special place on the wall of the recipient.

Surprisingly, I was not initially drawn to this process because of my tendency toward being a cheapskate. Basic QSL cards can be had at very reasonable prices from a number of sources, many of which have been discussed in this column. A glance in the classified section of any amateur radio oriented publication will turn up dozens of prospects.

What got me going down the do-it-yourself (DIY) QSL road was a desire to have my cards impart specific information at specific times. For example, referencing operating activities or contests that may only apply to a couple of dozen cards. I discovered I could make short runs of cards with the extra information added that saved me a lot of time when it came to filling things out for distribution. Once I got the hang of the word processing, making any group of cards fit a particular operating event was only a few keystrokes away.

❖ Getting Started

Developing a simple model for a QSL card begins with thinking about the information you want to impart to the station receiving the card. *Callsign* and *Name* are usually the first things that come to mind. *Operating Station Address* and *Country* are also needed. Some folks include their *County* or *Parish* to benefit folks who are seeking awards that reference such information. VHFers usually include the *Grid Square* on their cards. Then come the specifics of the QSO: *Date, Time, Operating Frequency* and *Mode*. Add a *Signal Report* and a space for your *Signature* and you have everything that needs to be accounted for in a card that can be presented for most major awards and contests.

Some folks have cards that give "Just the facts, Ma'am" and nothing else. Most hams like to spin things on a bit more. What ham doesn't like to add a line or two about the equipment they used in the QSO? Or perhaps they want to let folks know about the clubs or organizations they belong to or the awards they have achieved. I know many hams even reference other non-amateur radio activities they are interested in, such as sports or fraternal organizations. Many people include unique graphics or pictures of themselves or their shack. Designing your own QSL card allows for all this and much more.

As I mentioned earlier, modern personal computers put the mechanics of this QSL building process in the hands of almost anyone. Let me explain my setup by way of an example which can be fairly easily applied to other systems with bit of tweaking. I currently lay out my QSL cards in Corel WordPerfect 8. I begin by adjusting the Page Setup to *Landscape* mode and then I divide the pages into two columns and two rows with .025-inch margins. This creates four panels of 5-1/2 x 4-1/4 inch each. Note that using this whole area will result in an oversized card. There is nothing wrong with this unless you are using the ARRL Outgoing QSL Bureau to move your cards to DX entities. If so, you will want to limit the overall size of each card to that of a standard 5-1/2 x 3-1/2 inch postcard. You will find similar ways to set up the basic page in other major word processing packages such as Microsoft Word or Adobe Pagemaker.

Of course you can work in color or monochrome depending on the capabilities of your printer. My personal preference is for black ink and a *canary* card stock. This makes for a card that is simple but still stands out from the crowd. You will need to use a printer that will feed heavy-duty paper or card stock. I find most modern printers allow for this but may require adjustment or alternate paper feed paths to perform this task. As they say, RTFM (Read The Friendly Manual).

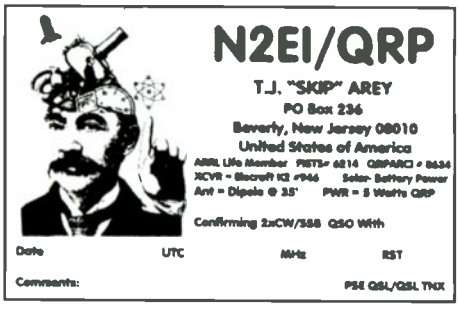
There are stationary companies that produce pre-perforated post card stock, but before you attempt to use this, you need to check compatibility with both your word processing program and your printer. I find this idea to be more trouble than it's worth. I currently use a Cannon BJC-4400 Ink Jet Printer fed with 110 pound card stock. I then cut each page of four cards apart using a paper cutter I found on sale at my local stationery store. Previously I cut them apart by hand. The cutter just makes it a bit quicker.

As to basic style, you will want to stick with fonts and font sizes that are easy to read. You will want to size and space your text on the card to allow sufficient room for hand writing or typing in the information that will be different from card to card. Some folks even take the time to enter this information into their QSL card template with each sheet of cards. That's a bit time consuming for my taste. Several of the more common commercial and shareware logging programs will print mailing labels with pertinent QSL card information. This makes it easy to just allow a space to stick on the label – a very efficient way to go that is used by a lot of "Big Gun" DXers and contesters.

Graphics are a lot of fun, but remember to choose pictures that work well with the limits of your printer's capabilities. A few test runs will give you a good idea of how this might work with your system.

❖ Express Yourself

The real fun, of course, comes from designing a card that reflects both your personality and the aspects of ham radio you want to share with the Op who will be receiving it. Allow me to show you a couple of my humble QSL cards as a way of getting the ball rolling.



Here we have the card you are most likely to see if you have a rag chew with me on 40 meters some evening. The overall layout reflects the kind of design you have probably seen on dozens of cards. The graphic is a fanciful "woodcut" image I found somewhere that I felt captured the essence of my rather tangential nature. I went with a rounded sans-serif font whose name escapes me at the moment. My Callsign reflects my "All QRP all the time" attitude. This is followed by the traditional name, address and country information.

The next three lines reflect a little bit about

my ham interests and my station. I indicate that I am a Life Member of the American Radio Relay League, FISTS – The International Morse Preservation Society, and the QRP Amateur Radio Club International. Next I indicate my transceiver of choice (in this case my trusty Elecraft K2) and the fact that my station is run by solar power. This is followed by my antenna and my power output.

I then leave a bit of space to add more information pertinent to the specific QSO. For example, I might write in "2xQRP QSO" if the station I am working is also operating low power. This might also be the space I indicate if the QSO occurred during a particular contest or operating event. Perhaps something on the order of "CQWWDX –CW."

Next follows a "cross out" line for the mode of operation and the space where I indicate the callsign of the station I worked. This is followed below by spaces for date, UTC time, frequency and RST. (Or RS if it is a phone contact...nobody cares about the tone of one's voice.)

I follow all of the above with a generous area for writing in comments. I usually have a bit to reflect on from the conversation. This is also the space where I sign the QSL. Remember, some awards programs do not accept unsigned cards as proof of contact. If you need a reminder, add an actual signature line to your design. Last but not least, I have another "cross out" line requesting or acknowledging a QSL.

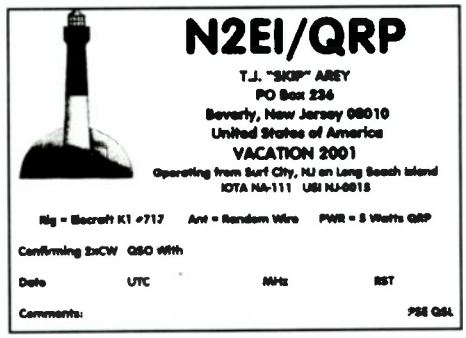
As you can see, the card gives all the required information for most awards but gives a bit more about myself and my station. It also leaves me room to add anything else that is pertinent, interesting or just plain fun.

With this as a basic template, I can whip out a bunch of cards in no time at all. If you swap rigs or antennas around a lot, it would be no problem to leave spaces next to "XCVR =" and "Ant =" to allow this information to be written in.

This second card was one I pulled together for a specific contest. The QRPARCI's Fall QSO party is one of a number of contests the club holds each year. While you will make QSOs with hams of all stripes during these events, it is usually the case that many of your QSOs will be with other club members. As a matter of fact, exchanging membership numbers, if possible, is part of the standard contest exchange.

This card prominently reflects the contest name and my QRPARCI member number. I also added the club graphic. Also, for this particular contest I used my ever-faithful TenTec 535 Argonaut II transceiver. Since all contacts were CW, I eliminated the "cross out" line for mode.

This is a simple tweaking of my original basic template. It was a simple matter to drop in the club graphic in place of my woodcut "mad scientist." Now, as I enter various QRPARCI contests, I really just need to change the contest name and the rig and mode references. The rest of the card works just fine.



When I go on vacation, I usually take a small rig along for those times when I want to relax and have a few fun contacts in the evening. Being an old Surf Bum at heart, our vacations tend to be to the coastal islands of the Eastern seaboard. That means in addition to having a little fun, I am doing my part to offer up an entity for the "Islands on the Air (IOTA)" award. Just another excuse to break out the QSL template and come up with something different.

Here, below my callsign and mailing address, I take a few lines to indicate that I am operating while on vacation, in this case from Surf City, NJ, on Long Beach Island which is IOTA entity NA-111 and USI NJ-0015. I then move back to more traditional information, in this case indicating that I was enjoying the simple pleasures of my diminutive Elecraft K1 with a piece of wire thrown out the window. Since the K1 is a CW only rig, no need for a "cross out" line for mode. Something else I often do from these vacation locales is send the QSL card in an envelope along with a tourist type postcard or brochure from the vacation spot. My way of saying to my ham friends "Wishing You Were Here!"

So as you can see, a few minutes poking around your word processor and printer settings will allow you to create custom-made QSL cards for any occasion. If you happened to catch me on the air in the month of December, you would have received one of my special "Holiday Edition" QSL cards printed on red card stock. No doubt destined to become a true amateur heirloom.

Have fun! I'll see you on the bottom end of 40 meters.

UNCLE SKIP'S CONTEST CORNER

10-10 International Winter Contest (Phone)
Feb 1 0001UTC - Feb 2 2400UTC

Minnesota QSO Party
Feb 1 1400UTC- 2359UTC

FYBO Winter QRP Field Day
Feb 1 1400UTC - Feb 2 0200UTC

Delaware QSO Party
Feb 1 1700UTC - Feb 2 0500UTC &
Feb 2 1300UTC - Feb 3 0100UTC

North American Sprint (Phone)
Feb 2 0000UTC - 0400UTC,

YL-OM Contest (CW)
Feb 8 1400UTC - Feb 10 0200UTC

FISTS Winter Sprint
Feb 8 1700UTC – 2100UTC

North American Sprint (CW)
Feb 9 0000UTC - 0400UTC

QRP ARCI Winter Fireside Sprint (SSB)
Feb 9 2000UTC - 2400UTC

ARRL School Club Roundup
Feb 10 1300UTC - Feb 15 0100UTC

ARRL International DX Contest (CW)
Feb 15 0000UTC - Feb 16 2400UTC

YL-OM Contest (SSB)
Feb 15 1400UTC - Feb 17 0200UTC

CQ 160-Meter Contest (SSB)
Feb 22 2200UTC - Feb 23 1600UTC

North Carolina QSO Party
Feb 23 1700UTC - Feb 24 0300UTC

Clem Small, KR6A
clemsmall@monitoringtimes.com

Effects of Frequency and Wavelength

There are some important antenna characteristics – and also some antenna-related phenomena – which are significantly affected by changes in frequency and wavelength. In the discussion of these two variables below note that, in an important way, frequency and wavelength actually each give us the same information.

Frequency:

A radio wave's electrical and magnetic fields change their polarity at regular intervals. The process of either field assuming one polarity, changing to the other polarity, and then back to the first polarity is called a "cycle." If a signal completes 100 cycles in one second it is said to have a frequency of 100 Hertz (Hz). So 200 cycles per second is 200 Hz, and so on. At increasingly higher frequencies the terms "kilohertz" (kHz) means 1000 Hz, "megahertz" (MHz) means 1000 kHz, and "gigahertz," (GHz) means 1000 MHz.

When we think of radio frequencies we usually think in terms of frequencies in the kHz, MHz, or GHz range. Nevertheless, some kinds of radio communication are routinely carried out at surprisingly low frequencies – even on down into the audio-frequency range and lower. Then why don't we hear those lower-frequency radio waves with our ears? It's because they are electromagnetic waves, not sound waves.

Wavelength:

A radio signal leaves an antenna and travels (propagates) into the atmosphere at the speed of light. The distance which a radio signal travels during the time it takes to complete just one cycle is known as that signal's "wavelength." For instance, if a signal has a frequency of 1 kHz it completes 1000 cycles each second. Thus it travels for 1/1000 of a second during each cycle. If another signal has a frequency of 1 MHz, then that wave travels only 1/1,000,000 of a second during each cycle.

Obviously the 1 MHz signal travels a much shorter distance during one of its cycles than the distance covered by the 1 kHz signal during one of its cycles. So, the higher the signal's frequency the shorter its wavelength (see fig. 1). This is called an "inverse relationship": as either value (frequency or wavelength) gets larger, the other gets smaller.

❖ The Relationship of Frequency and Wavelength

As you can see in fig. 1, by knowing either the frequency or the wavelength of a signal we can tell where in the radio-frequency spectrum the signal resides. Note that we could also call that spectrum the "radio-wavelength spectrum." And, with the proper equations, we can calculate frequency from wavelength, or wavelength from frequency. So in knowing one we essentially know the other.

❖ Antenna-Size Effects

The fact that wavelength changes as frequency changes has a very direct consequence on antenna design. Let's explore this with the halfwave dipole antenna. This antenna is called a "halfwave" because it is a half wavelength long at the frequency for which it is designed. The equation typically used for determining a halfwave antenna's length is given below.

Length (feet) = 468/freq (MHz) *or*
Length (meters) = 142/freq (MHz)

Designed for 300 MHz, a halfwave dipole would be 1.56 ft. or .47 meter long. Designed for 3 MHz it would be 156 ft, or 47 m long – a hundredfold increase in size.

Other antenna designs also produce smaller, more easily-constructed antennas at shorter wavelengths than at longer wavelengths. For example, several 440 MHz Yagi antennas are sometimes constructed together as an array, and mounted in the builder's backyard. If the design frequency were 4.4 MHz rather than 440 MHz, the 100-fold size and weight increase at that lower frequency would render the use of that array quite impractical.

❖ Antenna Bandwidth Effects

Even with a change in design frequency, the bandwidth of antennas of the same design remains a constant proportion of their design frequency. This proportion is called the "bandwidth factor." Let's say that a halfwave dipole designed for 100 MHz has a bandwidth factor of .04 of its operating frequency. Thus its bandwidth is 4 MHz. The same design used at 1000 MHz would also have a bandwidth equal to .04 of its design frequency. Its bandwidth would be 40 MHz. Note that the higher the antenna's design frequency, the greater its bandwidth.

One reason that TV broadcasting is done on VHF or UHF rather than on lower frequencies is to have antennas whose bandwidths can handle the very-wide bandwidth of TV signals.

❖ Effects on Propagation

Depending on conditions, radio signals leaving an antenna may be refracted back to earth by certain layers of the ionosphere. This is the basis of HF skip communication, and can be effective over long distances.

The angle at which the signal leaves the antenna and encounters the ionosphere is one factor that determines whether the signal refracts from the ionosphere or punches on through to space. Frequency is another factor. At any point in time there will be a frequency above which signals at a particular angle tend to punch through the ionosphere into space rather than refract back to earth.

When the frequency and ionospheric conditions support refraction of signals that are directed sharply upwards, then the returning signal is said to be a "near vertical-incidence skywave" or "NVIS." NVIS signals support close-in communication rather than the distant work supported by the lower-angled skip waves.

As we move up in frequency it becomes more practical to mount antennas significantly higher above the earth. Thus, as frequency increases above 5 MHz it becomes increasingly practical to elevate horizontal antennas a quarter wavelength for supporting close-in, NVIS communication, and

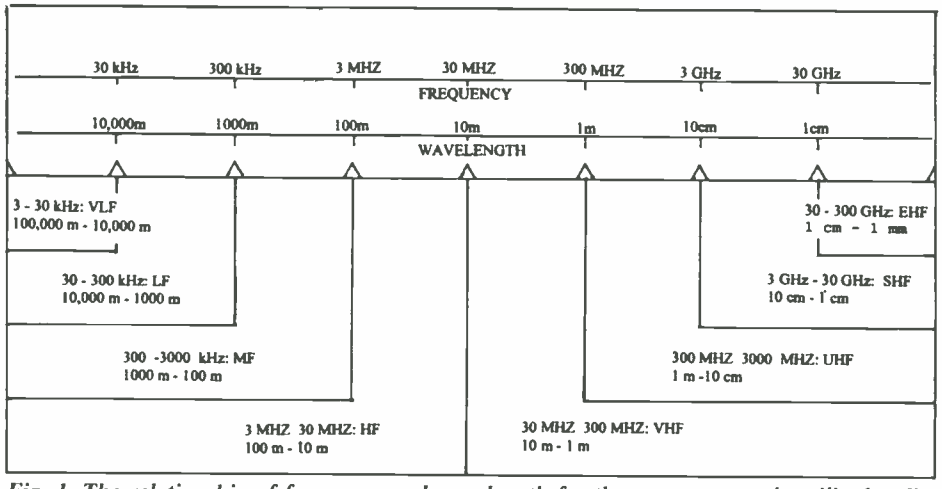


Fig. 1. The relationship of frequency and wavelength for the most commonly utilized radio-frequency bands in the RF spectrum.

This Month's Interesting Antenna-Related Web site:

A very informative chart of the electromagnetic spectrum can be found at:
http://www.astro.psu.edu/users/steinn/Astro1/Pictures/specscale.jpg

A very detailed frequency-allocation (what kind of signals are found where) chart or plain-text document is available from:
http://www.ntia.doc.gov/osmhome/allochrt.html

(above 10 MHz) to elevate them a half wavelength to yield low-angle radiation for DX work.

Effects Due to Antenna Polarization

Antennas with horizontal elements tend to be horizontally polarized: they radiate horizontally-polarized waves, and respond best to horizontally-polarized waves during reception. Vertically-oriented antennas likewise tend to produce vertical polarization, and respond best to vertically-polarized waves.

At MF and lower in frequency it becomes increasingly impractical to elevate horizontally-polarized antennas high enough to provide useful horizontally-polarized radiation. On the other hand, vertically-oriented antennas (1) provide useful vertically-polarized radiation at these frequencies, (2) can be electrically-loaded so that they are practical to construct, and (3) are the antenna of choice at these frequencies. Moving up in frequency to the HF band and higher, both vertically and horizontally polarized antennas become increasingly practical.

Effects on Level of Received Noise

The amount and kind of noise we receive varies with frequency. Levels of received noise are extremely high on the low-frequency band and lower. Lee DeForest, a well-known radio pioneer, was so disgusted by the receiving problems this noise presented that he dubbed it "hellofanoise." This noise, which is due to terrestrial sources such as lightning, diminishes as frequency increases. But it is often still a problem for weak-signal work into the high-frequency band, and even beyond. But, typically above 20 MHz or so, received terrestrial-noise diminishes greatly. At even higher frequencies, however, "galactic" noise originating outside the earth's atmosphere can occasionally be a problem.

RADIO RIDDLES

Last Month:

I asked: On HF and lower frequencies, which of the following would typically result in the best-quality reception at your receiver: a loss of 10 dB in the transmission line of the transmitter sending the signal you receive, or a loss of 10 dB in the transmission line of your receiving antenna? Or would both cases have identical results? Hint: Think of signal-to-received-noise ratio; it essentially determines quality of reception on HF and lower frequencies.

Well, as far as signal strength is concerned, the two signals would have the same strength when they reach the receiver's antenna-input connector. But quality of reception is generally not based on signal strength on "HF and lower frequencies" as the question asked. At those frequencies the received-signal to received-noise ratio (S/N) typically determines quality of reception. Of course, depending on the receiver's sensitivity and internally-generated noise, there is a minimum amount of signal necessary in order to receive a signal at all. At signal levels above that minimum, if the received noise is low, then S/N (and reception quality) is high; if received noise predominates, then quality of reception is poor.

If the 10 dB loss is in the receiving antenna's feedline, the loss attenuates both the received signal and received noise equally; so S/N isn't affected by that line. However, losing 10 dB in the transmitter's feedline reduces the signal's strength, but does nothing to reduce the strength of the noise received, because received noise doesn't traverse that line; therefore the S/N is reduced. So reception is best with the loss in the receiving antenna's feedline rather than in the transmitter's feedline.

This Month:

On the VHF bands, and particularly the UHF bands, we can hear experienced operators say that every single dB of gain they can get from their antenna is important. On the other hand, we don't often hear that about antennas on the HF bands. Why?

You'll find another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Marc Ellis
marcellis@monitoringtimes.com

The Zenith Comes to Life

For those of you who may have just joined the column, this is the fourth installment covering the restoration of a Zenith 6S229 – a Zenith "tombstone" cabinet set deliberately chosen for its sorry condition and discouraging appearance. My intention is to show you how satisfying it can be to rescue a relic radio that might otherwise have ended up in a landfill – and at the same time make a silk purse out of the proverbial sow's ear.

The November issue was generally devoted to poking around in the chassis, taking stock of the missing or butchered parts and working up a restoration strategy. The main activity in December was the removal the tuning capacitor as well as the shield cans covering the r.f. and i.f. coils. This facilitated the cleaning of the gummy grime from the top surface of the chassis. The shield cans were replaced immediately after the cleaning to protect the fragile coils. Last month, in January, we concentrated on the underside of the chassis, replacing all of the paper and electrolytic capacitors and cleaning the volume, tone and bandswitch controls.

❖ The Drive Shaft Puzzle

The main project for this month was the restoration of the dial drive system, which had been left in shambles by the previous owner of the set. Much of the problem was presented by the condition of the drive shaft (the shaft that is turned by the station selector knob). I'm including a picture of this shaft with the hardware removed and arranged below it in the order of installation.

The portion of the shaft to the left of the threaded bushing is the part that sticks out through the front of the cabinet and to which the knob is attached. The portion to the right of the bushing is located under the chassis. All of the hardware shown under the shaft assembly is mounted on this section. At the far left of the hardware display you can see the idler arm, which is intended to be under spring tension so that its little pulley will take up the slack in the long spring (not shown) driving the dial.

Notice the small hole near the forward end of the left portion of the idler arm. This is the attachment point for the small tension spring. This spring was missing. The part in the center of the hardware display is the dial drive pulley, which turns the dial drive spring. To the right of the pulley are the compression spring and retaining collar that lock the dial drive pulley to the shaft.

When this radio first came into my hands, I was quite puzzled by the shaft arrangement. *All* of the parts on the shaft, including the idler arm, were shoved together hard by the compression spring. Clearly this made no sense because the idler arm needed to be able to move freely to exert constant tension on the dial drive spring.

After I removed and disassembled the drive shaft, I discovered the answer. Milled into the shaft was a small groove just to the right of the idler arm location. After a little head scratching, I realized that the groove must once have held a little clip that would prevent the compression spring from pushing the other parts against the idler.

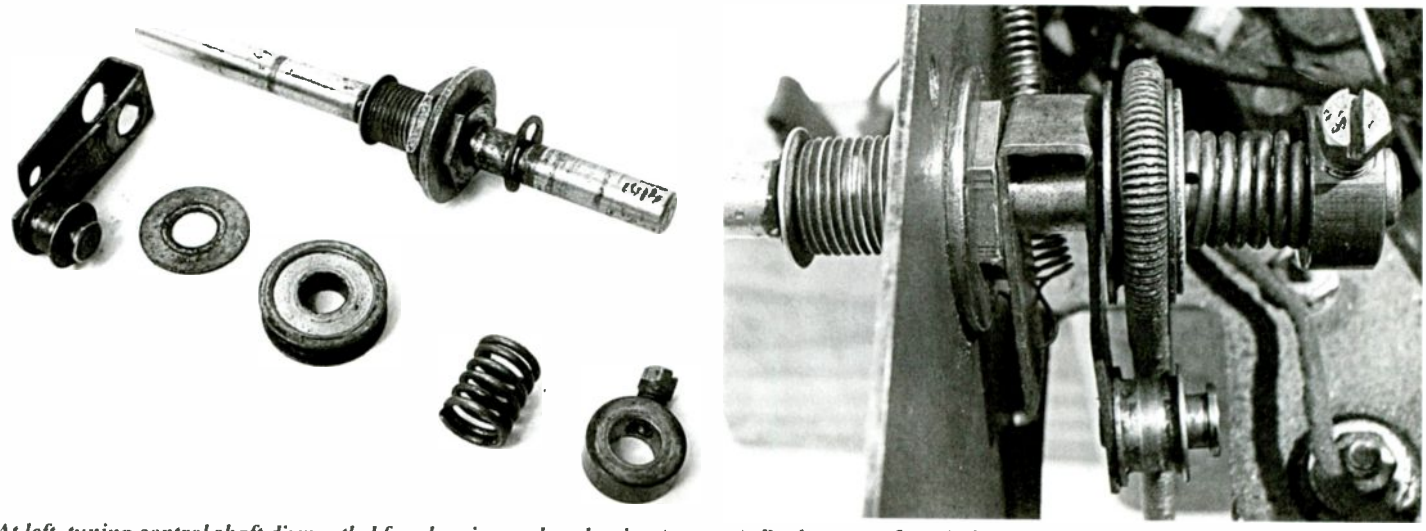
A quick trip to the corner hardware store netted me a little "D" clip that snapped right into the groove as if it were made for it. You can see this little clip sitting in its groove on the right-hand portion of the shaft. I've left it partially pulled out for better visibility. Of course it would not normally be installed until the idler arm was slipped into the shaft just ahead of it.

It's hard to imagine why a previous owner of the set mindlessly dismantled the shaft and removed the clip. However, the detective work required to resolve this kind of a mess is part of what makes the restoration process so much fun. I'm also including a picture of the shaft as it looked after reassembly and re-installation in the radio.

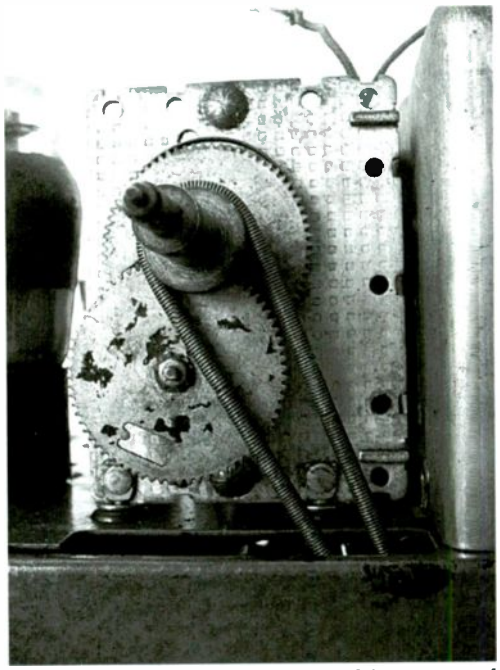
❖ Installing the Dial Drive Spring

Once the control shaft was in place, it was time to hook up the dial drive spring. But first, I had to adjust a tension spring on the front of the tuning capacitor. I hope I'm not confusing you with all these springs! Take a look at the picture I've included of the front of the tuning capacitor and you'll see the top of this spring just sticking up above the top of the rear drive gear. It's a flat coiled unit similar to a clock mainspring.

Apparently its purpose is to make the tuning smoother – similar to a flywheel effect. The spring works against the rotation of the tuning



At left, tuning control shaft dismantled for cleaning and evaluation (see text). Replacement for missing "D" clip can be seen temporarily sitting in its groove on right-hand portion of shaft. Reassembled shaft is shown at right as installed in set. Bottom of drive spring is seen at center, idler tension spring is at left, just behind front panel.

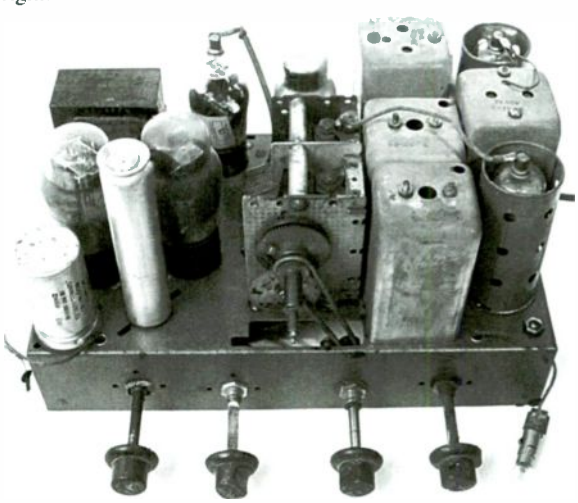


Front of tuning capacitor showing drive gears and top portion of drive spring.

shaft as the latter is turned clockwise. Its tension is adjusted by a collar and setscrew arrangement. I had no idea where to set this, so I settled for a very moderate tension and crossed my fingers.

After replacing the other tuning capacitor drive parts (all of which had been removed earlier for cleaning), I snapped the drive spring onto its pulleys and promptly ran into another small puzzle. With the idler arm tension spring anchored to the spot on the radio that seemed to be intuitively obvious, I found that the drive spring was rubbing on the mounting nut for the lower drive gear.

After experimenting with different anchor locations, I found one that pulled the drive spring over to the right so that it just cleared the nut (see photo of front of tuning capacitor). I have no idea if this was the original configuration, but I was gratified to see all of the parts working together smoothly and positively as I turned the control shaft throughout the complete range of the tuning capacitor. I guess I must have done something right!



Rehabbed and retubed chassis all set to plug in for the "smoke test."

Though I would have liked to install the dial plate, scale and pointers in this work session, I decided to be conservative and wait until I had put a little more mileage on the drive system. Because I had to guess at so many things in reassembling it, I wanted to be sure that no tragic flaw was going to assert itself after everything was in place.

❖ Time for Tubes!

With both the mechanics and the electronics of this radio nicely taken care of, I brought out the tubes that had come to me along with the radio. The first thing I noticed was that two of the original tall glass (or "G") types had been replaced with more modern stubby types: the 6F5 had been replaced with a metal tube and the 6A8 with a glass "GT" type. The newer tubes work just as well as their larger predecessors, but they look anachronistic in the radio. Also, it must have been quite a trick to hook up the grid cap to the top of the 6A8, which would be sitting so much lower down inside its shield can.

Another problem: The top cap of the 6K7 tube had come off when the seller removed the tubes for shipment. It was still sitting inside the grid cap. Checking my collection of spare tubes, I was able to find "G" types to replace the problem 6F5, 6A8 and 6K7. The broken 6K7 tests ok when a temporary connection is made to the wire stub at the top – so maybe I'll find a way to reattach the cap some time.

Incidentally, those of you just starting out in this hobby won't have large collections of tubes to draw from as I do, but don't be discouraged! Tubes such as these are still found in large numbers at swap meets – often priced at just a few dollars each. You might have to put a set aside 'til the next meet if you have a tube problem, but it is unlikely that you'll come up with a problem you won't be able to solve in time.

Now I tested the complete set of tubes I planned to use in the radio and found them all good. Another piece of tube wisdom I'll pass along is that it is really rare to find bad tubes, or even performance problems caused by weak tubes, in post-1930 radios. It can happen, though, and it is important to equip yourself with a decent tester once you become seriously involved in radio restoration.

I don't know what kind of environment this radio had been kept in, but the fact is I found that the radio's original tubes were almost impossible to clean completely. Normally it takes just a wipe or two with a damp cloth to remove the grime of the ages and come up with a tube that looks like it just came out of the box. Not these, though. I got some of the surface dirt, but couldn't remove the dullness from the top surfaces; it looked almost as if the glass had been attacked by chemical fumes.

This brings me to my final piece of tube wisdom for the day. When cleaning tubes (have I said this before?), stay away from the type identification mark stamped on the glass. It looks as if it is etched or engraved, but in fact is usually just some sort of rubber stamping and will wipe right off along with the grime.

❖ The Smoke Test

With all the tubes installed – along with the two tube shields I had borrowed from another Zenith set in my collection (see last month's column), I crossed my fingers, plugged in the speaker and applied power. As usual, I had connected a d.c. voltmeter to the output of the power supply filter. This quickly showed normal voltage, indicating that there were no serious d.c. shorts in the set.

In spite of my careful preparation, I really hadn't expected this radio to work first crack out of the box. Not only had it been in extremely neglected condition, but I also suspected that the output transformer might be bad (see November column). So I was surprised and gratified when the set came to life and, with just a short basement antenna, picked up stations across the entire broadcast band as well as here and there on the shortwave bands.

This proves, once more, the point I've made many times in the past. Good cleaning and housekeeping and complete capacitor replacement will take away many of the bugs in your restoration project before you even know they are there! If you are just starting out in radio restoration you can achieve a lot of success, even with minimal knowledge, by careful attention to detail. The knowledge and background will come to you bit by bit as you expand the scope of your work.

Next time we'll put the dial scale and pointers back together and realign this radio to original factory specs.

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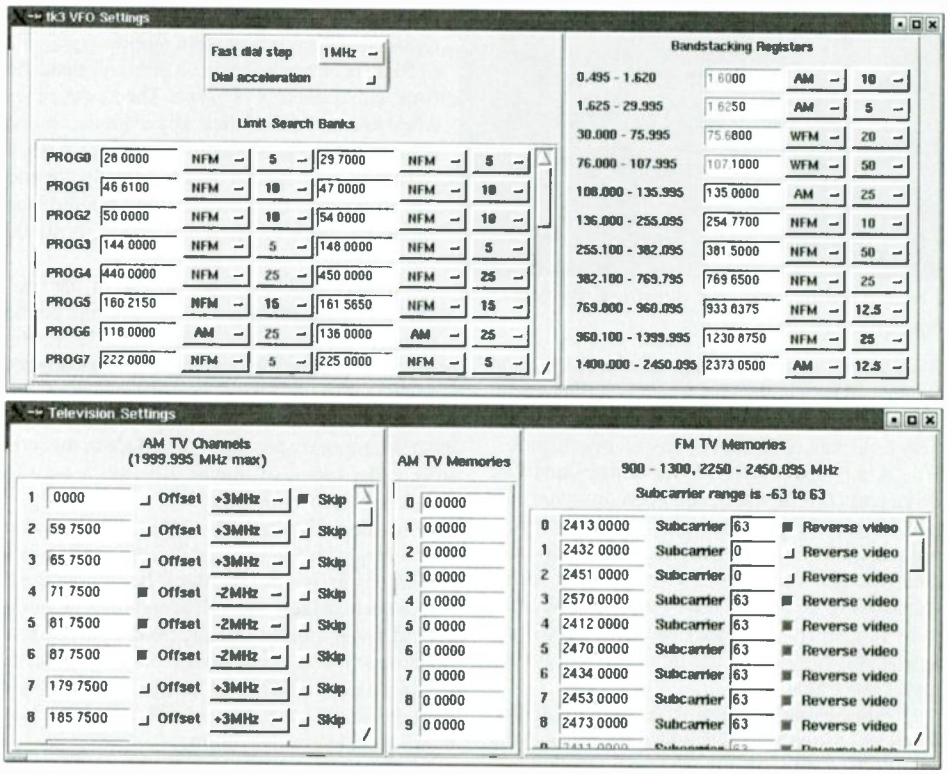
http://www.parnass.org

Software for ICOMs and a Squelch Mod

If you have been following previous Scanner Equipment columns, you know about our free radio software projects for users of Linux, MacOS X, and other operating systems. Earlier columns described free, open source cloning software for the Yaesu VR-120 (August 2002), VR-150 (November 2002), and VR-500 (July 2002). Control programs for the Japan Radio NRD-545 (June 2002) and ICOM IC-R8500 (April 2002) are available at http://parnass.com as well.

New open source software for ICOM's IC-R2, IC-R3, and IC-Q7 portable radios is now available. ICOM owners who use Linux, MacOS X, and other non-Microsoft operating systems can now enjoy the benefits of programming their radios using native software with a graphical user interface.

If you run Microsoft Windows, you already have other options, though you can use the new software, too.



Common Features

The ICOM radios are not nearly as flexible from a software standpoint as the Yaesu portables. Therefore, our software for the ICOM models has fewer settings than our software for the Yaesu counterparts. For example, you can change the Yaesu band plan which associates detection mode and tuning step with frequency range.

All three of our ICOM cloning programs share the same memory channel approach. To change the memory channels, you export them to a csv (comma-separated values) file, then use a spreadsheet or text editor program to make the alterations. Then, you import the updated csv file into the tk2, tk3, or tk7 program and write the information to your radio.

AM broadcast band frequencies are represented in a special format in the IC-R2 and IC-R3 radios sold in countries which employ 9 kHz spacing. Both tk2 and tk3 support the 9 kHz spacing if the user identifies the radio as requiring it.

Tk2 Software for IC-R2

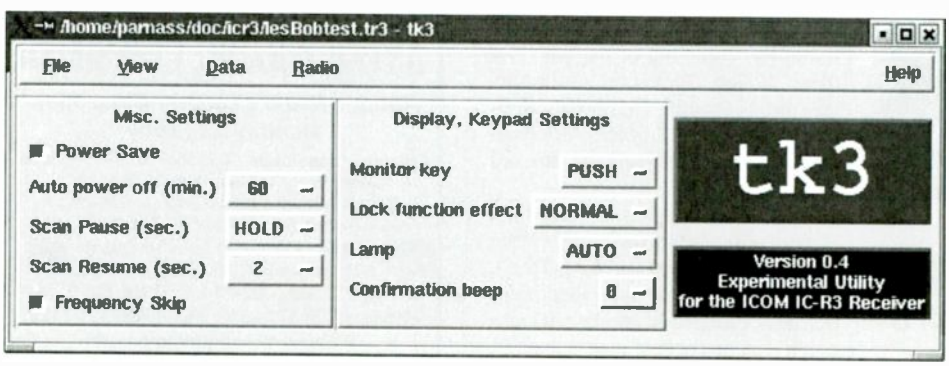
The ICOM IC-2 is probably the most popular of the tiny wide coverage receivers (reviewed April 1999). Windows users have their choice of three or more software offerings.

Goran Vlaski's icr2 freeware for Windows was an instant success from its inception (**http://www.digital-laboratory.de**). Butel's ARC2 software for Windows is arguably the most feature rich commercial offering (**http://www.butel.nl**). RT Systems sells its "IC-R2 Programmer" software for Windows (**http://rtsars.com**).

BlakkeKatte, an anonymous hobbyist and IC-R2 user, posted the internal memory layout and protocol for IC-R2 cloning on the web at **http://uk.geocities.com/blakkekatte**. The 31 page document, entitled "Cloning ICOM Receivers," provided a substantial portion of the information required to write a new IC-R2 cloning program, named tk2.

Tk2 lets you change the IC-R2's search limits, and other settings.

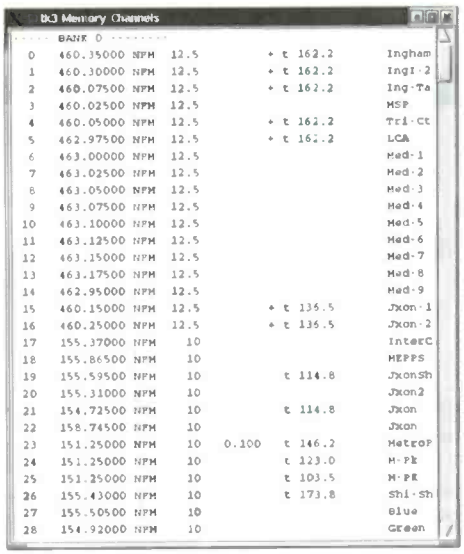
The IC-R2 has a bandstacking feature which remembers the last frequency to which the radio's VFO was tuned in a band. Tk2 can display and set the bandstacking VFOs.



Tk3 Software for IC-R3

The ICOM IC-R3 is a combination wide coverage radio and television receiver (reviewed October 2000). After a considerable effort, Irwin Shapiro deduced the internal memory layout for his IC-R3. We worked with Irwin, Les Butler, and Wayne Turner to develop tk3, a cloning program for the IC-R3.

Tk3 permits you to enter frequencies above the factory specified limits. Les reports using a



signal generator to determine that his IC-R3 is able to receive audio signals as high as 2600 MHz.

Tk7 Software for IC-Q7

The IC-Q7 dual band walkie-talkie is very similar to the IC-R2 receiver. A few scanner hobbyists bought IC-Q7s before ICOM introduced the IC-R2.

Vojtech Bubnik documented the IC-Q7 memory structure from Goran Vlaski's IC-Q7 Windows software. It didn't take much more work to reuse most of our tk2 code, combined with Vojtech's IC-Q7 information, to produce a tk7 cloning program for the IC-Q7 walkie-talkie.

We worked with Debbie Fligor, N9DN, who tested tk7 on MacOS X 10.2.1.

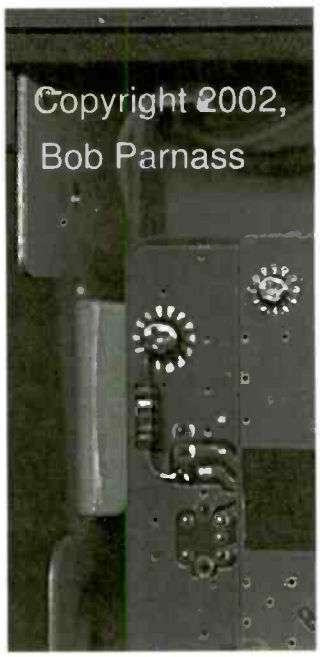
Preparation

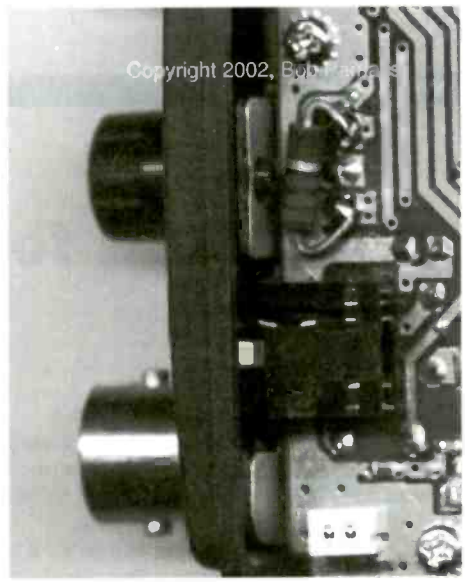
Before using any of the tk radio programs, you must connect your radio to your computer's serial port using a suitable TTL-to-RS-232 level converter. A simple, direct connect cable won't work. You can buy a CT29A cable from RT Systems, P.O. Box 12188, Huntsville, AL 35815, telephone 1-800-750-9689 or visit their web page at **http://www.rtsars.com**. The CT29A works with the IC-R2, IC-R3, VR-500, VR-120, VR-150, and other radios. It will work with the ICOM IC-Q7A when fitted with a CT-28A 4-conductor adapter.

Before using any software with a portable receiver, make sure your radio's batteries are sufficiently charged. Low battery voltage interferes with the cloning process.

❖ PRO-92A/B, PRO-2067 Squelch Modification

Our Radio Shack PRO-92B's squelch control was very difficult to adjust without eliminating signals we want to hear. We applied Jim Hoitsma's simple modification to expand the adjustment range near





threshold by adding a small, 2200 ohm resistor across the outer two contacts of the squelch potentiometer. Jim used a 3300 resistor instead.

If you are skilled in soldering small parts, follow these steps:

1. Remove the batteries and battery holder.
2. Remove the four long Philips screws from the rear of the case.
3. Remove the rear case. The PRO-92's three circuit boards are now visible.
4. The top two circuit boards were screwed together but do not separate them. The third board remains attached to the case front. The first and second boards are joined to the third board by several connectors and a pair of black and white wires. Gently pull the top two circuit boards away from the bottom board and case assembly. They must remain in close proximity to each other because they are connected by wires.
5. Locate the solder pads corresponding to the outer two contacts of the Squelch control. Tack solder a 2200 ohm, 1/4 watt or smaller wattage resistor to them, as shown in the diagram, using a small, low wattage soldering pencil.
6. Reassemble the circuit boards and case in reverse order.

We added the same type resistor to the squelch control in our PRO-2067 mobile scanner for the same reason and with the same, improved results. We soldered one leg of the new resistor to a solder pad and wrapped the remaining leg underneath the nearest screw which grounds it to both the circuit board and chassis (see photo).

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

John Catalano, PhD
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The RPR-X340 "VCR for Radio"

The need to record shortwave radio programs while we are at work (funding our monitoring needs) is not a new situation to any of us. Twenty years ago, I employed a modified digital alarm clock connected to a Sony ICF-2001 radio to catch Ian McFarlane's Sunday Radio Canada International program while we were at church.

Since those "olden days" many radio-recording devices have hit the market. These products include alarm clocks that do not require modifications, radio-cassette recorders that include on/off timers, and recorders with 6 six-hour capabilities.

Thousands of New Listeners

However, a new breed of radio "listener" has emerged over the past few years whose sole purpose is the program content. (Imagine that!) The focus of this new listening attention? Talk Radio! Although I have no hard data, I'm sure that the Talk Radio segment of listeners far outnumber US shortwave listeners. So now a daily "fix" of Rush L. and Art B. is very important to hundreds of thousands of people. This is where the two listening segments (SWL and Talk Radio) converge: recording radio programs for later listening. The dilemma is the same: how to record audio from a radio tuned to a specific frequency at a specific time.

By putting together recently released components, RPR Products have come up with a new approach to our recording need. Let me warn you, it's not cheap.

The RPR-X340 is totally self-contained in a cloth zipper case, which looks suspiciously like a modified 6 disk CD case. See Figure 1. Inside are three separate devices: a digital display PLL AM/FM radio, a digital recorder, and an FM broadcast transmitter. All are battery operated for complete portability.

Figure 1 - The RPR-X340 "...VCR for Radio.

Inside the RPR-X340 Case

Remembering that this product is aimed at Talk Radio programs, which are mostly broadcast on AM (medium wave), the STEC MR-317 AM/FM radio is no surprise.

The heart of this product lies in RPR's use of the Sony IC Recorder. This device is an outgrowth of the computer industry and digitizes audio that is then stored in internal solid-state memory, not on tape. This product is the next generation of the Sony Memory Stick product line. It is the key to the IC Recorder's long record time, small size and versatility. In fact, the IC Recorder embodies the uniqueness of the RPR product.

Figure 2 - Sony's IC Recorder ICD-BP150

The RPR-X340 allows recording of up to 339 minutes of audio at user-settable start/stop times. The recording session can be further defined to be daily, weekly or one-time. Since the audio is in digital form, it can be downloaded to a computer via the included USB cable and software. It can then be edited via cut and paste techniques and stored on the computer or returned to the portable unit.

What is the FM transmitter for? Let's see how the system is to be used and its use may become apparent.

Although manufacturer's instructions for each of the individual components is supplied, RPR also provides a concise and well-written one page (small print) system user guide.

Radio Set-Up

First the STEC MR-317 radio needs to be manually tuned to the station where the Talk Radio program will be broadcast. The audio switch is then set to the EAR position since the IC Recorder is connected to the radio via the ear jack using a supplied cable. Finally, the radio's volume is set to 6 bars on the display and the radio is left powered-up.

IC Recorder Set-Up

I must admit, the tiny (approx. 4 x 2 x 0.5 inch) IC Recorder with its complex LCD scared me a bit. See Figure 2. After I got a grip I realized I might have to do the unthinkable and read the instructions. Ignoring all the other interesting and useful Recorder functions, I concentrated on the RPR instructions for record on/off time setting. With a little help from Sony's manual the RPR-X340 was ready to go.

This Sony device is pretty useful and has many additional features, including recording in stereo. I can envision its 16meg memory being utilized all over the monitoring shack. However, it represents the major component cost in the system.

Using the RPR-X340

The system worked flawlessly for recording. For AM reception you must remember to orient the "package" toward the desired station and open the case to minimize computer noise from the IC Recorder.

The STEC radio uses the traditional internal ferrite bar antenna. For reception of long distance AM stations you can purchase the large round AM Advantage antenna made by Terk. Just place the case inside the loop to use it. This antenna is available from RPR as well as other radio suppliers. On FM, the earphone cable seems to act as an antenna. Radio sensitivity on AM and FM was very good.

Playback – Mystery Solved

As I looked more carefully inside the case I noticed that one cable went from the IC-Recorder to the radio. This one I assumed was for audio input. Upon further inspection a second cable was connected between the IC Recorder and the Sound Feeder FM Transmitter (model SF121). It didn't take an atomic physicist to figure out that the FM transmitter was for playback of the recording through an FM radio. For example, if the 340 was being played back during commuting to work, the audio could be heard over the car's speakers via the car radio. I guess RPR has studied the habits of Talk Radio listeners and determined the need for the FM transmitter!

If, however, you don't want to use the wireless playback feature you can always pull the plug from the ear jack of the IC Recorder and listen to the audio via its small speaker. A better alternative is to download the audio to a computer and play it over its speaker system.

Digital Voice Editor V1.2

This software comes on a CD-ROM with the Sony IC Recorder Model ICD-BP150. It requires Windows ME, XP, 2000 or 98. Instal-

lation was simple and took less than 1 minute on an HP 3266 running a Pentium 233MHz and 128M of RAM. The program requires 200MHz Pentium with 64M RAM and 20MB of hard drive space as minimums.

The Sony-included cable connects into the side of the IC Recorder and then to the computer's USB port. Once connected by the cable, Windows instantly recognized the IC Recorder and the drivers automatically loaded.

Figure 3 is the main screen of the Digital Voice Editor. The bottom of the screen acts just like a tape recorder. This is where all the action happens. Unlike a tape recorder, you can digitally name different selections and recall them.

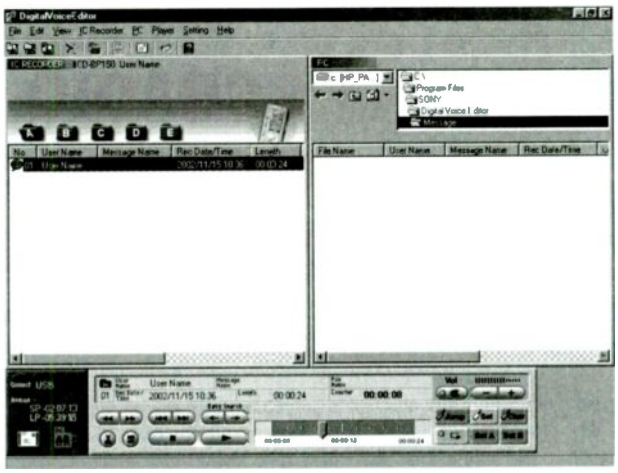


Figure 3 - Digital Voice Editor V1.2 Software Screen

Navigating the Software

The top sections of the screen are where file storage and retrieval takes place. The top left section displays all the files resident in the IC Recorder. The right top section displays previously stored IC Recorder files on your computer.

The top left of Figure 3 shows that a file named "User Name" is resident in the IC Recorder. Once transferred into the DVE software the bottom of the screen shows the following information: It was recorded on November 15, 2002 at 10:36, it is 24 seconds in length, and it is 8 seconds into being played. The audio output can be heard over the computer's speakers via the sound card.

The icons in the player region are pretty self-explanatory. The Cut and Paste (splice) buttons can be seen at the lower left. The Sony manual is a bit wordy but explains all functions of the IC Recorder and the software quite well.

RPR - Battery Life!

The RPR instruction's final panel (6) gives expected battery life for each of the three components. The FM transmitter will go 6 weeks between battery changes. However, assuming the radio is left on 9 hours a day you will need a battery change in five days. The IC Recorder is a bit more power hungry. It requires its batteries changed every 8 hours of operation. Therefore, assuming 2 hours of recording and 2 hours of playback per day, the batteries are gone in two days. In my opinion, battery usage is the one downside of the portable RPR-X340.

Wishful Thinking

Screaming in my head as soon as I opened the box was "*Include a shortwave/AM/FM radio!*" This is a natural wish for *MT* readers. Many companies make small radios that would fit the bill. It would open up a whole new market for RPR without much additional cost.

Also, if a radio was used that had an internal timer that would turn on and off the radio, its battery life would be greatly extended.

The FM transmitter is nice. But I think the space may be better be used by a speaker/amp for direct quality listening.

Overall

With lots of batteries in hand for portable timed monitoring of commercial AM (medium wave) and FM broadcasts, the RPR-X340 does a great job and is the only product of its kind I've seen. I've dubbed it the "VCR for AM/FM Radio," and it lives up to its name. The RPR-X340 is available from RPR Products at **http://www.radioprogramrecorder.com** or (520) 975-2187 for $239.99 plus shipping.

MT REVIEW

CCRADIO *plus*: The Ultimate AM/FM/TV/WX Band Portable?

By Ken Reitz

MT readers are familiar with the product-packed catalog and web site (**http://www.ccrane.com**) of the C. Crane company from Fortuna, CA. In recent years the company began selling its own brand of multi-band radio, the "CCRadio," which, according to their web site, was designed by a team of engineers from C. Crane and Sangean, the giant radio maker from Korea. The CCRadio*plus* represents the second generation of engineering from the two companies and promises to offer listeners "...unparalleled AM reception...." and believes it's "...the best radio for long range AM reception." It also features the FM band, all NOAA weather radio frequencies and the audio from the VHF-TV band (channels 2-13).

Any avid radio listener would be hard pressed to find a portable radio packed with more features. It's clear that every inch of this 11" x 6.5" x 4" receiver has been designed with the radio listener in mind. When was the last time you saw a portable radio boxed up with a 26 page instructional manual that actually had useful information, including a blank station log you can copy?

The number of features on this radio and options available are considerable, and I've listed them for quick reference in the sidebar. So, let's get right to the fun part: spanning the airwaves with the CCRadio *plus*.

A Serious AM Radio?

In this time of satellite-delivered car radio programming, personal CD and MP3 players in the hands of every kid over the age of two, and with digital broadcasting looming on the horizon, it takes some courage to design, build and market a radio almost primarily for listening to the AM band. Marconi, Armstrong and DeForest would be proud. But, is it necessary? Well, just ask the millions of American sports fans and AM band talk radio fanatics who tie up radio station phone lines night and day!

With seemingly more lives than an alley cat, AM radio has survived the advent of the 45 rpm record, the LP, FM radio, cable TV, VCRs, CDS, and MP3. Feasting on a carbohydrate blow-out diet of sports, shock jocks, all news all the time, and (gasp!) occasionally music, the AM band has actually prospered. In fact, it's the wallets of the loyal talk show and sports nuts in America at which the CCRadio*plus* is aimed.

Now, the interesting thing about this radio is that, since it's basically just an AM portable, they could have cheaped-out on the whole design and gone the way of every other cheap portable AM radio you've ever seen. But, they didn't. In fact, they went to the other extreme. It's been a long time since I've seen a portable radio of any description built this well. Let's take a close look at the features.

❖ Excellent Portable Radio Design

Besides the AM and FM bands, this radio tunes VHF-TV audio channels 2-13 and all seven frequencies used by NOAA weather radio stations in the U.S. and Canada. Only the left side panel of this radio is not put to complete use (the bottom panel hosts the four rubber supports and the master reset button!). Each side is packed with useful and well thought out features.

We'll start with the front. A clean metal grill takes up 2/3 of the front panel protecting the 5-inch speaker behind it. A large, easy to read LCD display panel dominates the other third of the panel. The digital tuning readout can be read even in moderate light from 15 feet away. There are no fewer than 14 icons or symbols which can appear on the display, including a 14 segment "S" meter, yet it seems uncluttered and easy to read. Printed at the top of the panel are the bands and frequencies covered by the radio. There's also a small "light" button which when pressed gives the screen a green glow which the manual says will last about 100,000 hours and uses little energy. When the radio is plugged into an AC source the display is always on.

Below the tuning panel are two flat buttons that tune up or down the frequency displayed. Holding either button momentarily activates the rapid tune mode and the radio will "seek" until it hits a strong signal. To the left of those two buttons are four smaller buttons which set the clock and timer. The timer can sound an alarm or turn on the radio at a set time. The sleep timer will allow the radio to play for up to 120 minutes after being set. There's also a "snooze" feature. Tired of staying up all night to hear a favorite talk show? When used with a tape recorder which is equipped with a Timer Activation Switch, the timer will turn the recorder and the radio on and tune to the frequency you've programmed. Now you can get a good night's sleep, listen to the show at your leisure, and zip through the commercials, news, or boring guests! The other two knobs on the front panel are for separate bass and treble adjustments.

On the right side panel is the rotary tuning knob, which features a finger tip indentation and very smooth operation. The tuning display changes 1 kHz on the AM band and 50 kHz on the FM band as it's rotated. Below the tuning knob is the volume control and between the two is a frequency lock switch. At the bottom of the panel is a 3.5 mm headphone jack that supplies a stereo signal when tuned to the FM band.

On the top right of the back panel is the recessed telescoping antenna used for FM/TV/WX. The carrying handle is recessed into the back panel with a rubberized strip to grip with your fingers for secure carrying. The extreme left of the panel has AUX input for your portable CD player or other device, the aforementioned Timer Activation Switch plug and below that the line out which you can feed to any recorder to make tapes of

Packed with features including four way power and tuning the AM/FM/TV/WX bands this is a serious, but troubled portable radio. (Courtesy C. Crane)

CCRadio *plus*
Specifications and Notes
C Crane Company
1001 Main Street
Fortuna, CA 95540-2008
1-800-522-8863;
http://www.ccrane.com

Frequencies:
AM Band: 520-1710 kHz
FM Band: 87.5-108 MHZ (Stereo signal available at the side-mounted headphone jack)
TV (VHF): Channels 2-13 Audio
WX Band: 162.400, 162.425, 162.450, 162.475, 162.500, 162.525, 162.550 MHZ

Tuning:
Side Mounted digital tuning knob and front mounted up/down buttons. Side knob tunes 1 kHz (AM), 50 kHz (FM) or by channel (TV/WX) and acts as a "fine tuning" knob. There is no direct frequency entry. There are five top-mounted memory presets which can be set for each band.

Antenna:
The FM, TV and Weather Band use a telescoping whip antenna which swivels 360 degrees and extends to a maximum of 20.5". AM uses a built-in Ferrite Bar (7/16" diameter 8" long). There is an external AM connection via two screw terminals (labeled antenna and ground) which puts the signal directly through the filter network and into the front end.

Power Source:
Uses four "D" size batteries which adds over one pound to the total weight of the radio (5.5 pounds with batteries). Power consumption is stated as 40-50 mA DC or 8 watts via the detachable heavy duty power cord which automatically disconnects the batteries. Estimated battery time with heavy duty NiCad batteries: 48 hours. Time to charge NiCads with AC adapter: 27 hours. Time to charge NiCad batteries with Solar Panel (see Options): 67 hours. Solar panel will run the radio in full sunlight without batteries installed.

Options:
C. Crane makes the following accessories available. Prices current as of this writing.

6 V Charging Adapter: $10.95
Sangean 4 Watt Solar Panel: $59.95
LED Lamp: $19.95
3 1/8" Stereo Patchcord 40" long: $14.95
VersaCorder dual speed tape recorder: $99.95
Custom carrying case: $29.95
SoftSpeaker pillow speaker: $19.95

your favorite programs. Antenna terminals for an external AM antenna are just to the right of the line out plug. On the other side of the back panel is a plug for the optional 4 volt LED lamp and a 6 volt DC charger. Access to the battery compartment is on the lower back side. The radio takes four "D" cells and will operate about 48 hours on a fresh set. The removable AC plug is on the far right side of the back panel.

The top panel features five station recall buttons, the main power on/off switch, the band switch, and weather alert button which allows the radio to be tuned to any other band until a NOAA weather alert is issued, at which time it switches the audio to the appropriate NOAA channel and flashes a red LED on the top of the front panel. It can be set up so that only the LED flashes. A third mode activates a siren which turns on for up to 1 minute. If headphones are plugged in during an alert, the headphone audio will be cut off and the siren will sound through the speaker.

Actual Reception

I tested this unit over several days and nights during early December when AM band conditions were moderate. Using only the built-in antennas, I found daytime reception satisfactory on all bands. Nighttime reception was excellent on the AM band. By swiveling the radio as I tuned I was able to hear the big powerhouses from New York, Chicago, St. Louis, New Orleans, Nashville, Atlanta and Detroit. Signals were greatly improved when I connected it to a short (350-ft) unterminated Beverage antenna. Many regional stations rose above the RF din to a useful audio level. Frequency separation was excellent thanks to the 1 kHz tuning resolution on the tuning knob.

There is a peculiar glitch in the receive circuitry of this radio which allows short wave broadcasters to show up at various points along the AM band at night. I heard a strong Russian language station at 520 kHz, what sounds like Japanese at 1386 kHz, and in between positive IDs on Catholic Radio EWTN at 625, Deutsche Welle at 689, a strong RTTY signal on 542, more German, Russian and Spanish language transmissions throughout. Now, you could look at this as a plus if you're interested in receiving shortwave on the AM band, but most serious AM band DXers will find this annoying at best and a serious problem at worst. I understand that the original CCRadio had a similar tuning problem and I'm at a loss to imagine why efforts weren't made to correct it.

As for FM, I found I had to hook into a roof-top antenna to help reception on that band. I used a short jumper with alligator clips attached to go from the coax's conductor to the whip. Reception was vastly improved, as I was able to tune in a good FM DX target over 150 miles away. But separation on this band proved to be a disappointment when trying to tune two closely positioned stations. It wasn't up to the capabilities of a good FM stereo receiver. Reception on the weather and VHF-TV bands were adequate.

That brings me to my short list of improvements. At the very least, I'd like the AM tuning problem resolved. I'd like to see more memory presets. Five is just not enough, especially on the AM band where, as a sports fan, I'd like to punch in my favorite teams and be able to scroll through the AM presets and check in on all the action. I'd also like to see a 75 ohm "F" connector on the back panel to help improve and extend FM coverage. And, finally, I'd like to see the UHF-TV band audio added. With so many sports and syndicated talk shows being carried on UHF channels, it would really boost this radio's value.

This is a physically well designed, well executed, feature packed portable radio, which sports fans and talk show listeners will really enjoy. But, for AM DXers it just doesn't live up to its web billing as "...the best AM radio available." In Black Mica or Platinum, the CCRadio*plus* is made in China and retails for $159.95.

An Economical BCB Ribbon Loop Antenna

By Michel Berlie-Sarrazin

Caveat: this BCB loop is usable only with radio sets having an internal MW ferrite rod antenna and without a metal case.

How to Assemble It?

To make this simple broadcast band loop antenna you will need:

- a good (air) variable capacitor (about 490 pF) and its tuning knob,
- a small length (about 4 feet or 1.2 meter) of 20-conductor computer ribbon (flat) cable (non-shielded and non-twisted type),
- a similar length of plastic plate the same width as the ribbon cable,
- a piece of printed circuit (a 20 parallel tracks type at least),
- a plastic box,
- a soldering iron and ordinary tools.

You solder each end of the ribbon cable to each side of the printed circuit, but with a one-track shift so as to get an electric coil (see diagram). You connect the air variable capacitor to each free track remaining at each side of the printed circuit (see diagram). You bend (in a circular shape) and insert the plastic plate in the ribbon cable loop to make it rigid. You put the AVC (air variable capacitor) and printed circuit part of the device in the plastic box. You add the AVC tuning knob. That is all!

The Working Principle

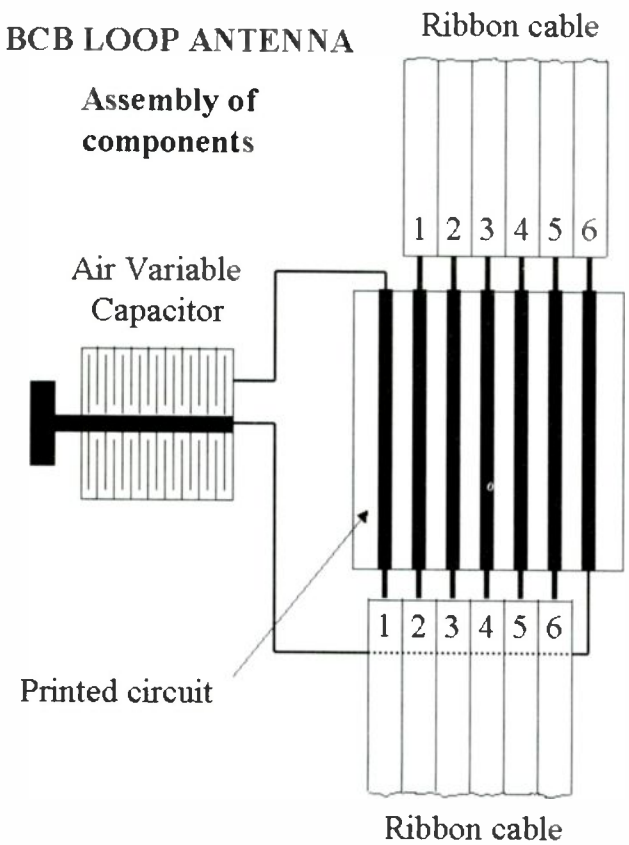
What you have made is a classic parallel LC resonant circuit. As you know, this kind of circuit shows a very high impedance (so an over-voltage) at its resonant frequency. For the record (Thomson formula):

$$F = 1/[2 \times \pi \sqrt{(L \times C)}]$$

(F in Hertz, L in Henry, C in Farad)

This kind of receiving antenna exists already on the electronic products market. But to assemble it from a few scraps of cable and electronic spare parts is an economical way to get a good equivalent for nearly zero cost.

The ribbon cable BCB loop serves as an antenna booster in relation to the internal ferrite rod of your receiver (inductive coupling), working on the MW band. For that you have to tune it according to the receiving frequency of your radio set.



How to Use It?

Once made, you still have to test it for possible adjustments. If your receiver is small enough, you put it on top of the plastic box, and inside the ribbon cable loop. If your radio set is too large (hi-fi rack tuner or old electronic tube one), put the BCB loop box near the radio set, as close as possible to its internal ferrite rod antenna.

Choose a distant broadcasting station in the middle of your AM band. Then slowly turn the loop antenna AVC knob from one side to the other. Normally, you will eventually see the S-meter rise and/or hear the station louder than before. If you continue turning, you exceed optimum tuning and the S-meter begins to fall. Turn back the knob slightly to perfect the tuning. Next, you rotate (at the same time) the radio set and the BCB loop to optimize their orientation towards the broadcasting station. If necessary, you fine tune it again.

If you do not cover the full range of the BCB with the AVC knob turned at full stroke, it is necessary to modify the loop impedance, in other words, its coil length.

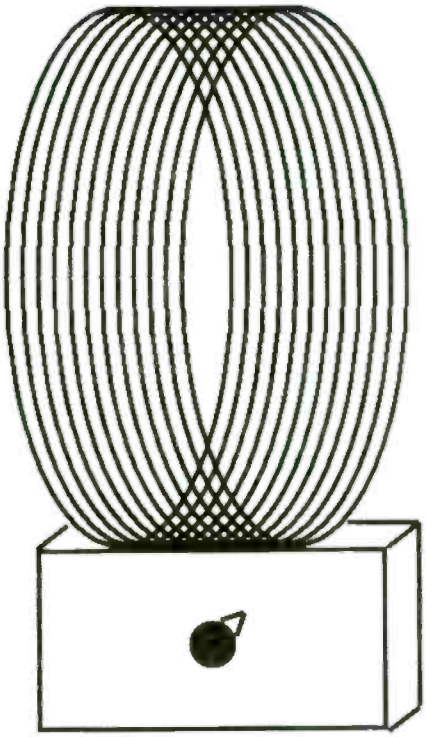
If the problem becomes apparent when you are on the lower side (lower frequencies) of the BCB band, you need to use a longer ribbon cable or one with more conductors. If the problem is present on the higher side (higher frequencies) of the BCB, you have to shorten the ribbon cable or remove one or few conductors. The best way is perhaps to begin with a coil that's slightly too large and to reduce its length (or number of conductors) in a trial and error approach – just as we all do when we are tailoring a wire antenna on a given frequency.

As an example, I started my own project with a 20-conductor ribbon cable (1 meter long) and a 10-centimeter-long parallel track printed circuit. After tuning, I finished up with only 17 conductors remaining and a 97-centimeter long ribbon cable (length loss due to stripping conductors before soldering). The AVC value was a standard 490 pF. From one stop to the other of the AVC knob stroke I now cover all the European BCB (from 526.5 kHz to 1606.5 kHz) and a bit beyond.

However, due to varying electrical characteristics of ribbon cables (and printed circuits) due to factors such as the diameter of the conductors, the width and thickness of tracks, the distance between conductors (and non conductive gaps between tracks), etc., not to mention your AVC actual value, your BCB loop's final dimensions can differ from mine.

When using this loop antenna, it is a pleasure to notice that stations barely picked up before now come in better, and moderately strong stations are now louder. What's more, the directivity and static (or interference) immunity properties of your receiver's internal ferrite rod fitted are preserved, if not enhanced. Very good value for the money!

A last technical remark: just before getting a perfect tuning of the BCB loop, you may notice a marked dip of the S-meter and corresponding signal level, but only when you are nearing the listening frequency of a higher one.



BCB LOOP ANTENNA

Overall view

How to Adapt It to Other Bands

Though being a MW BCB antenna originally, this loop most likely can be used on other wavelengths, just above or under its rated range.

Lower frequencies

Why not run trials in the marine/aviation NDB band (283.5 kHz to 526.5 kHz), or in the European LW BCB (150 kHz to 283.5 kHz)? In these two situations you need to modify AVC capacitance and/or loop inductance.

As regards AVC, either you exchange the present one (being about 490 pF) for another one of higher value and/or you add a fixed value capacitor soldered in parallel with it (new total capacitance = AVC value + fixed capacitor value). As regards the loop inductance, you exchange the ribbon cable for a new one with an increased length and/or number of conductors.

Theoretically, if you quadruple the AVC capacitance (or loop inductance), you shift the frequency domain of the BCB loop antenna by a 1/2 coeefficient (cf. Thomson formula). For example, the nominal 526.5 kHz to 1606.5 kHz range is shifted about 263 to 803 kHz. With a capacitance (or loop inductance) multiplied by eight, the range becomes about 132 to 401 kHz.

Higher frequencies

Another possibility is to use this loop antenna in the MF band (from 1.7 MHz up to about 6 MHz). Think about the chance to listen to tropical band stations (2.5 MHz, 3.3 MHz, 4 MHz, 5 MHz) with the help of this low noise, directional aerial. In this new situation you have to change the AVC capacitance and/or loop inductance again.

This time, either you exchange the present AVC (being about 490 pF) for another one of lower value and/or you add it a fixed value capacitor soldered in series with it (1/new total capacitance = 1/AVC value + 1/fixed capacitor value). As regards the loop inductance, you shorten the ribbon cable and/or you remove some of its conductors.

Theoretically, if the AVC capacitance (or loop inductance) is divided by four, you shift the frequency domain of the BCB loop by a two coefficient (cf. Thomson formula). For example, the nominal 526.5 kHz to 1606.5 kHz range is shifted about 1053 kHz to 3213 kHz. With the capacitance (or loop inductance) divided by eight, the range becomes 2106 to 6426 kHz.

Adjusting theory to reality should be predictable in relation to parasitic capacitance existing between ribbon cable turns. In all cases, changing the number of conductors of the ribbon cable means modifying the previous soldering job made on tracks of the printed circuit. If the new number of conductors you need exceeds the number of tracks, you will have to exchange the printed circuit for a new one.

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;editor@monitoringtimes.com.

Jock Elliott KB2GOM
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Icom's Insanely Great IC-T90A

Have you ever had the growing sense that "Things happen for a reason" – that there is no such thing as luck or coincidence? Proof positive of that very thing happened to me recently.

The wind was howling; the sky was black, and the trees were bending dangerously in the side yard. You didn't need Ph.D. in meteorology to figure out that the Elliotts might soon be seeking shelter in the basement or trying to cope with a power outage. It would be a good idea, I thought, to assemble an emergency kit of essential stuff that might come in handy at home or on the road. I grabbed a flashlight (one of C. Crane's nearly indestructible CC Trek Lights), a Swiss Army knife, a compact first aid kit and a small Silva compass and dropped them into a small shoulder pack.

Then I started thinking about electronics that would be good to have: an AM/FM radio for monitoring local broadcasts, a TV sound receiver for the same reason, a weather radio with alert capability, a handheld scanner for listening to emergency frequencies, and – because I am a ham – at least a two meter handitalkie for two-way capability. As I piled up the gear, I realized I was going to need a much bigger shoulder bag and maybe a couple of guys to help me drag it around.

Just then, there was a knock at the door. Brown Santa (aka the UPS guy) stood at the door with a package from Icom. In it was the IC-T90A VHF/UHF multiband FM transceiver.

General Description and Features

This palm-sized electronic wonder measures roughly 4 inches tall by 2-3/8 inches wide by 1-1/4 inches deep (excluding antenna and belt clip) and weighs just over half a pound. The frame and chassis are cast aluminum and the construction is weather resistant.

The IC-T90A may be small in size, but it is BIG in capability, including a wide band (495 kHz to 999.990 MHz) scanning receiver with AM, FM and WFM modes; 5 watt output on 50 MHz, 144 MHz and 440 MHz (DTCS and CTCSS encode and decode), and 555 alphanumeric memory channels, including 50 band edges and 5 call channels. The T90A comes pre-programmed to receive all U.S. TV broadcast channels and US weather radio channels (with alert capability). In short, it has everything that I wanted for emergency communications capability in a package slightly larger than a pack of cigarettes (excluding antenna).

On the front panel of the T90A at the top, there is a small backlit liquid crystal display that serves as information central for the handi-talkie. Below it to the right is a grill for the speaker microphone and to the left of that are Up/Down buttons, the power button and a Band button. Below them are three rows of five buttons each that serve as a numeric keypad and for activating various functions. All buttons are backlit as well, and the backlighting for both the display and buttons are activated when any button or knob is used.

On the top of the transceiver are a knob (which can be configured to change frequency or volume), a seven-and-a-half inch flexible antenna (with a replaceable tip for 50 MHz operation) and a jack for a speaker microphone with a flexible rubber cover. On the right side of the unit, you'll find a power jack with rubber cover. On the left side are the push-to-talk button and the squelch button. On the backside there are the belt clip and the BP-217 1300 MAh Lithium-ion rechargeable battery pack. (An optional battery pack that takes AA batteries is also available.) On the bottom of the unit is a clip for releasing the battery pack.

The T90A distinguishes itself in two ways. First, the good folks at Icom seem to have gotten the operating system right. Many of the buttons have two functions: push once for the first function; press and hold to access the second function. It's neat and slick, and it sure beats the heck out of having to access a separate "function" button. Once I got familiar with the basic operating scheme, I found I could do most things without having to consult the instruction manual.

And that brings me to another point: the Icom team has come light years in improving its manuals. I have an Icom 2SRA whose manual seems opaque to human reason, but the T90A's manual never left me guessing or in the dark. Hats off to Icom for a job well done.

Outstanding Performance

The performance of the T90A was all that I had hoped for. It received well on every single frequency that tried at my suburban location in Troy, NY, including local law enforcement frequencies, radio broadcast, TV, weather radio, ham bands, and more. I did find that the quality of local AM broadcast band reception depended upon where I was in the house. I suspect that the addition of a short length of wire to the antenna would aid AM reception.

Scanning functions worked surprisingly well for a handheld that is first and foremost a ham transceiver. I did not test the T90A for transmitting on 440 or 50 MHz, but I did test it extensively on 2 meters. In fact, several mornings I used it to run my ham radio commuter network. Not only did it bring up the net repeater with full quieting, but several of the net participants commented on what great audio I had! (Normally I use an Icom IC-706MkIIG which has performed flawlessly.) Usually when I switch to a handitalkie, someone is bound to say "Did you switch to a handheld? Your signal sounds kinda funny." Not so with the IC-T90A.

In my view, the IC-T90A is an insanely great piece of gear. It has everything I want in a portable communications "kit," including excellent performance and small size. The suggested retail price for all these goodies stuffed into such a small package is just $319.95. For more information, visit **http://www.icomamerica.com**

The Icom IC-T90A – Insanely great and highly recommended for any ham's emergency kit.

Lawrence Harris
lawrenceharris@monitoringtimes.com

To Buy or Not to Buy

The National Oceanic and Atmospheric Administration's (NOAA) Satellite Direct Readout Conference for the Americas was held in Miami, Florida, between December 9-13, as this was going to press. The Conference offered a significant opportunity to learn about future changes to the NOAA satellite systems, their impact on all satellite users, and how we might prepare for these changes. An extra item added to the program was a presentation by NOAA of an operating model of a NASA prototype LRPT receiver. I hope to carry a full report in the next edition, but a few questions about the new transmission formats can be looked at this month.

Perhaps the most significant point is that with the approach of solely digital format telemetry, the reasons for buying a new WEFAX system have all but disappeared. For the manufacturers, this was not unexpected; the decision to "go digital" was made public some years ago, offering an opportunity to produce a new product. On the downside, development costs for an uncertain market are hardly welcome.

◆ Low Rate Information Transmission (LRIT)

This protocol is the new digital data transmission standard that will be implemented on future geostationary meteorological satellites (including GOES) for transmission to relatively low-cost user stations. It will progressively replace the current analog (WEFAX) standard for transmitting image data, and will also replace some other geostationary meteorological satellite transmissions. The standard has been agreed upon by the Coordination Group for Meteorological Satellites (CGMS) for implementation worldwide by its members as they update their current systems.

Wayne G. Winston is the Direct Readout Coordinator for the Direct Services Division at NOAA, and he has provided some answers to queries regarding the implementation of WEFAX and LRIT.

Question: Currently we can receive WEFAX transmissions from GOES WXSATs over the east and west coasts. Will there be a transition period with WEFAX and LRIT transmitting simultaneously?

Answer: No. The transition period will be through 2003. There will not be simultaneous WEFAX/LRIT transmissions from GOES, but alternating transmissions from a single transmitter. The schedule is yet to be determined. This will allow for a near normal WEFAX products flow, while extensive testing goes on.

Question: When will WEFAX transmissions end for GOES-E and GOES-W users?

Answer: Presently scheduled for early 2004.

Some testing of LRIT has already been performed. It is done for short periods when a stored satellite is activated. From the NOAA perspective, the tests went well for both uplink and downlink transmission routes. A prototype LRIT receiver and software are under development, with the goal of producing a reasonably priced replacement for WEFAX users.

Meanwhile, in late November I became aware that at least one manufacturer has produced a GOES LRIT receiver, but I was unable to get any details about it for mention in this column.

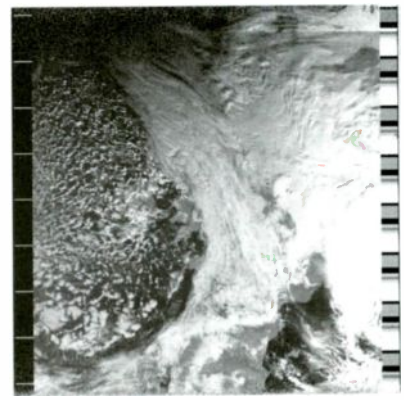

Fig 1: NOAA-17 1050UTC 4 December 2002 channel 2 - visible.

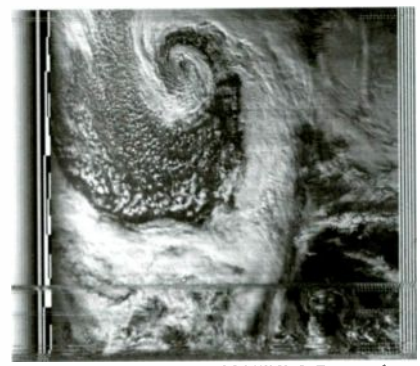

Fig 2: Meteor 3-5 1252UTC 1 December 2002

◆ Weather Satellites: current status

At the start of the New Year, hobbyists currently have access to several WXSATs, depending on exactly what equipment you use for monitoring. The lowest cost systems are usually those that receive APT, the low resolution "automatic picture transmission" telemetry. The oldest (currently operational) NOAA WXSAT, NOAA-12, was launched May 14, 1991, and shares a transmission frequency with NOAA-15. During November and much of December, their footprints overlapped, so NOAA-12's APT was switched off to avoid VHF conflicts. The HRPT transmission (see table for frequencies) remains active throughout because these do not interfere. Reception systems use high gain antennas that have correspondingly lower beamwidths.

NOAA-14's APT was switched off some time after the loss of image synchronization. HRPT transmissions have remained active, though virtually unusable, until around mid-November when during a short period, synchronization resumed. Since then, HRPT images have remained good, causing me to wonder whether the APT might be re-activated.

NOAA-15 continues to provide good quality APT and HRPT at conveniently early times each morning and evening. Pictures show the real weather just as I am planning the day, and seem to be more helpful, at least to me, than the weather reports!

NOAA-16 had a difficult experience early on in life, and has been left able to transmit HRPT, but not APT. This WXSAT provides mid-day and early afternoon imagery, much as NOAA-14 did in its post-launch phase.

NOAA-17 – the latest NOAA WXSAT – is fully functional and provides late morning and mid-evening imagery of both types.

Meteor 3-5 is now the only non-NOAA WXSAT transmitting APT. It is very old and its image quality is not high. A replacement satellite called Meteor 3M-N2 is scheduled for launch around 2004.

APT and HRPT systems remain worthwhile considerations for those considering joining hobbyists in WXSAT monitoring. Both transmission systems are to remain operating for several years – probably until beyond 2010.

Frequencies

APT
NOAA-12 and NOAA-15 on 137.50 MHz (except during VHF conflict)
NOAA-17 on 137.62 MHz
METEOR 3-5 usually on 137.30 MHz when in sunlight.

HRPT
NOAA-12 and NOAA-16 on 1698.0 MHz
NOAA-14 and NOAA-17 on 1707 MHz
NOAA-15 on 1702.5 MHz
FENGYUN-1C and -1D on 1700.4 MHz

WEFAX
GOES-8 and GOES-10 use 1691 MHz for WEFAX

What's NEW

Tell them you saw it in Monitoring Times

Free gift for WiNRADiO users

WiNRADiO has introduced a new XRS plug-in called "Calibrated S-meter," which makes it possible to measure the signal strength of WiNRADiO 1000/1500/3000 Series receivers in absolute units (dBm, microvolts or S-units).

The calibration is achieved using conversion tables for a number of frequencies, for all modulation modes. The software interpolates the values and presents the result on a "digital display" in one of the selected measurement units. Instantaneous as well averaged values can be displayed (over a user-specified averaging interval).

The Calibrated S-meter also doubles as a logger. It can store the received signal strength in a file, in user-definable intervals.

The Calibrated S-meter plug-in can be downloaded from the XRS Web site **http://xrs.winradio.com**.

The Calibrated S-meter plug-in includes ready-made calibration tables of typical values for WiNRADiO Series 1000/1500/3000 receivers. For more accurate results, an advanced user can edit the calibration tables using a reference signal generator, with the help of another new and handy tool: The S-meter Calibrator.

The S-meter Calibrator makes it possible to create, edit and manipulate the calibration tables. This software can be downloaded from **http://www.winradio.com/home/calibrator.htm** .

RIGblaster Pro

West Mountain Radio says the new RIGblaster pro can save you from $975 to $1745 while giving higher performance, simplified operation and a neater more efficient station. Here's how they figure it: For only $299.95 using a computer and appropriate software, the *pro* replaces a –

Multimode TNC
$250 to $550
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$150 to $180
DSP receive filter
$170 to $400
Receive enhancer
$170 to $170
EchoLink Interface
$55 to $65
Transmit speech equalizer/processor
$150 to $250
Rig control interface
$30 to $130

The new *pro* model manages to retain the full functionality, radio and computer compatibility, of the other RIGblasters, while providing simplified operation and greater flexibility. This includes PTT override and PTT interrupt, with completely automatic transmit switching between your mic and your computer.

New features include a built-in computer rig control interface for Yaesu CAT or Icom CI-V or Ten Tec TTL. The interface will allow computer control of your rig and sound card and CW modes using only one serial port. For running two separate software programs – one for sound card applications and another program for rig control – you may opt to use two serial ports.

Sound card based DSP software will turn the *pro* into a high performance transmit mic equalizer, speech processor and/or noise gate. When transmitting speech mode, the computer speakers will automatically mute. The new program being developed for *pro* users will automatically switch between DSP transmit speech processing and receive DSP filtering. Audio is continuously being supplied to the computer, for filtering, processing, and also for recording at any time.

Outputs are available for two independent keying outputs. It will also allow for a second mic operation, so you can leave your main station mic connected while using a headset microphone. In fact, there are two headphone outputs with 1/8" and 1/4" jacks. The *pro* circuitry will also allow you to use the new electret condenser type microphone.

For more information contact West Mountain Radio, 18 Sheehan Avenue, Norwalk, CT 06854; 203-853-8080; **http://www.westmountainradio.com**.

Becker Creates the Mobile Office

Until recently, the mobile office was limited to cellular phones and fax machines. However, California-based Becker Automotive Design, a premier luxury sport utility vehicle (SUV) conversion firm, has added the power of satellite TV and high-speed mobile Internet access to its elite SUV limousines. Using the TracVision satellite TV and TracNet mobile Internet systems from KVH Industries, Becker Automotive Design now offers its executive business and celebrity clients unmatched connectivity with more than 300 channels of news, entertainment, and audio, as well as the full power of two-way mobile Internet access.

Based in Los Angeles, Becker Automotive Design, Inc., **(http://www.beckerautodesign.com)** specializes in converting externally low-profile, non-attention-drawing vehicles like the Ford Excursion and Chevrolet Suburban into non-stretch, executive limousines, equipped with an array of personal comforts and top-of-the-line electronics. Options include GPS navigation systems, LCD video screens, world-class audio systems, and armor sufficient to protect drivers and passengers from a variety of threats.

"Increasingly, the automobile is becoming an extension of the modern office through the use of

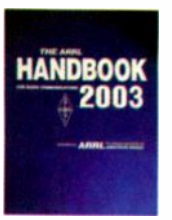
wireless technology," remarked Jim Dodez, KVH's vice president of marketing. "Satellite TV offers all of the news that an executive needs, from Bloomberg TV to CNN and the business coverage offered by CNBC. When you combine that with a two-way, mobile connection to the Internet, you have access to all of the resources necessary to stay in touch and make critical business decisions."

Complete information regarding KVH's TracVision and TracNet systems can be found on the company's web site, **http://www.kvh.com**.

2003 ARRL Handbook

ISBN: 0-87259-192-1

When we think about the institutions in the world of amateur radio, several things come to mind. Things such as the art of QSLing, which dates back to the very early days of the service, contesting, DXing, public service, building your own equipment, and many other facets of the hobby have stood the test of time. And so has a publication that discusses all those items and more. In fact, it is almost as famous as the amateur hobby itself – The Annual *ARRL Handbook*.



The new 80th edition (first published in 1926) has just been released, and it continues the long tradition of providing a valuable reference for not only hams, but engineers and researchers. Perhaps acknowledging new technologies and the book's broad application, there's been a slight change in the title from *ARRL Handbook for Ra-*

What's NEW

Tell them you saw it in Monitoring Times

dio Amateurs to *ARRL Handbook for Radio Communications*.

Inside the 2003 *Handbook's* massive 1216 pages is a comprehensive RF engineering reference with chapters on Introduction to Amateur Radio, Fundamental Theory, Practical Design and Projects, Construction Techniques, Operating Practices, Wireless Technology (pagers, cell phones...) and more. New in the 2003 edition:

- An updated and comprehensive chapter on modulation sources including digital voice.
- A revised and comprehensive chapter on Digital Signal Processing (DSP) technology.
- A new high-power, automatic EZ-Tuner project by W8ZR.
- An "Ugly Transformer" project for high current, 120-VAC stations.
- A revised chapter on safety practices.
- A completely updated handbook address list in the references chapter.

In my early days of ham radio, as a teenager, the *ARRL Handbook* was a yearly Christmas present that helped spark my long career in the world of electronics and communications. It is a reference like no other and deserves to be on the bookshelf of anyone involved in the world of electronics and communications.

The softcover eightieth edition can be ordered from the ARRL website (**http://www.arrl.org**), on their toll-free telephone line 1-888-277-5289 (Outside US +1-860-594-0355), or via snail mail at ARRL Publication Sales Department, 225 Main Street, Newington, CT 06111-1494 USA. Order catalog #1921 — $34.95 plus $7.00 shipping for the softcover ($49.95 harcover).

– reviewed by Larry Van Horn, N5FPW

Australasian Shortwave Guide

The 14th edition of the *Australasian Shortwave Guide*, compiled by Bob Padula, is now available in hard- or soft-copy. *ASWG* 14 includes over 1400 entries covering the international shortwave transmission period commencing on October 27, 2002, and concluding on 30 March, 2003 (B02). The 36-page guide is issued twice annually, and covers English shortwave schedules to Australia, Asia, the Far East, the Indian sub-continent, and the Pacific in all languages.

The data is arranged in two sections, by studio country and by starting time. Each entry shows broadcasting organization, frequency, starting time, finishing time, language, target area, transmitter site, transmitter country, studio country, and days of operation. The soft copy version (a ZIP'd Word 7.0 document) may be printed, searched and/or sorted as required.

The *ASWG* is compiled from an extensive worldwide network of broadcasters, frequency planners, engineering consultants, professional monitors, and members of the Electronic DX Press. Since it's not a commercial publication, the price represents a contribution towards the costs. In hard copy (including postage), the publication costs A$20 to domestic addresses, or US$10 or equivalent if mailed outside Australia. Cost for the soft copy is (within Australia) A$10; for other countries, US$5. For either version equivalent compensation is accepted in any currency, international bank draft, international money order, GIRO transfer, or credit card via PayPal. Cheques and money-orders must be in Australian dollars, payable at Australian banks. 12 IRCs for the hard copy or 6 IRCs for the soft copy will also be accepted.

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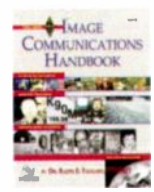
The ARRL Image Communications Handbook

by Dr. Ralph E. Taggart, WB8DQT
(ISBN: 0-87259-861-6)

Nothing I know fires up the imagination of a radio hobbyist faster than the mere mention of the words "image communications." It is one thing to listen to communications via our receiver or scanner, but a whole new dimension is added when we combine video with that audio.



And that is the subject of a new book published by the ARRL from an old friend, Dr. Ralph Taggart, WB8DQT. Ralph has been around this video business for a long time now. My early days experimenting in weather satellite video were thanks to his early publications and articles in various ham and radio magazines.

With Dr. Taggart's latest missive you can explore the possibilities of using amateur radio to see and talk with hams! With home computers, widely available software, and gear that many hams and radio listeners already own, it's easier than ever to enjoy the imaging modes. This book covers the imaging modes of Narrow-Band Television (NBTV), Amateur Television (ATV), Slow-Scan Television (SSTV), and Weather Satellite Imaging (WEFAX).

The book includes a CD-ROM with Windows, Macintosh and Linux software utilities and is published by the American Radio Relay League (ARRL). This softcover 184 page book can be ordered from the ARRL website (**http://www.arrl.org**), on their toll-free telephone line 1-888-277-5289 (Outside US +1-860-594-0355), or via snail mail at ARRL Publication Sales Department, 225 Main Street, Newington, CT 06111-1494 USA. Order catalog #8616 - $25.95 plus $6.00 shipping.

– reviewed by Larry Van Horn, N5FPW

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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Closing Comments

This page is open to thoughtful opinions on radio-related topics. Submissions should be about 800 words in length and may be mailed to Closing Comments, care of this magazine, or emailed to editor@monitoringtimes.com

No Commercial Market

by Dr. H. Paul Shuch, N6TX
Executive Director, The SETI League, Inc.

The privatization of SETI, the scientific Search for Extra-Terrestrial Intelligence, is in trouble – and not for the reasons you might assume. Once a glamorous NASA project, SETI was orphaned when Congress pulled their funding in 1993. Since then, several nonprofit organizations, including the grass roots, international SETI League, have stepped up to the plate. I am privileged to coordinate a global network of amateur radio telescopes, all seeking evidence of our cosmic companions. But now, all that is in jeopardy.

Our flagship enterprise is Project Argus, an ambitious effort to deploy 5,000 small backyard dishes around the world, and thus see in all directions at once. During the past eight years, though devoted hams and skilled experimenters have been building up SETI stations out of kits, surplus and scrounged materials, our numbers have grown painfully slowly. People have been insisting that, in order for us to approach our ambitious goal of all-sky coverage, commercial vendors must offer inexpensive, turnkey SETI systems. But major manufacturers (including Radio Shack ®) have declined to get involved in this endeavor, because they perceived that no mass market exists. It appears that they are right.

Perhaps you recall the Seeker 2000, a nearly turnkey SETI package (receiver, LNA, feedhorn, cables – just add dish and stir) introduced by Radio Astronomy Supplies about four years ago. After a year of heavy promotion, RAS had sold exactly one system (to SETI League Hardware Committee chairman Lee Kitchens), and decided to discontinue the product line. I can't say that I can fault that business decision.

Not long ago, one of our members (in Siberia, no less!) informed me that the link from our top web page to "Complete SETI Systems from Grove Enterprises" no longer worked. I emailed to Bob Grove (owner of that erstwhile equipment supplier, and publisher of this journal) to question its disappearance. His response:

"Over the period of years that we carried the equipment and promoted it on our web page, we never received a single order. Without a doubt on my part, they are probably hams for the most part who are immersed so deeply into the hobby that they don't need to buy systems; they can assemble whatever's required from their own resources. But we were pleased to try the experiment and lost very little money doing it."

Bob had spent both time and money designing SETI packages, promoting them in his catalog and magazine advertisements, and devoting web server space to SETI equipment and The SETI League. We are grateful for his effort. But Bob is running a business, not a non-profit (that's my responsibility!) And he just can't stay in business by promoting products for which there's no market. So, of course he made the logical decision, and pulled the plug.

But what of all those potential SETIzens who have long said to me, "I'll build a station if someone will produce commercial equipment that I can set up without having to be (or hire) an engineer"? I conclude that they were just making excuses. If someone isn't willing to spend as much on a SETI station as families typically spend on a weekend holiday at Disneyland, I figure he or she just isn't all that interested. And since *nobody* seems willing to put his money where his mouth is, I am forced to rethink the goals of Project Argus.

Chief among those goals was that notion of 5,000 active stations around the world, pointed in all directions at once. About six years ago, in our growth phase, I made the mistake of extrapolating, and optimistically projected full-sky coverage "by mid-2002." Well guess what, folks – we didn't make it! Having stagnated at just over 100 stations for the past two years, I figure we've pretty much tapped out the pool of techie hobbyists – and can't really expect significant growth until something changes.

I thought that "something" was the availability of commercial turnkey systems. Apparently I was wrong. Now, I haven't a clue what that "something" might be. But I do know it's time to redefine our objective for Project Argus. Instead of full-sky coverage, perhaps what we should be striving for is the very best science we can do with however many stations we can muster.

Our 100+ radio telescopes are still more than exist in the rest of the world (combined). Still, some have been saying that The SETI League is a failure, for falling short of our goal by a factor of fifty. Maybe so. For that matter, since its stated objective was to detect solid evidence of extraterrestrial intelligence, which we have not yet done in four decades of searching, I could argue that the entire SETI enterprise is a failure.

Believe that, and you'll be snatching defeat out of the jaws of victory.

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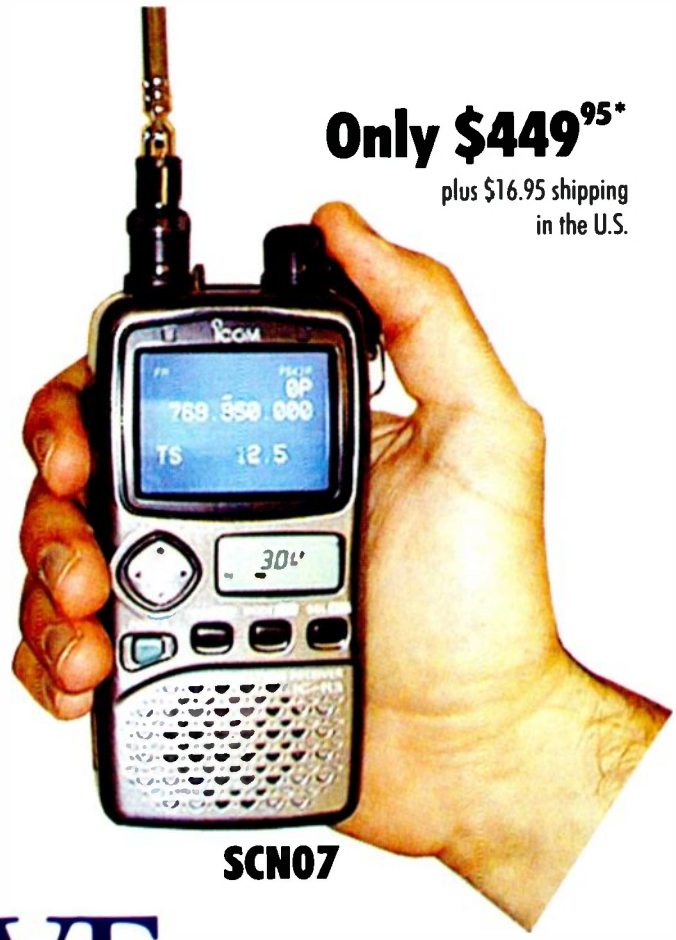

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