Scanning - Shortwave - Ham Radio
Equipment - Computers - Antique Radio

Monitoring Times

A Publication of Grove Enterprises

REPUBLIQUE DU NIGER

5U7JB

HAMS WITH A MISSION

EL2PM   MONROVIA
LIBERIA

BURUNDI AFRICA

9U5M

FEDERAL FIRE AND "ICE"
VOICE OF THE PACIFIC - RNZI
TRACKING DOMESTIC AIRLINERS
WINRADIO G313E HF RECEIVER

0 74470 74654 6

05

AOR, the Authority on Radio Makes MORE Than Great Radios!

Discover *these* Accessories & *Add to your* Capabilities.

Antennas for the Great Outdoors

DA3000: a 16 element receive wideband discone antenna with useable frequency coverage from 25MHz to 2GHz. Using different length elements to ensure true wideband characteristics, the DA3000 also includes one 'loaded' element to enhance low frequency performance. Engineered and manufactured to AOR's exacting standards, the DA3000 comes with 50 feet of quality RG58/U coaxial cable terminated in a BNC plug for the radio connection and a low-loss TNC plug in the antenna base. Pole clamps are also standard.

Designed for areas where space is a problem or when an "unobtrusive" installation is essential, **SA7000** is a super wideband coverage receive antenna with useable frequency coverage of 30 KHz to 2 GHz. The SA7000 is a passive arrangement with two whip elements: a long element for short wave up to 30 MHz and a second shorter loaded whip antenna for frequencies up to 2 GHz. The loading coils are tuned around 150 & 800 MHz to enhance VHF & UHF performance.

DA3000

SA7000

Antennas for Indoor Enjoyment

AOR has made performance even better with the new **LA380** indoor antenna as successor to the popular LA350. The LA380 features full frequency coverage (40KHz – 500MHz) using a single receiving element. Designed to provide reception when away from the main monitoring location or when large external antennas are not practical, the LA380 is a compact active (1 foot diameter) loop antenna which features an internal high-gain amplifier (20dB for 40KHz-250MHz) and excellent overall strong signal handling (high IP3 +10dBm). The loop design allows directional control and nulling noise or interference. Perfect for listening in remote locations or in antenna-restricted areas.

LA380

Accessories for Added Monitoring Capability
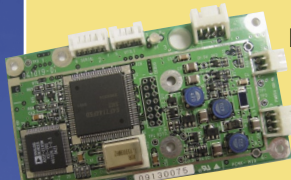
Now you can monitor APCO 25 signals using an AR8600MKII. The **P25-8600 APCO25 Decoder** can be installed in the AR8600MKII receiver to automatically decode the APCO25 signal. The decoded audio is then output from the receiver's speaker. *(Installation is required.)*

P25-8600 APC025 Decoder

The **TVA-1 External NTSC TV Converter** is compact, lightweight and easy to install. Designed to be used with the AOR AR5000A series of communications receivers, its simple operation uses the 10.7 MHz IF input from your receiver. Audio and video outputs allow monitoring a variety of sources such as broadcast TV, public safety agencies, aircraft, Amateur Radio FSTV, news media video and more.

TVA-1 External NTSC TV Converter

The **TV5000A NTSC TV Internal Converter** adds the ability to receive broadcast television signals (NTSC) and allow monitoring video feeds from a variety of sources including broadcast TV channels, public safety agencies, aircraft, Amateur Radio FSTV, news media video and more when used with AOR AR5000A series of communications receivers.
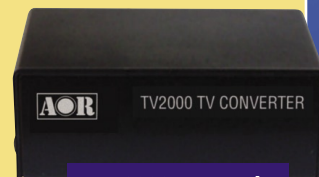
TV5000A NTSC TV Internal Converter

The **TV2000 External NTSC Video Decoder** is designed to be used with the AOR SR2000. Compact and lightweight, no external power supply is required (power is supplied from the SR2000). The video output is available from the rear panel of the TV2000 and audio is provided from the SR2000 through the external speaker jack.

TV2000 External NTSC Video Decoder

For more great accessories, visit the website at www.aorusa.com.

Your 5 star receiver search is over!
Look no further than WiNRADiO.

- Software-defined DSP demodulation
- Excellent sensitivity
- High dynamic range
- Continuously adjustable IF bandwidth
- Optional DRM demodulator
- Real-time spectrum analyzer
- Graphical IF shift, passband tuning and notch filter
- User definable audio filter
- Noise blanker
- Audio and IF recording and playback
- Test and measurement facilities

WiNRADiO G313 Series Software Panel

WiNRADiO G313 series

External or internal? With the WiNRADiO WR-G313 series the choice is yours. There is the PCI-based internal G313i (fits neatly inside your PC, no power supply necessary, no cables, no clutter on your desk). And there is also the USB-interfaced G313e which can work very well with your laptop if portability is important to you. Both are very high-performance software-defined HF receiver models, 9 kHz to 30 MHz, optionally extendable to 180 MHz.

The G313 software contains numerous advanced features, many tuning and scanning options, virtually unlimited memories and a rich on-line help facility.

With so many advanced features at a great price, and our large range of software and hardware options, the G313 series models will surely continue to impress.

If you're looking for a receiver with sophisticated, easy to use software displays, and *"an outstanding combination of performance, functionality, quality and value for money"** then look no further than the versatile and technically capable G313 WiNRADiO receivers.

* WRTH review of G313i

WR-G313e (external)   WR-G313i (internal)

Reviews

"Overall, the G313 remains, in both its forms, my receiver of choice when trying to extract weak signals out of noise and interference. The Synchronous AM mode is particularly effective and the IF filters manage to cut a very sharp line between passband and stopband."

"Sensitivity and stability are also excellent."

Short Wave Magazine

"Of note is that the operating software is constantly being updated and is freely available from the WiNRADiO website, giving a considerable degree of 'future-proofing' to a purchased receiver..."

RadCom

"So what would I like to retain in my own radio room? The WiNRADiO G313e is a splendid receiver in all respects, and an excellent example of what can be achieved in a contemporary software-defined radio."

"All in all, the G313e is an excellent receiver for both conventional and DRM broadcast reception and will undoubtedly enhance WiNRADiO's reputation for quality and value for money."

"Overall rating: 5 stars" ★★★★★

World Radio TV Handbook 2006

For more information about the 5 star rated WiNRADiO G313 radio products and the extensive range of accessories and options available to choose from, please visit our website:

WiNRADiO®
www.winradio.com

Cover Story

Hams with a Mission

By Ken Reitz

Most of us are familiar with amateur radio DXpeditions which go to remote areas for the express purpose of making as many ham contacts as possible from a location that may have no local hams at all (and maybe not even any human inhabitants). But there's another class of amateurs who are in those remote locations for reasons other than ham radio. These peacekeepers, missionaries, scientists, doctors, and others often get on the air as their time allows, providing both a service and an education to amateurs worldwide.

Story starts on page 10.

CONTENTS

Back around 1957 a boy with a 75-cent allowance had to scrimp and save and homebrew to acquire radio equipment. The author remembers the tedious copying of circuits from the library's ARRL Handbook, scavenging parts from discarded radios, winding coils, building his first radio, practicing Morse code, making his first CW contact...

What's your excuse for not getting your amateur radio license? No time? Too technical? Don't know where to find or take the test? Carl Herbert explains away all your excuses....!

Huh? Everyone knows VHF/UHF is line of sight reception! There is a trick to this feat of magic -- It's called the internet. With a repeater linked to the internet (called a gateway) you can use your hand held radio to talk to hams across the world. Or, you can do the same thing using your computer instead of a radio if your soundcard has a mic and speakers.

Reviews

The **G313e is WiNRADiO's external model** of their top of the line G313i PCI card HF receiver. With its improved specifications, stability, and flexibility due to software-based operation, Lee Reynolds finds this radio a hands-down winner (see page 69).

If you're tired of tinny or mushy audio from your radio's built-in speaker, you may find the **Heil Clear Speech speaker** solves your audio problems and restores your listening pleasure! (Page 68)

YPlog is a free logging and control program made with ham operators in mind. This truly impressive program is useful for SWLers, too. Also check out page 72 for a nifty way to transform an old laptop into extra hard drive memory through a USB port.

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Re_Inventing Radio through Design and Necessity

FR250 $50*
Multi-Purpose

Stay informed and prepared for emergencies with this self-powered 3-in-1 radio, flashlight and cell-phone charger — no batteries required.

_ AM/FM/Shortwave Radio Reception
_ Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)

_ Cell-phone charger output jack 3.5mm (various cell phone plug tips included)
_ Built-in 2 white LED light source and one flashing red LED
_ Dimensions: 6-1/2"W x 6"H x 2-1/2"D
_ Weight: 1 lb. 3 oz.
_ Power Source: Built-In Rechargeable Ni-MH Battery Pack; 3 AA Batteries (not included); Crank power alone; AC Adapter (not included); AC Adapter recharges built-in Ni-MH battery pack

FR200 $40*
Crank it Up

Without the need for batteries, this self-powered 2-in-1 radio and flash-light helps you stay informed and prepared for emergencies.

_ AM/FM/Shortwave Radio Reception
_ Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)

_ Built-in white LED light source
_ 12 international bands
_ Dimensions: 6-1/2"W x 5-3/4"H x 2-1/4"D
_ Weight: 1 lb. 2 oz.
_ Power Source: Built-In Rechargeable Ni-MH Battery Pack; 3 AA Batteries (not included); Crank power alone; AC Adapter (not included); AC Adapter recharges built-in Ni-MH battery pack
_ Available colors: Metallic Blue, Metallic Red, Sand

FR300 $50*
All-In-One

This all-in-one unit offers functionality and versatility that makes it ideal for emergencies.

_ AM/FM/TV-VHF/NOAA Radio Reception
_ Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)
_ Can be powered from four different sources:
  1. The built-in rechargeable Ni-MH battery that takes charge from the dynamo crank and from an AC adapter (AC adapter not included)
  2. 3 AA batteries (Not included)
  3. The AC adapter alone (AC adapter not included)
  4. The dynamo crank alone, even with no battery pack installed
_ Cell-phone charger output jack 3.5mm (various cell phone plug tips included)
_ Built-in 2 white LED light source and one flashing red LED
_ Weather alert
_ Dimensions: 6-1/2"W x 6"H x 2-1/2"D
_ Weight: 1 lb. 3 oz.

S350 Deluxe $150*

High-Performance Field Radio with Stereo Headphones

For S350 devotees the deluxe model combines a sporty new exterior with the same unrivalled functionality.

_ Highly sensitive analog tuner with digital display
_ Large, full range speaker with bass & treble control
_ Clock, alarm, and sleep timer
_ Built-in antennas and connections for external antennas
_ Headphones included
_ Dimensions: 12-1/2"W x 7"H x 3-1/2"D
_ Weight: 3 lb. 4 oz.
_ Power Source: 4 D or AA Batteries (not included) or AC Adapter (included)
_ Available colors: Metallic Red, Black ■■

Improvements over S350:

_ FM- stereo via headphones
_ AM/SW Frequency Lock
_ Set clock and alarm while radio plays
_ Operates on 4D or 4AA batteries

S350 $100*
Ruggedly Retro

With the look of a retro field radio sporting a rugged body and military-style controls – the S350 also features today's innovation for excellent AM, FM, and Shortwave reception and a large, full-range speaker for clear sound.

_ AM/FM/Shortwave Radio reception
_ Highly sensitive and selective analog tuner circuitry
_ Liquid Crystal Display (LCD), for frequency and clock display.
_ Digital clock with selectable 12/24 hour format
_ Dimensions: 10-3/4"W x 7"H x 3-18-1/2"D
_ Weight: 3 lb. 2 oz.
_ Power Source: 4 D Batteries (not included) or AC Adapter (included)

YB550PE $100*
Digital expertise

Offering high-tech digital performance and portability, the YB550PE packs performance into a small radio. Palm-sized and only 11oz, the YB550PE can receive AM, FM, and continuous Shortwave across all 14 international bands.

_ Shortwave range of 1711 – 29,995 Khz
_ Autoscan, direct keypad, and scroll wheel tuning
_ 200 customizable station presets
_ Alarm and sleep timer functions
_ AC adaptor and supplementary antenna inputs
_ Dimensions: 3-1/2"W x 5-3/4"H x 1-1/2"D
_ Weight: 10.5 oz.
_ Power Source: 3 AA Batteries (included) or AC Adapter (not included)

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*Prices do not include Shipping/Handling and applicable taxes.
To order, please call us toll free at 1-800-793-6542

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RE_INVENTING™ RADIO
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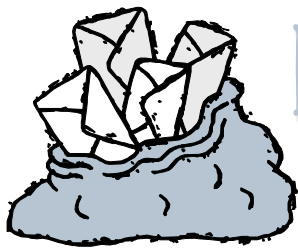
Though I've never made it to the Dayton Hamvention myself (someday soon, I promise!), it's such a big event in the amateur radio world that we traditionally focus on ham radio in our May issue. The Federal Communications Commission has squelched speculation that they might announce their ruling on eliminating the Morse Code requirement (WT Docket 05-235) at the Hamvention, so at presstime, that decision is still pending.

I hope you enjoy this month's selection of feature articles which look at both the past and the future of the hobby. One article gives some tips on passing the initial exam to get your ham license, but I'd also like to remind licensed hams that it's easier than ever nowadays to renew your license by doing it online at **http://wireless.fcc.gov/uls/** There are instructions on the page, but the most critical piece of information you will need is an **F**CC **R**egistration **N**umber (FRN), which is obtained by registering through the FCC's **CO**mmission **RE**gistration **S**ystem (CORES), also online.

– Rachel Baughn KE4OPD, Editor

MT Sparks Memories

"Various pages of personal interest lead to a renewal of now dearly loved *MT* –

"Several issues ago, it was a picture of NOAA's research ship anchored at 'Clipperton Island,' a French-claimed atoll, which in the starting weeks of WW2 Pacific warfare was sited to become a major airfield stop-off/stepping stone in case Hawaii was overtaken.

"Secondly, pages 14-16 of *MT*'s Feb '06 issue gave in great detail the story of the WW2 German military code machine, Enigma. It reminds me we would do well to always be mindful today that it is most certainly 'A-Okay' to listen in/read, spy upon everything and everyone to achieve the winning hand as occurred for WW2.

"As an aside, ye old Adolf Hitler was a hand carrying Army message-runner during WW1, and it was his order that gave understanding, birth, and encouragement to their Enigma planning.

"Only one senior German Command leader sent a complaint to Berlin headquarters, "They're reading our messages!" He, Field Marshall Albert Kesserling in the field in North Africa and later Italy, received the reply, 'That is impossible' on each enquiry. As I flew bombing missions in a Martin B26 over Germany I often looked out the aircraft and wondered how the heck could this German enemy NOT know we're coming and to what target??"

– Edward C Kranch

Did you know there are still Enigmas messages that have resisted all efforts to decode them? This month's Utility World reports on one message that has just been successfully cracked.

Old School versus New School

Musings by Lee Reynolds KD1SQ

I've been watching the steady ascent of the Software Defined Radio (SDR) for quite a few years now. I think we've seen the devices mature to the point that they're now going to start changing the way that radio hardware is done forever.

Let me illustrate – WiNRADiO has ***three*** very nice external receivers on the market now that are largely software defined. They are the G303e, G313i and the very new G33em maritime receiver. All three are probably 90%+ similar in terms of their hardware, yet offer differing capabilities and are aimed at differing end users or markets…and are differently priced! What's the main difference? *Software!*

Yep, think of the *hardware* (what you and I would have called the *radio*, until recently) as becoming a comparatively (compared to the past) unimportant component of the radio. The *software* has become the radio in terms of abilities, ergonomics and aesthetics. Something that's pretty intangible is morphing into the most 'touchable' aspect of something that was only ever accessible in steel, plastic and glass before.

Before you say "Ridiculous" and dismiss what I'm saying, consider what happened to the typewriter after the affordable PC came onto the market. A century-old industry, established worldwide, absolutely the epitome of heavy metal and essential to business everywhere. Gone. Blindsided. All because of the PC and the first truly usable word processing software packages.

Guess what? Digital signal processing (DSP) hardware and techniques are now sufficiently well developed that they're going to start replacing large chunks of radio circuitry. In the case of the WiNRADiO G303x products, your sound card is actually playing the role of an old school radio's IF and audio stages. Instead of capacitors, resistors, inductors and tubes, you have a smart bunch of integrated circuits (ICs) that can be told by software to behave with a signal in the same way as those capacitors, resistors, inductors and tubes would. Actual physical components or software running DSP circuitry – who cares? The net product is the same!

At present, the speed of DSP processing isn't high enough to readily handle VHF frequencies and up, *but it will be soon*. It already

handles our familiar 0-30 MHz spectrum, and there are radios/spectrum analyzers that are SDRs on the market that do this. DSP device costs are coming down, their power is increasing, and radios largely based on discrete analog circuitry are going to be joining the Underwoods and IBM Selectrics within a decade or so due to market forces. Why go to the expense of manufacturing different analog radios when you can produce one line of flexible DSP hardware and sell many different radio applications for it?

As I said in the first paragraph, I've been watching these changes and thinking about them for quite a while. Here's a prediction for you – The future equivalent of a table top radio is going to split into two distinct components:
1) A heavy duty DSP card for the PC that is cheap and commodity-level/generic, and
2) Much more expensive application code that turns that DSP card into the radio you wanted.

In the same way that your present day PC's sound card can record simple little audio clips with a freeware application *or* turn into a full-fledged recording studio with a high-end audio production package, you're going to be buying hardware that's pretty basic and then you'll be comparison buying for that perfect software radio package to make that hardware sit up and beg! You'll own *multiple radios* on CD-ROMs and *one* piece of *hardware* on which all those radios run.

My comments may sound like heresy to some of you and like hope to others of you. Like it or not, this is what we face, just as we face the changing world of shortwave radio itself. Myself, I plan on taking good care of my analog desk top sets *and* having fun with these new radios that are appearing on the market. Change for its own sake isn't mucah good to anyone, but necessary change has to be embraced. – Let's get with it, people, or we, as SW hobbyists, will wind up as an interesting and obsolete footnote in the radio history books!

(See page 69 for Lee's review of the WiNRADiO G313e, which sparked the above cogitations!)

This page is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be rephrased or shortened for length and clarity. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com

Happy monitoring!
- Rachel Baughn, KE4OPD, Editor

COMMUNICATIONS

AMATEUR RADIO

Dayton Hamvention Award Winners

Dayton Hamvention®, held this year from May 19 until May 21, annually attracts more than 25,000 people to the greater Dayton, Ohio, area for exhibits, a humongous flea market, forums and educational sessions.

This year the Hamvention named Gordon "Gordo" West, WB6NOA, *Amateur of the Year* for his efforts in recruiting and training many new amateurs, in addition to his nearly lifelong involvement in ham radio. Riley Hollingsworth, Special Counsel in the FCC Enforcement Bureau at the FCC's Gettysburg, Pennsylvania, office, will receive Hamvention's *Special Achievement Award* for his efforts in resurrecting the FCC's Amateur Radio enforcement effort. Richard "Dick" Illman, AH6EZ, was picked to receive the 2006 *Technical Excellence Award* for his work as principal staff engineer at Motorola in developing a broadband over power line (BPL) system for his company that essentially eliminates HF interference.

Radio Amateurs "Part of the Solution"

Addressing the FCC independent panel reviewing Hurricane Katrina's impact on communication networks, ARRL Alabama Section Manager Greg Sarratt, W4OZK, praised Amateur Radio's ability to get the job done.

"Amateur Radio operators themselves were part of the solution, providing experienced communications operators to replace and supplement local public service communications personnel in the devastated area," Sarratt said.

Sarratt headed the volunteer effort to process Amateur Radio volunteers headed to the Gulf Coast to assist recovery operations. Sarratt told the FCC panel that his operation was able to process and deploy more than 200 Amateur Radio volunteers from 35 states and Canada to devastated communities.

"We deployed several hundred thousand dollars worth of equipment and resources to the area," Sarratt told the FCC panel. "Indi-

vidual amateurs and dozens of Amateur Radio manufacturers donated thousands of dollars of radio equipment and resources." Ham radio volunteers or clubs supplied self-contained communication vans and trailers that were effectively utilized in the disaster area, he added.

"The ARRL and Amateur Radio will continue to prepare, train, practice and test ourselves for the next event," Sarratt told the FCC panel. He told the panel that interoperability is the most important thing Amateur Radio can bring to the table in emergency and disaster communications. ARRL President Joel Harrison, W5ZN, recently named Sarratt to serve on the ARRL National Emergency Response Planning Committee.

Mississippi Adopts PRB-1 Statute

Perhaps in recognition of the service Amateur Radio operators have made to the state, Mississippi became the 22nd state to enact a revision of its statutes to incorporate the language of the limited federal preemption known as PRB-1. Echoing the language of PRB-1, the measure calls on localities establishing ordinances regulating antenna placement, screening or height to "reasonably accommodate" Amateur Radio communication.

"This legislation supports the Amateur Radio Service in preparing for and providing emergency communications for the State of Mississippi and local emergency management agencies," the statute reads.

North Carolina Next?

Hams in North Carolina worry that local zoning regulations and the restrictive covenants of some communities could weaken their response to a major hurricane or disaster.

"During a storm, we're at the emergency operators' center, we're at the shelters and we're at the hospitals," said Bill Morine, who is a spokesman for the 21,000 hams across North Carolina. "Where we're not, is in the neighborhoods."

The reason for that, he and other hams said, is cable television. (See this month's *On the Bench*.) With the rise of cable TV in the 1970s, some local governments and nearly all communities with homeowners' agreements banned exterior antennas and large satellite dishes.

Now hams are mounting a public campaign of education as well as lobbying state capitols and Congress. They want neighbors to know that the revolution in miniature electronics has also made amateur radio equipment smaller and less obtrusive. "We're talking about stringing up horizontal wires that nobody can see from the street," Morine said. They want developers to know they can

rewrite their covenants to allow amateur radio antennas and still protect property values (perhaps even augment them).

And, they want lawmakers to step in to make local planning rules consistent statewide. The group would like North Carolina to join the 21 other states (now 22, see above story), that changed their laws to make it easier for hams to get city planning approval for antennas.

The group also backs HR 3876, a bill pending in Congress that would go further than the state proposal by requiring that private land covenants be no more restrictive than state and local land-use rules. The bill is co-sponsored by Rep. Mike McIntyre, D-N.C.

How NOT to Deal with Interference

This month's *On the Bench* column and our nostalgic feature article mention two ways of handling ham-related interference issues. But it seems to us some local police in Virginia got overly heavy-handed about it.

"They treated us like we were criminals. Like we had been convicted of something," said Dennis L. Alford, a licensed ham who is retired and works as a greeter at the Wytheville, Virginia, Wal-Mart. He and his wife were both volunteers with the Wythe County Volunteer Rescue Squad for many years.

County and town law enforcement officers arrived at the Alford's house one day in March with a search warrant, claiming Alford had caused interference to local law enforcement radio dispatch transmissions from the Wal-Mart location and from his home. While keeping them under surveillance, the police search turned up five two-way radios, four scanners, a computer, a power supply, radio tuners and an amplifier, all of which they seized.

According to the report in the *Wytheville Enterprise*, Dennis Alford said, "A lot of the equipment I have is from being in the rescue squad ... I have never modified any of it. I've never interfered with any police transmissions. If I did, it was unintentional."

A discussion of the story on **eham.net** noted that Wal-Mart stores often use inexpensive Motorola radios on MURS frequencies. Two MURS channels (154.570 and 154.600 MHz) would be very close to Wythe County Sheriff dispatch on 154.785 (141.3 PL, 156.090 input), and the town of Wytheville on 154.325 (153.770 input).

Charges are pending further investigation, according to an assistant attorney, who (contrary to the unnamed reporter) fortunately recognized that they would have to prove criminal intent.

Laws Amended

Nearly two years ago, a South Dakota

ham named Jason was charged with Unlawful Interception of Telephone Communication (maximum penalty 5 years in prison!) after a neighbor in an adjacent apartment reported hearing her phone echoing through the wall that separated their apartments.

Jason wrote, "I'm happy to report this battle was fought and WON in the 2006 legislature. A bill to fix this law was approved with only one dissenting vote. The bill changes the wording of the eavesdropping statute from 'knowingly and by means of a device' to 'intentionally and by means of an eavesdropping device,' where an 'eavesdropping device' is any device operated WITH INTENT to intercept such communication."

However, South Dakota still prohibits scanners in a place of business or vehicle without a permit or FCC license. Michigan also had a similar law on the books, which required anyone without an FCC license to apply to the Michigan State Police for a permit to carry a scanner in a vehicle. That requirement was finally removed in March, thanks to the efforts of folks like Mark Bajek, who writes:

"I'd like to express thanks to Michigan House Rep. Kevin Elsenheimer for sponsorship and eventual passage of HB4544.

"I'd also like to thank the countless others who over the years took the time to express their thoughts to Michigan legislators and government agencies, to those who gave space on their websites and in the pages of magazines to inform "unawares" of the presence of the old law and ask that it be changed.

"Thanks also to those who decided to apply in large numbers to MSP for permits ... your efforts helped prove to the state that only 'law abiding' individuals were applying and that the permit process was simply a waste of money and MSP resources."

– Mark Bajek, Westland, MI

FCC Creates New Bureau

The FCC approved a proposal (DOC-264395A1.doc) to create a new Public Safety and Homeland Security Bureau (PS&HSB) that would assume some functions now under the umbrella of the Wireless Telecommunications Bureau (WTB). It appears that the Amateur Radio Service and other services, which are defined as critical infrastructure but which do not perform public-safety functions, will remain within the Wireless Bureau.

"Communications" is compiled by editor Rachel Baughn KE4OPD from newsclippings provided by our readers. Many thanks to this month's fine reporters: Anonymous NY, Azizul Alam Al-Amin, Mark Bajek, Kevin Carey, John Carson, Mark Cobbeldick, Bob Grove, Douglas Harrigan, Norman Hill, Walt Ireland, Merlin Jacobs, Sterling Marcher, John Mayson, Hue Miller, Jerry None, Ken Reitz, Doug Robertson, Brian Rogers, Henry Ruminski, Greg Smith, Robert Thomas, Larry Van Horn, Dan Veeneman, Cliff Watts, Ed Yeary

Hams with a Mission

How peacekeepers, missionaries, scientists and doctors do their work, often for free, while keeping DX chasers happy.

By Ken Reitz KS4ZR

DXpeditions to distant parts of the world financed by DX societies have been common for decades in amateur radio. These trips are a holiday for the participants, a real radio adventure often including harrowing sea journeys and difficult operating conditions. But, such DXpeditions are very brief, well financed and within a few weeks the DXpeditioners are safe at home toasting their success in the friendly confines of their local watering hole.

There are others, though, whose radio exploits from seldom heard DX countries are secondary to their real mission. These are United Nations peacekeepers, scientists from many countries, missionaries, doctors, and Peace Corps volunteers, among others. These hams are on site for weeks, months, even years, often living under the same conditions as the people of their host country. It's a rough life, and one most of us stateside are unlikely to ever know. The remote nature of these sites means there's often no phone service and only sporadic electric service. For many, contacts with hams from the home country are a welcome sound.

Getting on the air for these hams is no easy task, either. Some countries are suspicious, at best, of foreigners, and those wishing to set up international communications via radio come under closer scrutiny. License fees are often exorbitant by U.S. standards and may require the applicant to be fluent in the native language. Would-be hams may have to travel across the country to visit their Federal Communications Commission equivalent, only to be met with a mountain of red tape. But, to the many thousands of DX chasers worldwide, these hams represent perhaps the only chance to work many of the elusive country prefixes, most notably those from the dozens of nations of Africa and southern Asia, whose native base of radio amateurs is extremely small or nonexistent.

Ham radio equipment manufacturers aren't clamoring to loan their latest gear for the cause, either. Volunteers have to borrow or buy the equipment themselves. Tropical climates take a real toll on electronics, forcing a premature end to otherwise long-lived gear. Local repair is often unavailable and the cost of shipping to overseas repair facilities can be prohibitively expensive or risky.

U. N. to the Rescue

The United Nations provides a wide range of help in service to the world's victims of natural disasters, hunger and civil unrest. It's an endless effort and requires all manner of skills, including soldiers, doctors and, yes, telecommunications specialists.

Michael Dirksen, a Belgian telecom specialist working with the United Nations World Food Program, found himself in Bujumbura, the capital of Burundi, a small country in Africa wedged tightly between Tanzania, Uganda, and the Democratic Republic of Congo along the east coast of Lake Tanganyika. His time in Burundi would be only six weeks, so he wasted no time applying for a license. The license fee was $250 and good only for two months. In two weeks he had his call: 9U5M. He put a vertical antenna on top of the small hotel where he was staying and operated with 60 watts from a Yaesu FT857. Time was tight, but he managed to rack up a fair amount of QSOs in only a few weeks.

Michael Dirksen is a Belgian telecom specialist with the United Nations World Food Programme. Last year he found himself in Burundi, Africa where he operated as 9U5M. (Courtesy: Michael Dirksen)

Patrick Molloy, EI5IF, is from Dublin, Ireland, and a soldier with United Nations peacekeeping forces (see photo). He drew a lengthy assignment in Monrovia, the capital of Liberia, during the turmoil of 2004 and found himself back again from November 2005 to May 2006. He also operated from his hotel room when not on duty, giving many hundreds of hams the elusive EL prefix on many HF bands.

The Science DX Shack

Dave Taylor, an Australian, spent three months as VK0MT doing research on Macqua-
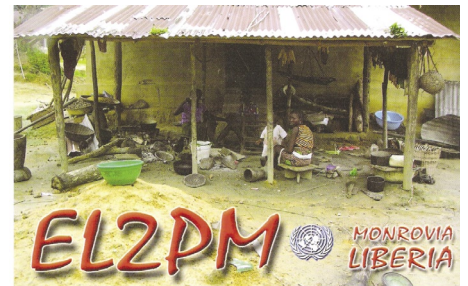
Patrick Molloy is a soldier with the United Nations Peacekeeping forces stationed in Monrovia, Liberia where he worked the world as EL2PM. (Courtesy: Patrick Molloy)

rie Island, a World Heritage nature reserve administered by the State of Tasmania, Australia. The research station is maintained year round on the island as part of the Australian Antarctic Program. He found it was tough to operate as much as he wanted to, but even so he managed to make 2,700 contacts on HF during his stay. According to his QSL card, the research station "...is on the same site as the radio relay station established in 1911 by Sir Douglas Mawson, used to relay the first message from Commonwealth Bay, Antarctica, to Hobart, Australia. It is Australia's oldest Antarctic research station, operating continuously since 1948."

Paul Budanov, UX2HO, is from the Ukraine, but found himself at Vernadsky Base operating as EM1HO on Galindez Island, the Ukrainian Antarctic outpost. It snows there 250 days a year on average, and the temperature

David Taylor VK0MT worked in a little DX when he was doing research on Macquarie Island part of the Australian Antarctic Program (2,700 contact in 3 months!). (Courtesy: David Taylor)
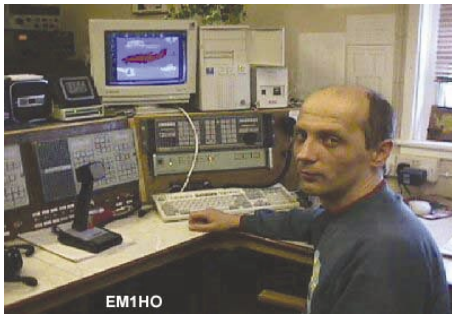
Paul Budanov, UX2HO, is from the Ukraine but operates as EM1HO from Galindez Island, Vernadsky Base Antarctica. (Courtesy: Ukrainian Antarctic Club Station)

ranges from 0 to +2° C in the summer to -2 to -25° C in the winter. Sunshine is counted in hours, not days, and there are about 840 of them a year – the equivalent of 35 days. EM1HO is very active on PSK31, a weak signal digital mode, perfect for hams operating with 100 watts and a dipole.

Tomasz Lipinski, SP3WVL, is from Poland but did a stint at the Polish Antarctic Base "Arctowski" on King George Island in the South Shetland Islands, off Antarctica and stretching out to the lower reaches of South America. The research station's amateur call sign is HF0POL, and there have been many operators signing that call since 1978 when the call was issued. If you work HF0POL, be sure to QSL via the home call of the operator you worked.

Tomasz Lipinski is from Poland and worked at the Polish Antarctic Station on King George Island in the South Shetland Islands where he operated using the Polish Antarctic Station's call: HF0POL. (Courtesy: HF0POL)

Multi-Purpose Missionary Hams

For decades, religious organizations of all faiths have sent hundreds of hams throughout the world as missionaries to preach and teach to those in the most remote regions of the world. Often bringing much needed medical and pharmaceutical supplies, they also bring expertise in water resources management, environmental education and a host of other disciplines which could make a great difference in the lives of people whose governments are vastly underfunded or poorly directed.

Jan Heise, K4QD, who lives in Florida, has made several trips to Haiti in connection with the Northwest Haiti Christian Mission (NHCM). When he's there he operates as HH4/K4QD. The mission was founded in 1979 and

operates an educational campus which houses a school, Bible college, and medical facilities as well as a home for elderly Haitians and special needs children. Without the activities of NHCM, these are just a few of the people who might be swept away in the daily turmoil of political strife in this ravaged country.

David Firth, 5X1DF, operates out of Kampala, Uganda, where he has lived and worked for the last three years. His home call is KH9AE and he works for Blessings For Obedience (BFO – no pun intended!), a radio ministry based in Midland, TX. David travels to several countries in East Africa as part of his work, but in his spare time he's at the controls of his Icom 706 running 100 watts into a 2 element 5-band MA-5 beam. You might find him between 2100 and 2300 Z working the 15 and 20 meter bands. BFO can also make good use of your excess amateur radio gear. Check out

Jan Heis K4QD lives in Florida but has occasion to operate in Haiti as HH4/K4QD with the Northwest Haiti Christian Mission in St. Louis du Nord. This photo is from his trip in February 2005. (Courtesy: Jan Heis)

The Ukrainian Antarctic Club station EM1U is located at the Vernadsky Research Station on Galindez Island, Vernadsky Base Antarctica. (Courtesy: Ukrainian Antarctic Club)

their website for details on how you can help and for a schedule of their shortwave programming. **http://www.blessingsforobedience. homestead.com/RadioNetSchedule.html**

Peace Corps Volunteers

Jim "Bull" Bullington holds the stateside call N4HX, but in Niger he's known as 5U7JB, where he's the Director of the U.S. Peace Corps program. A former career diplomat and U.S. Ambassador, Bull, as he's known on the air, has operated as HS5AFJ, N4HX/TT8, TYA11 and 9U5JB. QSLs for all on-air contacts must be made through his QSL manager ON5NT.

Bull is a very active ham and works the inevitable pile-ups from his home-based radio shack in Niamey, Niger, often until propagation totally disappears. His easy pace and personal attention to each station calling requires would-be contacts waiting in the wings to be patient. If you get a chance to work him, no doubt he will go on at some length about service in the Peace Corps and the young volunteers in his charge, as well as the various countries in which he has lived and worked. You'll always learn something new when you talk to him.

While few Peace Corps Volunteers (PCVs) are hams, it's considered a plus on your application. Volunteers have to use their own resources in obtaining and paying for their in-country call signs and setting up their own stations. Like their missionary counterparts, PCVs are usually assigned to remote regions of countries without much infrastructure. Letters to and from home can take weeks or months, so the prospects of chatting "real-time" with stateside family and friends is cherished. When you hear them in such QSOs, give them as

REPUBLIQUE DU NIGER
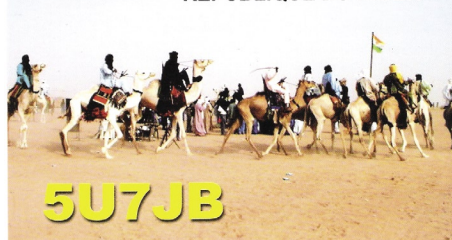
5U7JB

Jim Bullington is the Director of the U.S. Peace Corps program in Niger where he operates from Niamey as 5U7JB. (Courtesy: Jim Bullington)

much time as they need before chiming in.

The Final Frontier

Let's not forget the volunteers selected for the most arduous and prestigious of outposts: space. Nearly all scientists, military and mission specialists aboard the ISS and earlier *Mir* and Space Shuttle missions carried the call signs of their homelands into space with them. As with all scientific expeditions, mission members work the ham rigs when there's time. But, it's more than just a distraction to have amateur equipment on board. Few will forget the riveting drama listeners heard from *Mir*, the old Soviet space station, as amateur radio was used to provide situation updates after the hull was punctured by a supply ship.

Monitoring the ISS is extremely easy and requires no more than a hand-held scanner. First, program the downlink frequency, 145.800 FM, into your scanner. Now all you need to know is when you will be within the "footprint" of the ISS. To find out, just check into **http://spaceflight.nasa.gov/real-data/tracking** and wait for the next favorable pass.

When they're not operating voice, the packet digipeater sends and receives packet contacts from ground stations. You'll have to turn your squelch off in order to hear the ISS approach, known as Acquisition Of Signal (AOS). It will be very faint at first. You'll only hear one side of the QSO, but the audio will build dramatically in the next couple of minutes until you can clearly hear the on-board operator working the ground stations. A typical pass lasts only 10 minutes. With Loss Of Signal (LOS) the ISS fades just a dramatically as it came, but the excitement of actually hearing it lingers for some time.

Ultimate Ham Spirit

All of these hams have asked for these assignments. They willingly endure the hardships and give up a certain part of their lives to help others in need directly or indirectly. And, when they have some time off and can slip away to their rigs, they brave the havoc of the ham bands. They endure the pile-ups of frenzied and sometimes rude operators with only one shallow need: that all-important DXCC contact. So, when you hear one of these exotic calls, be patient; you'll work them eventually. And stick around the frequency. Over the course of a few dozen QSOs with other hams from around the world, you'll learn a lot about the operator and gain an insight on what it's like to live and work where they do.

Remember that SWLers can enjoy listening to the volunteers, too, by monitoring the nets or listening to the pile-ups. You can also get QSL cards from these stations, but you'll have to follow the same rules as the hams. QSL only via the route indicated by the operator (manager, QRZ.com, etc.). Don't forget to include a self-addressed envelope and proper amount of money ($U.S.) for postage or IRCs, depending on what the operator requires. With some, sending your report via the bureau will work, but you should be prepared to wait a

long time.

Finally, there may come a time in your life when you're looking to do a little more than your current 9 to 5 work. Perhaps you'll consider spending time as a volunteer abroad. Many church organizations offer short trips to those with skills who want to make a change in the lives of the less fortunate. And, for longer term activities there's the Peace Corps where age is no barrier and experience counts.

Whatever you might choose, don't forget to work your radio hobby into the move. Find out what you'll need to make operating a reality and prepare for a life altering change.

Missionary Amateur Radio Networks
Halo Net (Daily) 21.390 MHz USB (2-3 PM ET)
Hams for Christian Missions Net: Mon, Wed, Fri: 14.327 MHz 0100-0400 Z
Amateur Radio Missionary Service (ARMS) Mon-Sat 14.307.5 1500-1700 Z

Amateur Radio Missionary Service Regional Nets:
East: Mon-Thurs 7:00 AM (ET) Sat 9:00 AM (ET) 3.907 MHz
Southeast: Sat. 9:00 AM (ET) 3.900 MHz
South Central: Sat. 8:00 AM (CT) 7.226.5 MHz
Midwest: Sat. 8:30 AM (CT) 3.905 MHz
Rocky Mountain: Mon-Sat 7:00 AM (MT) 3.993 Mhz
Northwest: Thurs. 7:00 AM (PT) 3.984 MHz

International Space Station Frequencies
Worldwide downlink for voice and packet: 145.80
Worldwide packet uplink: 145.99
Region 2 voice uplink: 144.49
Worldwide uplink for cross band voice repeater 437.80
Russian callsigns: RS0ISS, RZ3DZR
U.S.A. Callsign: NA1SS
Packet station mailbox callsign: RS0ISS-11
Packet station keyboard callsign: RS0ISS-3
Packet Digipeater: ARISS

FOR MORE INFO:

Live from the "Great Green Sponge." Look over the shoulders of Antarctic scientists with this live web camera from Macquarie Island.
http://www.aad.gov.au/asset/webcams/ macca/default.asp

Want to help hams affiliated with Radio Ministries? They can use your old rig to help keep missionary hams on the air. Check out this web page which tells you what they need and how you can help: **http://www. radioministries.org/nets.htm**

Want to tune into the hams on the "final frontier?" Find out where the International Space Station is right now: **http://space-flight.nasa.gov/realdata/tracking** The red circle around the ISS on the graphic indicates the ground "footprint" within which ground stations may be able to make contact. Find out who's been chatting the ISS: **http://www.ariss.net**

Tales of a Teenage Radio Amateur - Circa 1957

By Greg Smith, WB2PPQ

I grew up in the small country town of Mendham, New Jersey. This was a quiet community with a few local stores, four churches and three farms. Back then, young people had to find an interest or hobby to provide entertainment. From early childhood, I was fascinated with radio and would scavenge any radio that I could find at curbside or buy for a quarter at the local church rummage sale.

Even during elementary school I was able to fix these wonderful radios with tuning eyes and rotating antennas. Some were floor models and others were table models all housed in wood cabinets. Many had receiving bands with foreign countries identified on various parts of the dial. Then there was that dial inscription, "amateur."

Needless to say this literally sparked my interest in the wonderful hobbies of amateur radio and short wave listening. But for this soon-to-be ham (radio amateur), obtaining equipment meant "rolling my own" or "home brewing."

The *ARRL Handbook* at the local library became my resource for circuits for construction projects. The first task was to learn how to read a schematic diagram with all the funny looking symbols and all those lines and dots. Then there was learning to associate the part to the drawn symbol. This was also the starting point to learn component color codes. Resistors were easy to understand, but the mica capacitors with different number of dots and the arrow seemed to challenge my intelligence.

Once I felt confident that I'd mastered how to read an electronic schematic, it was time to find a suitable receiver to construct. I chose an 80 Meter regenerative receiver from the *Handbook*. Parts would need to be located to match the provided parts list. (Just as a reminder: photocopiers were not yet invented. You had to copy all the necessary information on paper by pencil. The highest tech device for copying was carbon paper. Hopefully, the librarian would not catch me tracing the schematic diagram. This would surely be a major offense!)

Creative Parts Sourcing

There were no Radio Shack stores back then. If your family was wealthy, you could order parts from Allied Radio. For me, on a 75-cent weekly allowance, I needed to be creative on sourcing parts. Parts, such as tube sockets, resistors, condensers (now called capacitors) and switches, came from old receivers found in junk yards and church rummage sales. Electronic circuit laws were applied to obtain the needed component value by placing components in series, parallel or a combination of both. This practice was to come in handy at a later date when taking the FCC radio amateur examination.

Creativity was essential to fabricate coil forms. These forms were made from cardboard tubes and bases removed from vacuum tubes. Detaching the Bakelite base from the glass envelope of a tube was a major chore and safety hazard. You had to carefully twist the glass tube and Bakelite base in opposite directions and hope for the best. The cardboard tube was secured to the tube base – usually four prongs – with Duco model cement. The coil form was now complete, ready to be wound with enamel covered copper wire.

Early chassis design was even more creative: two slats of wood spaced about 1-1/2 inches apart and secured to two side sections to form the chassis. The tube socket was secured between the wood slats with wood screws. Using this method, the socket terminal lugs were exposed to permit the circuit components and wire to be connected. The preferred practice of using short leads for RF circuits had not been acquired at this point.
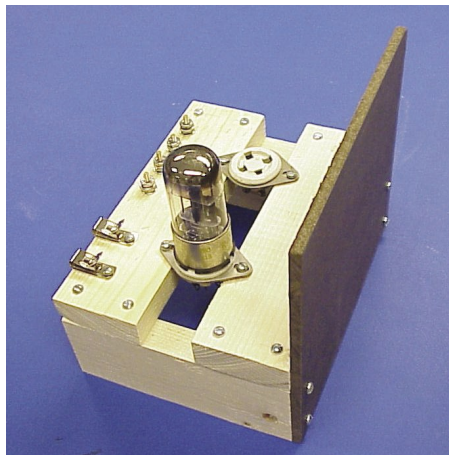
The front panel consisted of a piece of scrap plywood. Another trick was to go to a general store and obtain an empty wooden cigar box; the folding lid could be removed and used for the front panel.

Variable capacitors were always a nightmare to obtain. I was able to smooth talk one from a friend whose dad worked at Bell Telephone Laboratories. I was always jealous of this friend. He had box after box of all brand new components. Leaded parts had l-o-n-g leads – a la Bell Labs. After much pleading, my friend permitted me to have one variable condenser of the required value.

My early receivers were powered by discarded telephone batteries scavenged from the local Bell Telephone Central office. These were really neat; they were gray and had numerous fahnestock clips for obtaining various voltages. A number of batteries could be put in series to obtain "B+" for the plate voltage.

Construction and Testing

All the parts were finally collected and construction began. The coil was wound and secured with some of my mother's nail polish. Resistors, capacitors and wires were soldered with a wood burning iron. (This device is no longer marketed to youth, due to the safety and legal considerations.) The variable condenser was centered on the plywood and the circuit wiring was completed. My masterpiece was now finished!

The antenna, which was a random length of wire that ran from the house to the back barn, was connected to the receiver's antenna post. I was now ready to apply filament voltage from the "A" battery; it was truly magic to see the vacuum tube filament glow. Next, the "B" battery was connected to the vacuum tube plate circuit. I put on my Cannon headphones and I could hear a hissing sound; this was a good sign! Then I advanced the potentiometer labeled regeneration.

Wow, an awful squeal was heard instantly! Instinct caused me to return the regeneration control to its original position. This time I carefully advanced the control, and after I heard a pop, suddenly I heard shortwave Teletype signals. It worked! I was soon to discover that bringing my hand close to the tuning condenser did crazy things. The frequency would change and the regeneration did indescribably strange things. No words could do them justice.

Getting the correct receive frequency was seat of the pants trial and error, since I never had the specified gauge wire for the coil. But

using a commercial receiver, I was able to trim some of the turns of wire from the coil. The sensitivity of these simple regenerative receivers was amazing; however, the selectivity was nearly non-existent. No BFO (beat frequency oscillator) was needed; CW (continuous wave) code signals were heard clearly.

Mastering Morse Code

80 Meters CW was packed with signals, and you could always identify the Novice portion of the band by the very slow speed of the sender. Many people had entered into this hobby back in the '50s, especially Boy Scouts who gained merit badges upon mastering Morse code. Many scouts became hams due to this introduction.

Next it was my turn to learn this mysterious "secret language." I obtained the alphanumeric Morse code table from the *ARRL Handbook.* I started with a few letters first, mainly the letters "A" and "E". I would listen to a slow sender and listen for these letters to be sent. Soon, I could clearly identify these letters. It indeed was a milepost and a proud moment in time.

After several weeks of listening I wrote down a complete word – hurrah! This was truly exciting and fun. As weeks passed I started to be more proficient and was able to copy a complete sentence.

After learning Morse code with some proficiency, I needed to learn the material for the written test. This was a real cinch since I had mastered most of the technical material in order to build my receiver. I only needed to memorize some Novice frequency bands and some basic Federal Communications Commission rules.

At that time, any willing radio amateur that had a General Class License could administer the Novice FCC test and submit it to the FCC by mail. A local ham gave me the code test and then the written exam. This ham informed me that I had successfully passed both tests, another milepost! The FCC was very slow back then to process radio amateur licenses. After many weeks (10 to be exact), the envelope arrived with the official FCC return address. I ripped open the letter with great excitement to see my call assignment – WV2NAV. This was printed on my station license and was a great day in my life.

The "V" in my call sign indicated that I was Novice class. I could now participate in our town's "Civil Defense." Nuclear war was

a real threat in the '50s as relived monthly at the local elementary school bomb drill. Students had to proceed in orderly fashion to the school basement where we would stand against a cement block wall. There were cans of water and canned food provisions that made this threat feel very real.

Call sign assignments made a lot of sense back then. When you achieved the General Class License, the FCC would change the "V" to an "A". Most hams went on to the more advanced General Class License. For hams in my geographic area, you had to go into New York City to take this exam at the Federal Building.

Graduation time had come and my parents presented me with two boxes. The first box contained a red Wen soldering gun – now that was a good choice. The next box was a bit of a mystery. Removing the decorative paper I saw the name Allied Radio then the words, "Knight Kit – Space Spanner." This was also a regenerative AM plus shortwave radio with a band spread control and it had a speaker! However elementary its receiver design may have been, it was far superior to my home brew receiver. The transformer-less, series filament design would soon prove to be a shocking experience!

CW Transmitter 101

Most teenagers in the '50s made their own CW transmitters out of economic necessity. Few had the resources to buy the Heathkit AT-1 or Ameco AC-1. So for me, it was back to the Mendham Borough Free Library to find a simple CW transmitter circuit. (By the way, *free* really appeared on the library sign; I have yet to find a library that you have to pay to use.)

I skimmed through the trusty *ARRL Handbook* again, seeking an 80 Meter, single oscillator tube, crystal-controlled radio. I had only one available tube, a 6L6 that was removed from an old radio. Also, the tube checked "good" on the

tube tester at the local drug store. Most drug stores had tube testers for their customers and they even had a decent selection of tubes in the cabinet below the tester.

Hours were spent in the library manually copying the chosen circuit since there were no photocopiers. You always heard the grinding noise of the pencil sharpener back then…. even the ball point pen had not yet been invented. Students were continuously sharpening their lead pencils.

Again, the construction utilized a wood chassis, but this time I would use a single large diameter copper wire from a scrap piece of BX cable for the ground buss. A second octal socket would serve as a crystal socket.

Fortunately, a local ham gave me three 80 Meter Novice band crystals. Wire for the transmitter's tank circuit came from windings removed from an old radio transformer. I can painfully remember the difficulty in disassembling the laminate core. This had to be done before the coil became free of the core to unwind the copper wire. The reward for the successful disassembly was many feet of enamel covered copper wire.

It seemed everything regarding coils was an experiment ready to go wrong. With a different gauge wire than was specified, it was trial and error all the way. A Millen Grid-Dip meter would have been a treasured piece of equipment. By the way, my sole piece of test equipment was a neon lamp electrical tester consisting of a neon bulb, series resistor and two test leads with probes.

My transmitter would use an AC power supply for the very first time. This would have a full wave rectifier circuit using a 5U4G vacuum tube. The supply also had filter capacitors, inductor and bleeder resistor, all cannibalized from old radios.

One thing for certain, these simple CW transmitters were easy to construct and they were almost certain to work the first time. Most of these transmitters had the characteristic sounding chirp as heard on a monitoring receiver. To test the transmitter, a standard household light bulb had to be connected to the antenna and ground terminal. My first brass "straight key" was mail ordered from Lafayette Radio. It was
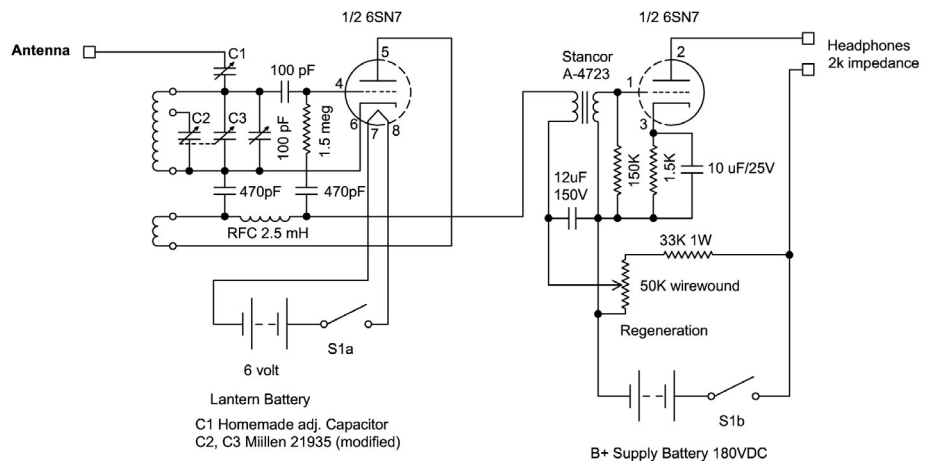
COURTESY OF ARRL "RADIO AMATEURS HANDBOOK" 31ST EDITION 1954

terminated to a telephone plug that plugged into the mating jack on the front panel.

It was time to test the transmitter! I plugged in the power supply, constructed on a separate wood chassis, into the 120 VAC utility outlet, held my breath and said a quick prayer. Bad things had happened before when taking this step. One Smokey experience was learning the difference between the primary winding and the secondary winding of a transformer. Remember, I had no ohmmeter to measure resistance. I soon learned that black transformer leads were primary winding leads.

Next, I placed the toggle switch to the on position and both the rectifier and oscillator tubes lit. I took my trusty neon tester and checked the B+, high voltage; one side of the test lamp bulb glowed brilliantly. This verified that there was DC voltage present. I pressed the key down and the light bulb had a faint glow. I tweaked both the oscillator tuning and tank load variable capacitors for maximum brilliance. The project was a success and everything was working, as it should, although, when I monitored the signal on the "Space Spanner" receiver, I heard just a loud buzz.

One learning experience occurred when my hand slipped off the insulating Bakelite knob on the key and touched the bare brass. Ouch! What in the world was that? I was only touching one thing; my other hand was not touching anything else. The burn seemed to go straight to the bone. This turned out to be an RF burn, which I am embarrassed to say, I still experience now and then.

On the Air!

The final moment had come to put the transmitter on the air. I had to make a good ground, so I found an old baby carriage and removed the axle. I drove this solid rod into the ground near my bedroom window. I ran some hook-up wire from the ground rod through the window to the transmitter ground. My antenna was just a random length of transformer wire from the house to the barn about 100 ft away. I did use nice glass insulators that the local hardware had in stock. Back then, many people constructed antennas, mostly for shortwave listening. I used a Bakelite insulated knife switch to switch the antenna from the receiver to the transmitter.

Zero beating the "Space Spanner" to the transmitter was useless, it would just overload. I would need to set the band-spread control to 3.7 MHz and tune up frequency to hear if anyone would reply to my transmission. The poor selectivity of the receiver did have one advantage; you heard a whole group of signals all at one time. Hopefully one would be a station responding to you.

Calling CQ (request for another station to contact you) for the first time was a frightful experience; I can remember how nervous I was. My hand shook so much that it was difficult to send code. (It did make sending dots a little easier, though.) This was such a giant step to actually go on the air. I also wondered if I could copy the text intended for me.

Numerous times I called CQ, none of which resulted in a reply. I was almost ready to pack it in when I decided I would give it one last try. This time I heard my station call sign! The station was located in New York State. For a beginning radio amateur, even this was considered a distant contact. There must have been many patient hams out there putting up with my chirpy signal and learning curve on CW.

It was an outstanding thought that my little transmitter that I built from scrap parts could reach distant parts of New Jersey, New York, and Pennsylvania. It seemed such a scientific feat to send radio waves out from my antenna to another part of the country.

Cleaning Up My Signal

Everything was going great until a letter arrived in the mail from an Official Observer and I must say that this looked like a serious matter. What was this about? Unfortunately, these simple single tube oscillator circuits could transmit on the second harmonic – that was double your transmitting frequency. The Novice Class frequency band segment presented a real problem with out of the band signals if the transmitter was improperly tuned.

Back to the *ARRL Handbook*: It said an inductor-capacitor tuned circuit to 80 Meters with a small flashlight bulb indicator would solve the harmonic issue and it did. It was held near the tank circuit and if the light bulb glowed you were guaranteed to be transmitting on the fundamental frequency.

TVI (television and radio interference) became a whole other issue to deal with. Properties in Mendham were large in size so chances were that low power transmitters would not interfere with neighbors' receivers. But that didn't matter; if you were a ham and had an outside antenna you were considered guilty until proven innocent. However, even within your own home, the open, wood chassis was a big-time interference maker.

Early TVs in Mendham had to struggle to get stations from New York City; however, the high altitude did help somewhat. There were no high gain Yagi TV antennas back then and most antennas looked primitive.

My father was not understanding about the interference from my new hobby. He would have made a wonderful FCC enforcer! After a few disruptions of his favorite evening TV programs, I was "shut down." With some pleading I was permitted to go on the air during quiet hours, which meant morning hours.

I still had fun filling my station log with QSOs that I made and adding more confirmed states each week. More hams sent QSL confirmation cards back then; postage was practically nothing in cost.

One night I decided to outsmart my father and get up around midnight when he was fast asleep. I heard a W6 station calling CQ. Wow, this was unheard of DX on 80 Meters! I responded to his CQ and to my amazement, he responded. Talk about excitement, my heart was pounding out of my chest. This was a major achievement for me and still represents a pleasant memory today in this wonderful hobby.

Even though I have modern amateur equipment, I like to go on the air periodically with some antique gear – namely a Hammarlund HQ-145 receiver and an Ameco model AC-1 transmitter keyed with an old Ten-Tec Keyer. This brings back those special memories of yesteryear. Also, I can still remember dreaming many a night about those wonderful Hammarlunds and Hallicrafters pictured with "professional equipment" in the back of the *ARRL Handbook*.

I hope this trip down memory lane will inspire some hams to rediscover the joy of antique radio.

About the Author

Gregory Smith currently holds an FCC Extra Class license, WB2PPQ and can be heard often on 40 Meters CW. His station can be viewed on QRZ.COM.

Stop Wasting Time - Just Do It!

By Carl Herbert AA2JZ

You really should make the effort and get that "ham ticket" you've been thinking about all this time! It's never been easier to achieve and the personal rewards can be impressive.

I hear the following excuses all the time. How many have you used?
- I don't have time for that
- It's too technical for me
- Why would I want to do that?
- Do they still use Morse Code?
- I'm too old (too young) to learn.
- It costs too much.
- and more "lame" excuses.

Sure, you'll have to put some effort into learning and at the end there's the actual examination process, but it's really not all that difficult! Let's start from the beginning, and answer some of your questions, hopefully before you ask. Perhaps then you'll realize that being rewarded with your "ham license" is quite possible.

Why would you want to be a "ham"?

There are many answers to this question. Some of them are personal satisfaction (proving I can pass the exam), learning how radios work, joining my friends in the hobby, becoming a more valuable person in my community, and the list goes on according to your interests.

I don't have the time.

Yeah, we're all busy doing something else. But if it's something that interests us, we always seem to shift our time schedules to accommodate. And sometimes getting the license is only part of the motivation.

Take for instance, this true saga of a single parent with a teenager. The child had expressed interest in amateur radio. This *mother* and her son arranged their study times to learn, and both passed their examinations at the same test session. She spent "quality time" with her child, and shared the limelight with him. I assume they celebrated after leaving the testing place!

A similar true story is about a grandmother that wanted to help with the local scout troop, of which her grandson was a member. She passed the exam, but the grandson didn't. He retested at a later date and passed. The lesson is, neither gender nor age disqualifies anyone from becoming a radio amateur. Nor do physical ability, handicaps, etc. None of them are a reason for not becoming a "ham."

I don't know where to go to take the test.

Long ago, the examinations were given by either General Class amateurs (the old Novice Class License) or by appearing at a location specified by the FCC and taking the exam there. It required a trip to the nearest city having an FCC office. For me it was an adventure to the second floor on Varrick Street in New York City, where a cigar chewing examiner awaited. I passed my General, but will never forget that day.

Things have changed! Now, examinations are given by Volunteer Examiners (VE), of which I am one. It is usually the local radio club which holds the examination session. The group providing the examination process advertises the information (time, place, etc.) well in advance. Check with your local radio club to gather information. They can be found by using the ARRL.ORG website, under the banner heading "exams," or also at the W5YI.ORG site.

VEs (Volunteer Examiners) are just that, volunteers. We receive only the satisfaction of knowing that the amateur radio hobby is gaining new members because of our service. A minimum of three VEs must be present for each examination session. We insure that forms are completed correctly, examinations are administered fairly, and that all aspects of the testing procedure are above scrutiny.

You will be required to pay a fee ($14.00) to be allowed to take the examination. This fee pays for postage, printing, etc.

Exam Day!

United States amateur radio licenses are granted by the FCC (Federal Communications Commission) after proving that you have adequate knowledge needed for the class of license for which you were tested. The license is valid for ten years and is renewable.

There are three classes of license: (1) Technician, (2) General and (3) Extra. Examinations increase in difficulty as you progress from level to level, but have additional benefits associated with that class of license. There are study guides available from multiple sources for each class of license. Sources are listed at the end of this article.

Required "Paper Work"

You've studied, and you're ready to pass the examination. Well, slow down there, you have some necessary steps to accomplish before being allowed to test.

Walk-Ins

First, when you found a testing location and date, did the announcement say "walk-ins welcome"? If not, you should contact the testing group to insure that they can accommodate you. It would be a rare occasion when they are unable to do so, but I have participated in testing sessions when the expected number of applicants far exceeded the number of examination documents we had available! (One of our VEs then scurried to have additional documents printed, etc.! It was a chaotic but fruitful day.)

$$$ Money Problems

Second, there's a fee required ($14.00). Do you have the fee in currency, or are you expecting to pay with a check? While checks are acceptable in most locations, exact amount cash makes the process much more convenient. License applicants who have the exact amount of cash available are the VE's best customer! I have sometimes had the task of taking large bills to local vendors, to exchange them for smaller bills, before the process could continue!

Identification & Forms

You will be required to provide two forms of identification, such as a driver's license and perhaps a work picture I.D. card. For those who haven't these items, a library card, birth certificate and the like are acceptable. Check with the examining unit *prior to attending* to see what items will be accepted.

Next you will be asked to fill out FCC Form 610. It is the document used to process your license application. Name, address, etc, the usual identifying items needed to insure delivery of your new license.

The Test

A Volunteer Examiner will place you in the proper area for the examination you are taking. Sessions administered by the group of which I am a member follow the following procedure.

In a school classroom environment (where we usually give the exams), persons taking different classes of license are "mixed." In other words, the persons on either side of you are taking a different class of license test. Therefore, their test is different from yours. All tests are multiple choice, but there are several "versions" of each class of examination. If the person next to you is taking the same class of license, their examination is still different from yours and therefore the correct answers will be different from yours. We believe that all persons are honest, and we intend to keep them that way.

You must first complete the Technician Class license examination, but it does not require that you know Morse Code! So much for one of the fears listed above. You can be a "ham" and not know the code! The Technician test is comprised of thirty-five multiple choice questions, which are basic in nature. By reviewing your study material prior to the examination process, you will have a good chance of answering all the questions correctly.

If by some chance there is a question for which you have "no clue" as to what the correct response is, guess. Make a mark in one of the answer blocks! You have a one in four chance of guessing correctly. An unanswered question is counted as incorrect anyway, so take a chance. You may just pick the correct one!

When you have completed the examination, the VE will take your papers for grading. You won't be told which ones you missed or passed, just that you passed or failed. This keeps the testing procedure more secure.

Follow the VE's instructions. Others are testing around you, and will appreciate your consideration.

Success!

Yippee! All that effort has its reward and you've passed the Technician Class License! You could stop here and leave the testing area, or you can ask to have the General Class Examination administered to you at no additional cost. It's up to you. Testing sessions require that the fee be paid for the first examination, but successive exams may be taken in order, *provided you passed each of the previous requirements at that sitting*. That means that it is possible for you to come in with no license, begin by taking the Technician Class, followed by the General and Extra Class examinations and the Morse Code Examination (required by the General Class license) and walk away with an Extra Class license! All on the original $14.00 fee! I've seen it happen, several times.

The most common progression, however, is that the examinee accomplishes one portion of the process, then re-appears at another testing session to complete another portion, and so on, working their way through the requirements. Each new test session requires payment of the $14.00 fee.

More Paper!

Upon successful completion of any section of the process, you will be given a certificate (CSCE). This certificate, signed by you and the examining team, is your proof that you passed that portion of the examination process and is valid for one year from the date issued. Now all you have to do is *wait!*

Following examination day, the VE team forwards appropriate test results to the appropriate services. Response to the events can be a few days to a few weeks, depending upon circumstances. This can be one of the hardest parts. The U.S. Postal Service will deliver your new license to the address listed on your FCC Form 610. The *average* response time in my experience is about two weeks.

End Results

So you did all this; now what is it worth to you?

First, you've proven to all that you studied and learned and accomplished your goal. Your proof is the new license of which you are now the proud owner.

You've joined a group of enthusiastic individuals interested in many facets of communication. The technical levels involved range from the very basic to scientists and astronauts. The choice is yours as to how far you want to take it.

Now you can purchase that 2 Meter HT you've been "eyeing" and ragchew with the group on the local repeater. Perhaps you'll be chatting with old friends or meeting new ones. A whole new social arena is open to you.

You can do it ... you just haven't given yourself the "push" to get it done. Come on now; those excuses just won't work anymore...

I'll see you on the ham bands!

RESOURCES

www.arrl.org
• study materials
• class and test site information
• VE information

www.qrz.com/p/testing.pl
• practice tests for all three licenses
• study materials

www.w5yi.org
• study materials
• test site information
• VE information

www.hamuniversity.com
• study materials

Or write:
American Radio Relay League
225 Main Street
Newington, CT 06111-1494
or call 860-594-0200

Working the World on VHF/UHF FM

By Ian Abel G3ZHI

Would you like to keep in touch with your ham friends all over the world any time of the day or night? Have you moved into a retirement home where HF equipment and antennas are not allowed? Have you had to take down your tower and beam because you can no longer maintain them?

Then why not use an internet gateway to keep in touch with ham friends in the USA and around the world?

Internet gateways operate on VHF and UHF simplex channels and repeaters using FM. The quality of the audio is mostly excellent and because you are using the internet and not radio there are no problems with propagation. You can just dial up your friends whenever you wish.

Background

For nearly 10 years radio amateurs have been experimenting by connecting their VHF and UHF FM radios to the internet.

In the year 2000, after a personal request from Ian G3ZHI, David Hendon G8DPQ (who was the Chief Executive of the Radiocommunications Agency) gave his personal permission for internet gateways to be licensed in the UK. Now there are around 5,000 ham radio internet gateways all over the world – many available 24 hours a day.

Operating an internet gateway

Using an internet gateway is very easy. There are three main gateway systems in use: Echolink, eQSO, and IRLP.

With Echolink and IRLP it is possible to use a hand held radio with DTMF or a DTMF MIC on a base station to individually call a station via the gateway. So, for example, on IRLP if you wanted to call a ham in Sydney, Australia, using your hand held, you would press the PTT and press the DTMF key numbers 6 0 0 0 then release and listen.

You would hear a voice announcement telling you that the link was connected. You would then talk and carry on a QSO normally as you would if you were working a local station. When you have finished, you press the PTT and then press DTMF 7 and then 3 which closes the link.

You will then hear another voice announcement informing you the link has been closed.

On Echolink different codes may be used to turn a link off – ask your node owner.

You should always listen first on a gateway frequency to see if it is in use. You can also send a '0' to see if it is connected to anywhere.

Recently, a local ham from Doncaster, Kevin G8JJR visited Perth for eight weeks. He was able to keep in touch every day with his friends back home in South Yorkshire, using his hand held and working the local repeater, which is connected to the IRLP network.

Echolink and eQSO can also be used from a PC computer, providing the computer has a soundcard with MIC and speakers attached. IRLP can only be used using a radio.

If you are on the internet, you can see the live status pages showing which nodes are connected on all the three systems.

If you don't have access to the internet at home, there is free access at your local library where you can download and print the list of gateways and station numbers. Helpful library staff will show you how to use the internet if you have not used it before.

In the UK, the holder of an intermediate or advanced license may set up an RF gateway by requesting a Notice of Variance (NOV) from Ofcom. US operators do not require special permission to make their repeater a gateway.

If you have any questions, my contact information is listed below. Much more information is available on the web sites. Following are excerpts from the information shown.

To Contact the Author:
Ian Abel G3ZHI
52 Hollytree Ave
Maltby
Rotherham
Yorkshire
S66 8DY

G4NJI IRLP 5200 Echolink 135909
Rotherham simplex 145.2875mhz
g3zhi@hotmail.com

Tel: 01709 799911
Mobile 0783 338 0578

IRLP

Node Status
(02/20/2006 15:16:03 GMT)
IRLP Network Summary
Idle Nodes: 987   Nodes In Use:130   Nodes Offline:41

Country	Nodes	In Use
Antarctica	1	1
Antigua	1	1
Aruba	1	1
Australia	69	2
Belgium	1	1
Bermuda	1	1
Canada	196	9
Canary Islands	1	1
Denmark	2	1
Dominica	1	1
England	53	1
Germany	3	2
Ireland	3	1
Italy	5	2
Japan	12	5
Mexico	17	4
Netherlands	2	2
Netherlands Antilles	1	1
New Zealand	6	5
Norway	2	2
Puerto Rico	10	7
Scotland	5	5
South Africa	4	4
Spain	1	1
Sweden	8	8
Trinidad and Tobago	5	4
USA	826	99
Virgin Islands, U S	1	1

Sample IRLP Node codes and locations:

Node	Callsign	City Prov./St.	Country	NodeFreq	CTCSS
3540	W6DXX	Palm Springs CA	USA	445.6400	131.80
3257	WA7DG	Reno NV	USA	147.3000	
3160	WA6RQD	Oceanside CA	USA	446.8600	0.00

Linking Example
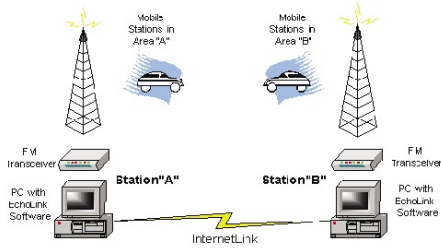
3150	WA6RQD	Oceanside CA	USA	449.3200	141.30
3900	K6MF	San Jose CA	USA	1286.4500	123.00
3671	K6SA	Saratoga CA	USA	146.6550	114.8
4865	KG4ZXK	Portsmouth VA	USA	145.6000	0.00
8310	KB5KZS	Bartlesville OK	USA	145.7000	88.50
8274	XE3NO	Oaxaca	Mexico	146.8800	103.5
2380	VE6RJO	Calgary AB	Canada	147.5100	100.00
8710	KD5KTB	Enid OK	USA	146.5550	97.40
7240	KB2CDY	Payson AZ	USA	146.4200	100.00
4490	WB2CIK	West Hills NY	USA	447.9500	114.80
4870	W1HHO	Mid Coast ME	USA	449.1250	82.50
6000	VK2RBM	Sydney NSW	Australia	147.0500	0.00
5450	GB3PZ	Manchester	England	430.9000	82.5
5400	GB3PZ	Manchester	England	430.9000	82.50
4300	N3APP	Erie PA	USA	147.2700	141.30

ECHOLINK

Sample list of Echolink node numbers and locations

4Z4IZ-R	HAIFA R-12 Rpt.	169676
7K1FHJ-L	Ohshima 432.34	128671
7K1NAQ-L	Bunkyo,Tokyo 1294.82MHz	22778
DL9GRB-R	Link to DB0DBR	159122
DM0ZAA-L	Duesseldorf 144.975 MHz	136397

DM0ZBB-L	Boeblingen (BB) 430.025	6877
DO0SMZ-R	Mainz 439.2125 MHz	100823
DO0ZB-L	Berlin 144.975 pse CQ	8222
DO0ZFG-L	DO @ 144.975 MHz	154965
DO1GUM-L	Freiburg, Black Forest	129169
DO1HEN-R	D B ÿ S Y — HAMBURG	153627
DO1JOH-L	GER JN49MD 145,575	151037
DS5CLX-L	deagu 145.540 (1)	21440
DV1LWQ-L	In Conference *MAKILING*	130919
E20ZGH-L	In Conference *TACLUB*	177730
EA1RCW-L	FOZ	172581
EA3RCB-R	Palamos 145.300	113456
EA4TD-L	In Conference *ESPANA*	82308
EA5RCI-L	In Conference *ESPANA*	97451
EB2CTZ-L	In Conference *ESPANA*	153942
EB2FGI-L	In Conference *ESPANA*	115083
EB4CKB-L	In Conference *ESPANA*	24853
EB8BCG-L	Tenerife 145.550 MHz (1)	56868
EB8CHG-L	lanzarote pls cq	128358
F5POE-L	Forges les B 91 144.525	76584
F6CDD-L	Toulouse 145.250	100889
G0OPD-L	South Hampshire	1515
G0WYG-L	Bromley Kent,UK 434.475	3275
G3SNA-L	Greenfield Lancs	2586
G3ZHI-L	Maltby South Yorks	99045
G4IPE-L	Louth, UK www.g4ipe.com	37980
G4LCH-L	Solihull UK	136330
G6CKK-L	Rochester Kent 145.2 (1)	93069

Sample list of UK internet gateway frequencies and locations

G4NJI 145.2875	Rotherham	IO93ij	6/2/2006 09:00
G0FSM51.9300	Rugeley	IO92br	4/2/200617:44
G0JJO 430.0375	Rugeley	IO92as	18/2/2006 17:10
G0NWE 51.9400	Runcorn	IO83pi	4/2/2006 17:44
G0NWE 430.0125	Runcorn	IO83pi	4/2/2006 17:45
G0LGJ 434.5250	Scarning, Dereham	JO02lq	7/2/2006 12:14
G4YPV 430.0125	Selby	IO93lr	7/2/2006 19:27
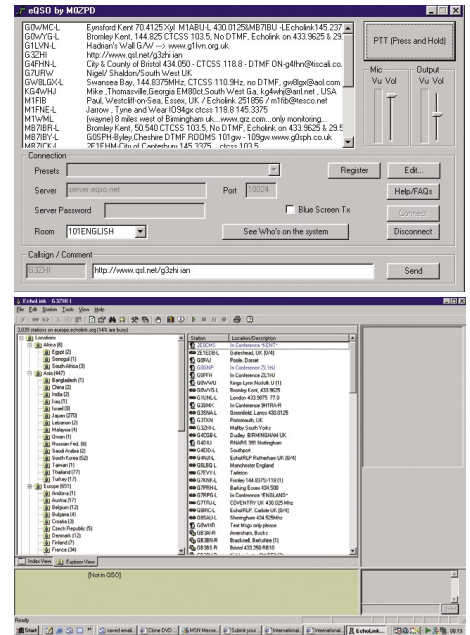
More information can be found at:
www.echolink.org
www.irlp.net
www.eqso.net
www.qsl.net/g3zhi
www.ofcom.org.uk
www.rsgb.org
www.dcc.rsgb.org/ShowGates.asp?call=ALL
www.ukirlp.co.uk
www.gb3ir.co.uk
www.eqso.info
http://irlp.g4eid.co.uk/status/all_reflectors.html

The Readers Comment
Satellite & Shortwave Radio, Antennas, QSLs & Radio History

This month there are some questions and comments regarding previous *Beginner's Corner* columns, so let's see what's on *MT* readers' minds.

❖ Satellite TV Combo

John Kurtinecz, Sr. K3EGK, writes, "I read your article in *MT (December 2005, "Tune in International Radio Broadcasts with a Small Dish")* with great interest. I used to have a C-band set-up here until everything went digital. My question is, can you receive both Ku and C-band with the Globecast receiver by splitting the inputs with diplexer switch or is the IF input different? ... Also I have a dish like the one on the right pictured in the article on page 69 which someone gave me. I think it was for store use. The LNB is 11.7 to 12.2 GHz ... can

Use your old C-band dish to tune in your favorite C-band MPEGII FTA channel and your stand-alone Ku-band dish to tune your MPEGII FTA receiver and have some real flexibility. Or take LNB feeds from any of up to 4 separate dishes with a multi-feed switch. (Courtesy: Author)
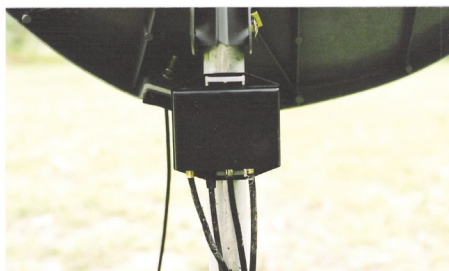
4:1 Multi-feed switch at the back of a Ku-band dish allows receiver to switch among 4 individual dishes each aimed at a different satellite (fourth dish not yet hooked up in this photo). (Courtesy: Author)

I use this?"

To the first question: Yes, you can use either a C-band input or a Ku-band input on the Globecast receiver (or any other MPEGII FTA receiver for that matter) and, using a diplexer switch, you can change between the two dishes in an instant. To do this, set your C-band dish up on a particular satellite and the Ku-band dish on another and, after you've programmed in the channels you want to receive in the "favorites" menu, you can just hop from one to the other. This is possible because the software in the receiver allows you to set the parameters for each channel. Follow the directions in the receiver's manual to do this. First time around it will seem difficult, but stick with it and it will be as easy as programming your scanner.

As to the second question about the system you got from a friend: The dish will undoubtedly work, but you will likely want to replace the LNB with an LNBF designed for the broadcast Ku-band. And, if other readers find LNBs, here's how to identify them (the data is usually on the label of the LNB of LNBF): DISH Network and DirecTV DBS broadcast services are transmitted in the 12.20 to 12.70 GHz range and are circularly polarized; MPEGII FTA broadcasts in the 11.7 to 12.2 GHz range and are linearly polarized; there are also "universal" Ku-band LNBFs which receive in the 10.7-12.75 GHz range.

The difference between an LNB and LNBF is that the LNBF can switch polarity electronically, whereas the LNB needs to be rotated or attached to a rotatable feed horn in order to receive opposite polarity.

❖ Getting Started with Shortwave Radio

MT reader Brian Rubenstein from Calgary, Alberta, Canada, writes: "I would like to obtain some information on learning more about shortwave radios. We have an old Panasonic model RF2200 8 band radio at home, but I personally have never used it. The instructions are nowhere to be found. I would like to buy a new, more portable radio. I see a lot of the Grundig radios advertised in our city. Can you recommend some radios that would be good for a novice? My purpose is to listen to radio stations for pleasure (BBC and American stations). I may be traveling up north to work in a remote community at some point soon. Does this make a difference when choosing a radio?"

Here's a link to RadioIntel, a great web site for radio enthusiasts. You'll find everything you need to know about your specific radio at this page: **www.radiointel.com/review-panasonicrf2200.htm**. It sounds like a nice portable and I would suggest that you use that before looking for something newer. It does have some gaps in receiving frequencies and is not the best for tuning CW or SSB signals. And, thanks to its analog tuning, it'll be a little harder to tune into exact frequencies, but, as stated in the review, it's a great AM receiver.

The "Classic" Panasonic RF2200 may be an old radio but it's still valued by AM DXers and has a couple of other things going for it. (Courtesy: K3PI Radiointel.com)

Front panel of the RF2200 has enough knobs and switches (and a real "S" meter!) to satisfy any SWLer. (Courtesy: K3PI Radiointel.com)

It has screw terminals for an external SW antenna and I would try that before giving up on it for shortwave purposes. A random wire outdoor antenna will probably do wonders for shortwave reception. I like the report, too, about the shortwave audio. Those old analog radios had great audio for the broadband AM signals found on the shortwave bands,

something sorely missing in today's small shortwave radios.

Of course, I say this having no way of knowing if anything is wrong with your radio. Sometimes these old radios get kicked around a lot over the years and knobs get busted off, antennas snapped off – it's hard to know what problems you'll encounter. I say: Fire it up and see what it'll do. Use the shortwave program guide in *MT* and hunt down some stations to see how it performs. If you're not happy with it after a couple of weeks, then look for something more modern. The Grundig YachtBoy 400 is a nice radio. It's portable, has digital tuning, and decent receiving capability. But, it won't sound nearly as good as the old Panasonic.

Finally, while the BBC has dropped its transmissions aimed at North America they are still easily receivable on a decent shortwave radio with an external antenna via their Africa and Asian beams. The Panasonic should serve your purposes well.

❖ More Help for Building the Grove Tunerless All-Band Antenna

In the February issue of this column I was helping Byron Robinson build his Grove Tunerless All-Band antenna. Byron took my advice and started to put this antenna together, but later had trouble finding the necessary parts. If you're lucky you can find these parts really cheap at a local ham fest. If you have to order them new, here's the shopping list: Radio Shack still sells the 300 ohm twin lead in 100-ft packs for $12.99 (catalog #15-1175). Not every Radio Shack store carries this cable but you can buy it through their mail order division by calling 800-843-7422.

The Hy-gain center connector is available directly from Hy-gain at: **www.hy-gain.com/products.php?prodid=C-1**. It sells for $30. You can also call Hy-gain at 800-973-6572.

The 4:1 balun by Van Gorden costs $18.99 and is available from Amateur Electronic Supply (**www.aesham.com**) or call 800-558-0411. It has terminals at the top for the twin lead and an SO239 connector at the bottom for the coax going back to your shack. For coax I used the Belden 9258 RG8X which costs 44 cents/foot and is also found at AES.

❖ Stateside QSL Depository

MT reader Jerry Berg wrote concerning my November 2005 *Beginner's Corner* entitled "QSL Mania" in which I described a QSL depository in Vienna, Austria, which has cataloged QSL cards from hams and SWLers dating back to the early 1920's.

Jerry writes, "The Committee to Preserve Radio Verifications (CPRV) is the main depository for QSLs in the U.S. and has been operating since 1986. The Austrian project does a great job and I wish we had the resources or sponsorship that they must have. It looks like a business; CPRV is a hobby history project. The focus of the Austrian project is amateur QSLs, ours is broadcast QSLs, shortwave

A well done web site for SWLers is www.ontheshortwaves.com. Here is a wealth of information to the ham and SWL alike. You can spend hours or even days checking out the various links! (Courtesy: On The Shortwaves.com)

and medium wave, although we have some amateur and utility QSLs as well. The CPRV is well known within the North American DX community (it would not occur to North American broadcast DXers to send their QSLs to Austria). Our collection is located at the Library of American Broadcasting, University of Maryland. We have collected almost 40,000 pieces, some of which go back to 1920s. *MT* has done some articles about us in the past."

Jerry also suggests anyone wanting more information about CPRV should check out this Web site: **www.ontheshortwaves.com**.

Thanks, Jerry! There can't be too many QSL depositories in the world. If we don't pass them on they'll disappear for future generations. There's a ton of information on that Web site and I know *MT* readers will do as I did: spend a lot of time reading the articles and chasing down all the interesting links. It's great fun.

On one such link I came across was **www.qsl.net/wb1gfh/swl.html** "Were you a WPE?" It's a page devoted to the old SWL "call sign" program started by *Popular Electronics* in the '60s and enthusiastically embraced by the legions of SWLers of that time. There are pages and pages of comments from original holders of these calls.

Lots of nostalgia and fond memories for all. As a kid growing up in Florida in 1965 I was WPE4IYY. Were you a WPE?

Radio history buffs will really enjoy the links to articles written in the early days of radio and reprinted in pdf format for our enjoyment today. One article I read was from the March 1928 *Radio News* and entitled, "Wisdom for Radio Widows." It gave advice to wives whose husbands were addicted to DXing the broadcast bands. Not much has changed!

Another was from *Short Wave Craft* magazine from the July 1933 issue about a 7-1/2 watt broadcast station from Heredia, Costa Rica, operating outside the normal shortwave bands and calling itself NRH, the suffix of the ham call TI4NRH which was held by Sr. Amando Cespedes Marin. He received so many letters from listeners around the world (17,000) that the Costa Rican government gave him full postal privileges, a right granted only to government agencies.

Another great collection of old amateur QSL cards is found at the Harvard Wireless Club, home of W1AF, one of the oldest ham radio clubs in the country, having been founded in 1909. Take a look at these old cards from the 1920s: **www.w1af.harvard.edu/qsl-antique.html**.

ASK BOB

Q. *In the March issue's GLOBAL FORUM, I read about clandestine Radio Republica, and how some were guessing as to where the signals were being transmitted from. I'm surprised that the ham community doesn't have a network of interested monitoring stations with direction-finding capability. With the Internet as well as radio for immediate informational exchange, is there simply very little interest? (Judy May, W1ORO, Union, Kentucky)*

A. Your point is well taken. I once established a ham network to try to identify unknowns, and while we had many participants, none had DF capability.

VHF/UHF triangulation is easy because the antennas are small, easily rotated, and arrays are mountable on a car roof. Most of the hams are catching repeater violators at those higher frequencies

HF (SW), however, is a different story. Two of the leading radio-direction-finding styles, cross-phased loops and the Adcock array, can be rather daunting in size, and their bearings are affected by hilly terrain since they utilize ground wave signals.

How about it, fellow hams? Any of you interested in establishing such a network for identifying unknown signals at HF?

Q. *I often see the abbreviation "DSP" referring to audio accessories; what does this stand for, and what does it do? (Larry Vipond, Mesa, AZ)*

A. Digital signal processing (DSP) is a procedure which electronically converts conventional (analog) sound from the external speaker or headphone jack of a receiver, transceiver or scanner (actually, any audio device) into digital sound ("bits," just like computer data). This digital data stream is then "massaged" to remove noise, tones, static crashes and other unwanted interference before it is re-converted back to analog so that the recovered sound will be much cleaner and more intelligible. DSP equipment can usually be manually controlled by the operator for desired sound.

Q. *Why does my old, inexpensive scanner hear more signals than my new, more expensive one? For example, I'm hearing TV stations on the 900 MHz range on the old one, but not a one on the new model. (Anthony Alise, email)*

A. Your older scanner is a very basic model with poor image rejection. TV signals (which actually aren't broadcast in the 900 MHz range) aren't the only false signals you will hear repeated on incorrect frequencies within the older unit's tuning range.

All scanners have oscillators which produce signals that combine with others internally; the unwanted combinations (images) are filtered out so that only the one desirable combination remains (this is called the intermediate frequency, or "IF"). If more than the one proper combination remain, you will hear images as phantom signals on frequencies that really don't have any activity on them. This is what you are hearing on that earlier model.

Current-model scanners are built to more rigid specifications with better filtering to remove images. This is a requirement by the FCC so that images from cellular phone signals, which cannot be legally intercepted, won't be overheard on their images.

Q. *I read that it's possible for the attending physician to get an electric shock when he touches the stethoscope to an electrocuted prisoner following the execution. How is this possible?*

A. Perhaps if his moist body is the "hot" side of a charged capacitor, sitting on an insulator (the wooden chair) which is attached to a conductive surface (a wet floor?), and that's only if there is some remaining charge from the execution high voltage. The physician could conceivably get a shock by standing on the conductive floor and touching the body. This would be similar to getting out of a car on a cold, dry day and then touching the metal car body. I don't buy it, since the voltage is varied up and down, with down effectively shorting out the "capacitor." But it's possible, I suppose. (*Sounds like a challenge for the "Mythbusters" team! - ed.*)

Q. *Several members of my family can hear a female voice in the background of our TV audio, whether connected to an antenna or our satellite system. It's the same voice and it's on at all times, day and night. How can we remove this? (A.R., Chipley, FL)*

A. First, several additional questions:

(1) Is the voice always on, day and night, 24 hours?
(2) Does it sound like a broadcast, or simply one side of a two-sided conversation?
(3) If you replace the TV set with another at the same place, does it also hear the voice?
(4) Can you give me some actual quotes of what the voice says?
(5) Do you have any transmitting towers near you, like AM, FM, shortwave, or Weather Service?

Now some suggestions with reasons they might *not* be the correct answers:

(1) Illegal, high-powered CB would be erratic, brief, and mostly at certain times of day or night.
(2) National Weather Service broadcasts have the same repeated message over and over.
(3) Broadcast voices change periodically, and they give their station identification on the hour.
(4) Travelers Information Stations (TIS) are low-powered, and repeat their short messages constantly.
(5) Cordless telephones would be short calls, only at certain times, and not around the clock.
(6) A voice paging service would transmit briefly, and may be accompanied by a tone or data.

Listen carefully and let me know what is said, as well as answer these five questions. Once we figure out the source, we can define the cure.

Q. *It's just a matter of time now before all TV broadcasts are digital. In the meantime, is there a converter or something that will allow me to receive digital programs on my trusty analog TV? (Mark Burns, Terre Haute, IN)*

A. Such converters are already available at mass merchandisers like Wal-Mart. Of course, since your set is standard analog, the high-definition benefits of the digital television will not be observable, but at least you can continue to use your analog TV to receive digital programs during the long analog phase-out period.

Q. *I monitored the following transmission on 11175 kHz (USB): "All stations all stations this is Andrews Andrews – Break, QTS4AX standby, QTS4AX standby, QTS4AX standby, message follows – QTS4AXJRDNL5V2J7DPW4, I say again QTS4AXJRDNL5V2J7DPW4. This is Andrews out." What am I hearing? Tom Hawman - Kansas*

A. (Note: The information presented in this answer below has come entirely from public sources.) Tom, you have monitored what is known as an EAM (Emergency Action Message) broadcast by the U.S. Military. From AFM-01-1-18, sub 3; amended 01 Jan 1990 first published in my *MT Utility World* Column in May 1995:

"Joint Chiefs of Staff Emergency Action Messages (EAMs) contain key instructions or information from high level authority and have predetermined formats (pro forma). Such messages are transmitted by various communications systems and normally carry FLASH precedence. They are vital messages of an extremely time-sensitive nature, and rapid processing is mandatory to obtain the fast reaction required by their content. Usage and handling procedures are of the highest classification and have been issued by the JCS only to those who have a need to know."

From a US Army Operations Support Command, OSC Regulation 500-4:

"EAMs come in as FLASH or IMMEDIATE messages. Ordinarily, they provide notification of a change in Defense Readiness Condition (DEFCON) status, but they are also used to alert personnel of any emergency situation needing immediate action."

Based on material we have seen in public official instructions, not only are EAMs used to pass primarily command and control messages for nuclear forces orders, but they also carry Defense Condition (DEFCON) changes, Terrorist Threat Conditions (THREATCONS), and various departmental notification tests. This could account for message formats of various lengths that have been monitored by hobbyists over many years. These formats are laid out in a classified Joint Chiefs of Staff publication EAP-CJCS Volume VII. These messages can contain real world or exercise information, and can be scheduled or unscheduled.

EAMs are disseminated over numerous survivable and non-survivable communication systems, including terrestrial and space systems. The current backbone for pre-attack EAM dissemination is the Automatic Digital Network (AUTODIN) and associated Defense Message System (DMS) Transitional Hub (DTH). Several years ago the EAM network for the ICBM crews changed from a Single Channel Transponder (SCT) on the DSCS satellites and UHF AFSATCOM transponders to a new EHF-EAM network aboard the MilStar constellation of satellites.

On the HF side you will hear EAM broadcasts on a wide variety of frequencies including: 4724.0

6712.0 6739.0 8992.0 11175.0 13200.0 15016.0 kHz (All HF-GCS primary frequencies) and 6697.0 13155.0 kHz.

You can learn more about EAMs on the World Utility News (WUN) website at **www.wunclub. com/files/eam.html**

Q. *Is it legal or even possible to decypher the coded messages on 11175 kHz? Frank - Ottawa, Canada*

A. The short answer is no. It is believed that each EAM is not encrypted with a coded message, but contains information that allows the user to look up the information being conveyed in publications to which they have access. In other words, if you don't have those publications, then you can't know what is being transmitted. If you were in possession of these decoding books it would be a violation of U.S. laws, since the publications are classified.

Q. *Do you know the HF frequencies for Canadian Air Traffic Control that I could receive in Ottawa Canada? Frank - Ottawa, Canada*

A. First, a good Google search online or purchasing a copy of the *Grove Shortwave Directory* will give you more info than I am going to present here. In Canada, as in the United States, you really won't find that much Air Traffic Control (ATC) activity in the HF spectrum. The primary communications medium will be the VHF and UHF aircraft bands.

There are several types of services in the HF spectrum that are designed to handle aircraft communications when the aircraft is outside the range of civilian VHF aircraft frequencies. The transmission mode for the information below is upper sideband (USB) and frequencies are given in kiloHertz (kHz).

Distress and Calling

All aero monitors worldwide should keep these two distress and calling frequencies in their memory channels: 3023.0 and 5680.0. In Canada there are quite a few ground stations that monitor and use 5680.0.

MWARA

Most of the Canadian HF ATC activity involves what is known as the MWARA (Major World Air Routes) North Atlantic (NAT) family of frequencies. Here you will find airline, charter, military and business aircraft getting ATC instructions. Here are all of the NAT family of frequencies:

North Atlantic Family A (NAT - A):
3016.0 5598.0 8906.0 13306.0 17946.0
Ground Stations: Canarias, Gander, New York, Paramaribo, Piarco, Santa Maria, and Shanwick

North Atlantic Family B (NAT - B):
2899.0 5616.0 8864.0 13291.0 17946.0
Ground Stations: Gander, Iceland, New York, Santa Maria, and Shanwick

North Atlantic Family C (NAT - C):
2872.0 5649.0 8879.0 11336.0 13306.0 17946.0
Ground Stations: Gander, Iceland, and Shanwick

North Atlantic Family D (NAT - D):
2971.0 4675.0 8891.0 11279.0 13291.0 17946.0
Ground Stations: Arctic Radio (Baffin), Bodo, Churchill (Emerg's Only), Gander, Iceland, and Shanwick

North Atlantic Family E (NAT - E):
2962.0 6628.0 8825.0 11309.0 13354.0 17946.0
Ground Stations: New York and Santa Maria

North Atlantic Family F (NAT - F):
3476.0 6622.0 8831.0 13291.0 17946.0
Ground Stations: Gander and Shanwick

The best online guide I have seen on this is at **www.liveatc.net/downloads/NAT-HF-Guidance.pdf**. You should download this and study it to understand completely how the NAT MWARA system works.

Other Services

Another level of ATC communications occurs on the RDARA (Regional and Domestic Air Route Areas) frequencies. Canada used to have quite a few of these several years ago, but I have not seen a report on any of these being in use recently.

If you are looking for weather from Canadian airports, then you should tune into the Gander VOLMET station. Check 6604.0 and 13270.0 for those transmissions.

Another HF aero activity is the airline LDOC (Long Distance Operational Control) frequencies. These do not carry ATC traffic, but you will find communications more along the lines of airline company frequencies. I do not have a current list of these for Canada, but an excellent list to check out is available on the WUN Club website (known as the Risto Aero List). It is only available in Excel spreadsheet format and can be downloaded at: **www. wunclub.com/archive/files/findex.html**

Military

There is also a lot of non-civilian military traffic of the Canadian Forces (CanForce) Military Aeronautical Communications System (MACS). Here is a list of frequencies authorized to the Canadian military in the HF aero off route (OR) portion of the bands. An (*) asterisk indicates the most active frequencies used by CanForce and a (**) double asterisk would indicate primary comm frequencies. A (***) indicates a CanForce frequency with VOLMET style weather broadcast.

3032.0	3038.0	3044.0	3047.0*	3050.0	3053.0
3056.0	3059.0	3068.0	3074.0	3077.0	3080.0
3086.0	3092.0*	3095.0	3101.0	3110.0	3113.0
3116.0	3112.0	3128.0	3131.0	3137.0	3143.0
3149.0	3152.0	4700.0	4703.0*	4706.0	4712.0
4715.0	4718.0	4721.0	4724.0	4727.0	4730.0
4736.0	4739.0*	4742.0	4745.0	5684.0*	5687.0
5693.0	5696.0	5699.0*	5702.0	5708.0	5711.0
5714.0	5717.0**	(SAR)	5723.0	5726.0	6685.0
6691.0	6694.0*	6697.0	6700.0	6706.0*	6709.0
6712.0	6715.0*	6721.0	6727.0	6730.0	6736.0
6742.0	6745.0*	6751.0	6754.0***	8965.0	8968.0
8989.0*	8992.0*	9007.0**	9010.0*	9022.0*	9028.0
9031.0	9037.0	11187.0	11190.0	11205.0*	11208.0
11214.0*	11217.0	11220.0	11223.0	11229.0	
11232.0**	11235.0	11238.0	11244.0	11247.0*	

New Digital Systems and Reader Feedback

New digital radio systems are being installed at a rapid pace. With Homeland Security grants and local bond measures as two popular funding sources, money is available for smaller municipalities to upgrade their public safety equipment. This month we take a look at a few rural areas in Pennsylvania and Alaska. We'll also update you with reader mail and warn you of a change in the availability of frequency information for the Civil Air Patrol.

❖ York County, Pennsylvania

York County is located on the southern edge of Pennsylvania, across the Mason-Dixon Line from Maryland. It covers more than 900 square miles and is home to almost 400,000 residents.

The county is in the middle of a $68 million project to upgrade their 30-year-old emergency communications system. A new $15 million dispatch center is under construction in Springettsbury Township and will eventually house the 911 communications center, emergency management operations, and other elements of the York County Department of Emergency Services, including a 13,000 square foot service garage for public safety vehicles.

M/A-COM, a radio equipment manufacturer headquartered in Virginia, will build an APCO Project 25 radio system using 22 repeater sites at a cost of a little more than $30 million. A contractor out of Pittsburgh will build the repeater towers and shelters for about $5 million. Another $3 million will go to Alcatel North America to install a microwave relay network connecting each repeater site to the dispatch center. This type of connective relay is sometimes referred to as a *backhaul network* since it "hauls back" traffic from remote locations to a central station.

Police and Fire Departments in the county will have to purchase new digital radios, but the County Government has promised to cover most of the cost. The radio system is expected to provide 95% coverage across the county, which will be an improvement over the current analog system.

M/A-COM is already involved in several radio upgrade efforts in Pennsylvania, including the statewide OpenSky system that started life back in 1996. M/A-COM reports that the state system currently has 10,000 users with a capacity of 150,000. A number of state agencies are reportedly using the system, including Pennsylvania Department of Transportation, Pennsylvania Emergency Management Agency, Pennsylvania National Guard and the State Police. Unfortunately, there is no scanner available to the consumer that can monitor OpenSky transmissions, so this system remains out of reach for the general public.

The planned York County radio system will use frequencies in the UHF band rather than the more common 800 MHz. It will also be set up in a simulcast (*simultaneous broadcast*) configuration, meaning that a transmission may be broadcast from more than one repeater site at the same time.

That "same time" is an important consideration. Each repeater site has a geographic area of coverage. Repeater sites are located so that there are *overlap areas* where the signals from two or more sites are each strong enough to provide good reception. Synchronization is necessary to be sure that the radio waves from each repeater do not weaken each other because of *destructive interference*.

Simulcast Overlapping Coverage
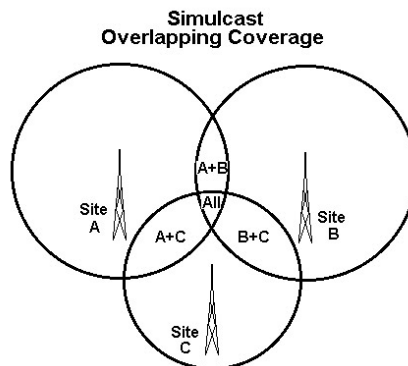
The signal from each repeater site can be thought of as looking like a wave as it travels, with peaks and valleys. If the signals arriving at a receiver in one of these overlap areas are synchronized, the peaks and valleys will line up and strengthen each other in what is called *constructive interference*. This properly combined signal can be received and processed correctly by a standard public safety radio.

If, however, the signals are not synchronized, then the peaks and valleys tend to cancel each other out in destructive interference, and the improperly combined signal is very difficult for a radio to receive correctly.

M/A-COM's simulcast technology uses

Constructive Interference

Destructive Interference
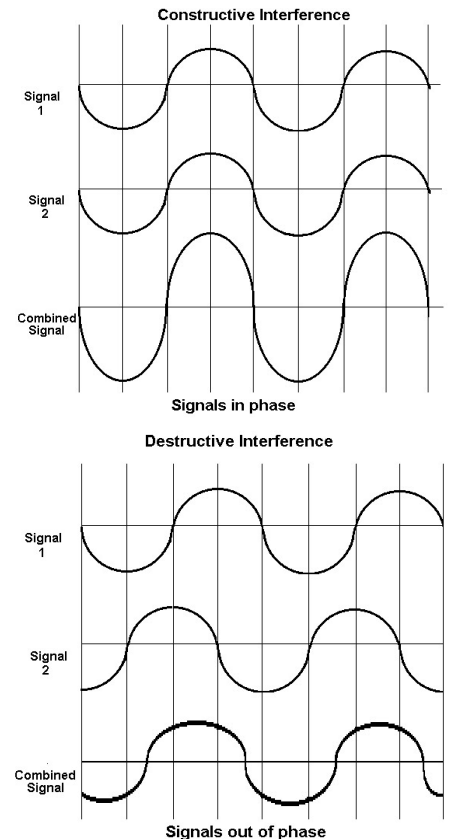
the Global Positioning System (GPS) to synchronize each repeater site. Most people are familiar with the ability of a GPS receiver to provide accurate location information, but GPS can also serve as a great source of very accurate time. By placing GPS timing receivers at the control center and at each repeater site, the network can be sure that transmissions from multiple towers are truly simultaneous.

Until the new system is in operation, the following frequencies carry county and local public safety activity:

York County Current System

Freq	Description
33.10	River Rescue
33.48	County Fireground (Northwest)
33.52	County Fireground (Southwest)
33.54	County Fireground (Northeast)
33.58	Fire Mutual Aid (Countywide)
33.66	County Fireground (Southeast)
33.88	Fire Command (Countywide)
33.90	Fire Dispatch (Countywide)
153.890	York City Common (portables)

153.950	York City Fire Tactical 2	
154.010	York City Fire Tactical 3	
154.040	Fire Police (Countywide)	
154.070	York City Fire Tactical 4	
154.190	York City Fire (Main)	
154.235	York City Fire (Operations)	
154.250	York City Fire (Administrative)	
154.280	Mutual Aid 1	
154.265	Mutual Aid 2	
154.280	Mutual Aid (Inter-County)	
154.295	Mutual Aid 3	
154.325	York City Fire Tactical 1	
154.445	York City Public Safety	
154.540	Fire Police (Countywide)	
155.250	County Sheriff (North)	
155.415	County Sheriff (Southwestern)	
155.475	Law Enforcement Mutual Aid	
155.610	County Sheriff	
155.625	County Sheriff (Southeastern)	
155.820	Shrewsbury Police Department	
155.985	County Sheriff	
156.330	York City Police	
156.570	York City Police (Dispatch)	
158.940	County Sheriff	
158.970	County Sheriff	

453.5250	Hazardous Materials
453.6000	Emergency Management Agency
453.7750	Emergency Management Agency (On-Scene)
453.9625	Hazardous Materials
458.9625	Hazardous Materials (Operations)
460.5375	Hazardous Materials (Operations)
460.4250	County Sheriff
462.9750	County Emergency Medical Service (Dispatch)
463.0000	County Emergency Medical Service (Operations)
463.0250	County Emergency Medical Service (Operations)
463.0500	County Emergency Medical Service (Operations)
463.0750	Emergency Medical Service Calling (Statewide)
463.1000	County Emergency Medical Service
463.1250	County Emergency Medical Service
463.1500	Mass Casualty Incident Command
463.1750	County Emergency Medical Service
465.5375	Hazardous Materials (Talk-Around)

❖ Cumberland County, Pennsylvania

Although the 95% geographic coverage promised for York County sounds good on paper, it's not working out so well for the Shippensburg Police in nearby Cumberland County. They're using the Cumberland County 800 MHz system, which was built by M/A-COM and also advertises 95% coverage. Unfortunately, some of the remaining 5% of the county that lacks coverage happens to fall within the jurisdiction of Shippensburg. The areas that lack good coverage, called *dead zones*, are places where an officer cannot reliably transmit or receive radio transmissions. The town lies on the boundary between Cumberland and Franklin Counties and reportedly suffers from numerous dead zones.

One way to reduce the number and size of dead zones is to tune each repeater site to maximize coverage. This involves being sure

the site is operating at the proper power levels and that the antenna is located and oriented correctly.

If tuning doesn't solve the problem, the next step is usually to add additional repeater sites. It's an expensive and often time-consuming process, which is why initial proposals from vendors always try to minimize the number of repeaters. In some cases there simply aren't enough repeater sites to provide adequate coverage in places where it is really needed.

In the case of Shippensburg, the police are waiting for a second repeater site to be built on high ground. Once that is in place and operating, the number of dead zones should be greatly reduced.

❖ Homer, Alaska

Homer is located on the southwest side of the Kenai Peninsula, about 200 miles from Anchorage. Calling itself the Halibut Fishing Capital of the World, it is perhaps more famous as being the westernmost point of the U.S. highway system. The town is home to about 4,000 people.

In February, the Homer Police Department switched to a $500,000 digital radio system thanks to a grant from the Department of Homeland Defense. The Homer 911 PSAP (Public Safety Answering Point) dispatches for a number of agencies, including Fish and Wildlife Protection, Alaska State Troopers, Search and Rescue Teams, Alaska State Parks, as well as numerous fire and emergency medical services in the southern part of the peninsula.

The Federal Communications Commission (FCC) database shows the Homer Police Department licensed for four frequencies: 155.310, 155.625, 158.730 and 158.790 MHz. The first two are transmitted from repeater sites on Diamond Ridge and Homer Spit. The last two are licensed for mobile operation only.

These frequencies carry APCO Project 25 (P25) conventional (non-trunked) traffic using the Common Air Interface (CAI). Any digital scanner on the market today should be capable of monitoring this activity, unless transmissions are encrypted.

This transition to P25 will make it easier to work with the Alaska Land Mobile Radio (ALMR) network, a statewide digital P25 system. ALMR is different from systems in the lower 48 states primarily due to the significant involvement of the federal government, including the Department of Defense. Alaska is a very large state with numerous, small areas of population. A system that is shared by federal, state, and local agencies seemed to make the most sense.

Build out of the Kenai Peninsula for ALMR is expected to be complete this year with the construction of twelve additional repeater sites.

The Homer Volunteer Fire Department will not be switching over to the P25 police

system, due to the relatively high cost of new digital radios, which run about $1500 each. The department uses the following frequencies:

Homer Fire Department
153.830	Dispatch (TX)
153.890	Fire/EMS
154.370	Fire/EMS
154.415	Dispatch (RX)
155.160	State Emergency Medical Services
154.965	EMS Repeater

The FCC database also lists a number of frequencies licensed to the Homer Public Works Department for telemetry (data) transmissions. One such frequency is 158.205 MHz, which is apparently used to monitor and control pumps at the water treatment plant. There are several Public Works frequencies in the 400 MHz band, specifically 451.175, 451.225, 451.275, 451.325, 451.350, 451.400, 451.425, 451.450, 451.475 and 451.525 MHz. These are noted to be used for GPS/RTK (Global Positioning System/Real-Time Kinematic) related to water service. Perhaps they are used to report the location of service vehicles around town?

For those who can't make the trip out to Homer, there are attractions that you can see from the comfort of your own computer. The Augustine Volcano, located about 75 miles southwest of Homer, is active and has had a number of eruptions since the first of the year. Further low-level activity is expected for several months, and thanks to the Alaska Volcano Observatory you can monitor it via the Internet at **www.avo.alaska.edu**
(Image courtesy of AVO / Alaska Division of Geological & Geophysical Surveys.)

❖ Freehold Township, New Jersey

Dan,

As an area resident, it was nice to see a write-up in the March 2006 Scanning Report column about Freehold Township, New Jersey. I would like to make a few corrections and some additions.

There is no Monmouth County police. Municipalities either have their own police departments, or contract with the State Police for service. The Sheriff's Department operates a 9-1-1 answering point that dispatches countywide Fire/EMS, and under contract for many police departments. Freehold Township has its own 9-1-1 answering point and self-dispatches police.

39.46 is the Sheriffs Department countywide hotline for high priority bulletins.
154.680 is the State Police Emergency Network channel 1 (SPEN1) used for state-wide interoperability.
155.475 is SPEN2.
154.875 is the Sheriff's Department channel for non-jail units (e.g. warrant service.)
462.950 is MONOC, a private company contracted by Monmouth and Ocean Counties

for paramedic and ALS services.
476.6625 is Sheriff's F1 at the county jail.
477.0625 is Sheriff's F2 at the jail.
501.1125 is the primary police dispatch for the Township (F1).
500.3875 is the Township information channel (F2).
500.5625 is the dispatch frequency for Freehold Borough.

The Borough is the county seat with its own police department. It is completely surrounded by the Township. Freehold Township has this frequency for interoperability.

The 800 MHz channels listed are the State Police Troop C trunked system. Troop C covers the Central New Jersey counties.

– Michael in Freehold Township

Thanks for the update and the frequency clarifications. It's always nice to hear from local scanner listeners who can confirm activity in their area. It's also interesting to see public safety using frequencies around 500 MHz – not a place we usually scan!

❖ **Genesee County, Michigan**

In response to the March column detailing Genesee County in southeast lower Michigan, a reader sends the following:

Dan,

These are the frequencies that are still used in the VHF/UHF range. Everything else is on the Michigan Public Safety Communications System (MPSCS) APCO-25 system for Genesee County, Michigan.

153.785 - Emergency Management / Animal Control
154.145 - Genesee County Central Fire Dispatch
155.865 - MEPS
155.475 - NLEEF & Special Ops (i.e. speed traps, seat belt enforcement)
155.160 - EMS Mutual Aid Channel
155.370 - Intercity
155.340 - EMS Hear Radio (EMS TO HOSPITAL)
147.100 - Skywarn / Fire Coordination

Genesse County Michigan

147.260 - Skywarn / Fire Coordination
155.220 - C-M Ambulance Dispatch
150.965 - DVA Ambulance Dispatch
155.325 - ERS DIspatch
155.820 - Fenton Fire Dispatch
153.890 - Flint Fire Dispatch
154.235 - Flint Fire Secondary
155.070 - Flint Police Dispatch
155.250 - Flint Police Secondary (car-to-car, LEIN, info)
155.685 - Flint Police Special Ops (Vice team)
156.150 - Flint Police Special Ops (Vice team)
151.010 - Flint Twp Fireground
461.3875 - Patriot Ambulance Dispatch
155.325 - Regional EMS Dispatch
464.050 - STAT EMS Dispatch
155.400 - Swartz Ambulance Dispatch
462.050 - U of M Flint Campus Police Dispatch
461.025 - Kettering University Police Dispatch
464.925 - Mott College Police Dispatch

The digital 800 MHz system is up and functional in the county and has been for a few months now. I have not heard of the agencies complaining of any problems, but have heard from scanner listeners complaining of some reception problems. I hear that upgrades are in the works, but the system is working wonders in the county.

I own a BC895 and a BC245, I listen at various hours of the day, seven days a week. I am currently working with local media outlets in programming their scanners and reporting breaking news tips to them. I am a tipster and dispatcher for Fire Notification Network of Michigan (FNNM) and an avid fire buff. On my BC895 I currently do not have an external antenna, but from my location on the first floor of a two-story home in Grand Blanc (southeast of Flint) I am able to pick up a wide range of northern metro Detroit communities and mid-Michigan area communities.

– Dave in Grand Blanc

If any readers are interested in getting more information about the Fire Notification Network of Michigan, send me an e-mail and I'll put you in touch with Dave.

❖ **Civil Air Patrol Frequencies**

The Civil Air Patrol (CAP) is a private, non-profit organization chartered by Congress in 1941. Its most public role is aerial searches for downed private aircraft, but it has a number of additional activities, including providing assistance to the U.S. Air Force (USAF) in non-combat programs and missions.

While performing these missions, CAP primarily uses USAF frequencies, mostly in the HF (high frequency) and VHF (very high frequency) bands. CAP radios are used primarily for tactical operations, supporting individual air and ground activities during service missions.

In a January memo addressed to Civil Air Patrol Region and Wing Commanders, Major General Antonio Pineda, the National CAP Commander, wrote:

"It has come to our attention that the radio frequency assignments provided us by the USAF are considered sensitive information and require protection from unauthorized release."

The memo goes on to reference Air Force Instruction (AFI) 33-118, Radio Frequency Spectrum Management, which contains a classification appendix with the following instruction:

"Lists (two or more frequencies) of unclassified frequency assignment records in a given range of frequencies, or in a given area, can be classified because they may provide information leading to the disclosure of military or national security-related operations and scientific and technological matters relating to national security. These lists can indicate the overall strategic telecommunications capabilities of the U.S., and their disclosure could cause damage to national security. The continued protection of this information is essential to national security because it pertains to communications security and reveals vulnerabilities and capabilities. Its unauthorized disclosure can reasonably be expected to result in nullifying the effectiveness of telecommunications networks and the capability of the U.S."

The memo goes on to order:

"For these reasons we will begin implementing procedures to protect our frequency assignments... regions and wings are instructed to review all plans, supplements, and other documents which may contain lists of CAP frequency assignments. Such documents must be removed from public access, such as on the Web, and may not be released to outside agencies without coordination of HQ CAP/DOK and CAP-USAF."

A link to the complete memo and AFI 33-118 can be found on my web site.

❖ **Dayton Hamvention**

The month of May means that the annual Dayton Hamvention is once again on the schedule. Three days of radio, electronics, and computer exhibits and forums are scheduled for Friday, May 19 through Sunday, May 21 at the Hara Arena in Dayton, Ohio. Five hundred indoor exhibit spaces offer the latest equipment and publications, while more than 2,500 outdoor flea market locations have bargains of nearly every kind.

If you have any interest in radio, making the trip to Dayton at least once is a must. More information on this annual event is available at **www.hamvention.org**

That's all for this month. I welcome your e-mail to *danveeneman@monitoringtimes.com*, and I have more radio-related information on my web site at **www.signalharbor.com**. If I don't see you at the Hamvention, happy scanning!

U TILITY WORLD

HF COMMUNICATIONS

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Nazi Messages Decoded

Y es, you read that right. There are still some intercepted World War II messages from German military units that were never broken. These used the now-famous Enigma code machine, and in particular a 1942 four-rotor version introduced on U-boats. Until this machine made its appearance, submarine traffic was being pretty routinely decrypted by the ace British cryptanalysts at Bletchley Park. The four-rotor Enigma put them back to start, leading to heavy shipping losses for a time.

Three particular messages attracted the attention of amateur cryptographers after their publication in 1995. Finally, a programmer named Stefan Krah devised a clever distributed-processing approach resembling that used in the well-known program for SETI (Search for Extra-Terrestrial Intelligence). In both cases, users participate in massive data-crunching by contributing resources on their own machines. After all, today's personal computers often have huge processing power just sitting around loafing.

Enigma, however, still responds better to ingenuity than brute force. This is due to the staggering number of potential code keys if all possible machine features and historically known procedures are used. A typical Nazi application had a key range calculated by the US National Security Agency (NSA) as one hundred thousand billion billion. The maximum theoretical key space is around 2 times 10 to the 145th power, or more than the estimated number of atoms in the known universe!

Krah named his ingenious effort the M4 Project, after the old name given the 4-rotor machine. It began in January of 2006, growing exponentially from 45 computers to a current 2500. Within a month, one of the messages was successfully decrypted.

The original message is a typical stream of ciphertext, separated into 58 4-letter groups. The "winning" crack produced German text that separated out, more or less, as follows:

"Von Looks: Funktelegramm 1132/19 Inhalt: Bei Angriff unter Wasser gedrueckt, Wabos. Letzter Gegnerstandort 08:30 Uhr, Marqu AJ 9863, 220 Grad, 8 Seemeilen, stosse nach. 14 Millibar faellt, NNO 4, Sicht 10."

This was translated by the M4 Project as follows:

"From Looks: Radiogram 1132/19 contents: Forced to submerge during attack, depth charges. Last enemy location 08:30 hours, Marqu AJ 9863, 220 degrees, 8 knots, following. 14 millibar falling. NNO 4, visibility 10."

Amazingly enough, someone was able to find this actual message on a research microfilm of an old U-boat diary, as recorded at the time. This validates the text. "Looks" is Hartwig Looks, lieutenant captain of U-264. "Marqu AJ 9863" is a German naval grid for position 51-33 north by 41-35 west. The rest is a weather observation.

At press time, the M4 Project continues. Those wanting to follow this interesting effort, read about its clever design, or even participate in it, can find it at **www.bytereef.org/m4_project.html**

❖ Teleprinting in Chinese

At first, the messages sent at 2350 UTC (Coordinated Universal Time) over XSG, Shanghai Radio in China, look like some kind of coded military communication. They consist mostly of 4-figure groups of numbers.

The messages are sent in standard Simplex Teleprinting Over Radio, mode B (SITOR-B), using the single-shift International Telegraph Alphabet #2 (ITA2). The first tip-off that something else is happening besides encryption, or even some arcane weather code, comes when one notices the literal strings in parentheses. These are common, and include such items as times of day, geographical coordinates, callsigns, or even vessel names.

This broadcast is actually a scheduled transmission, in Simplified Chinese, of local marine warnings for ships. A typical message starts off with "N/W" (presumably "Navigational Warning"), then a serial number ("NRxx"), a group count ("CKxx/xx"), and a date-time group ("dd hhhh," where d is for day of month and h for hours). This is followed by the message body. There is then a line break and the word "NEXT," followed another message. If there is no next message, the station sends its international "Who Are You" Telex designator "2010 SHAIRDO" (Shanghai Radio), followed by a standard sign-off "XSG VA" (End Of Work).

What we have here, then, is plain text, using an old 1980s standard called GB2312-80. The GB simply stands for "Guojia Biaozhun" (National Standard), or "Guobaio" for short. GB is an encoding method that uses these 4-figure groups as locations on standard tables for 6763 Chinese characters and 682 symbols, including punctuation and several alphabets for different languages. These include that skinny Latin font often associated with Asian documents in English.

It's actually a pretty slick achievement to get the fantastically complex Chinese language into the typically compact, character-based formats used for electronic communication. GB2312 is neither as comprehensive nor as expressive as newer codes used on computers, but it remains the most compact and efficient system for the relatively slow transmission speeds used on the radio. Obviously, the parentheses are for literal strings which are not to be evaluated as GB characters.

XSG's powerful transmitters can be heard worldwide on maritime narrowband direct printing channels. They have a lot of frequencies, but a 2003 international list gives the ones used by this broadcast as 4215, 6326, 8425.5, 12637.5, and 16898.5 kilohertz (kHz). That last one has been blasting into the US West Coast pretty reliably every day. Along with 2350, other UTC times listed are 0100, 0250, 0850, 1350, 1400, and 1700. The area of responsibility is given as the Chinese coast north of the 24th parallel.

These, of course, are the assigned channel frequencies. Your radio may very well show a different number on the dial, especially if tuning in upper sideband (USB). One very common dial offset is minus 1.7 kHz, but this is hardly the only one.

XSG accepts the usual radiotelex weather and position messages by automated command and without financial charge. Also, large vessels are required to check in with the China Ship Reporting System in Shanghai (command "CHISREP+"), when entering Chinese waters. These are also taken for free.

All broadcasts are with the standard 170-Hertz shift and 100-baud speed. Around here, there's always a good signal on 16898.5 kHz for the 2350 UTC broadcast, which can last 15-20 minutes.

U TILITY WORLD

UTILITY LOGS

Hugh Stegman

ABBREVIATIONS USED IN THIS COLUMN

AFB.............. Air Force Base
ALE .... Automatic Link Establishment
AM .... Amplitude Modulation
AMVER........ Automated Mutual-Assistance Vessel Rescue
ARQ............. Automatic Repeat Request teleprinting system
CAMSLANT .. Communication Area Master Station, Atlantic
CAMSPAC .... Communication Area Master Station, Pacific
CW .... Morse code telegraphy ("Continuous Wave")
DEA .... US Drug Enforcement Administration
DSC............. Digital Selective Calling
E3................ British female "numbers," probably Cyprus
E10a............ Israeli English phonetic "numbers" variants
E11a............ Female "Oblique" with message
EAM............. Emergency Action Message
FAX.............. Radiofacsimile
FEC.............. Forward Error Correction teleprinting system
HFDL .... High-Frequency Data Link
HF-GCS .... High-Frequency Global Communications System
M8a............. Cuban CW "numbers" cut to ANDUWRIGMT
MARS........... US Military Affiliate Radio System
Meteo .... Meteorological
MFA............. Ministry of Foreign Affairs
MX............... All Russian single-letter markers/beacons
Navtex .... Navigational Telex
PR................ Puerto Rico
RTTY .... Radio Teletype
S32.............. Russian voice station, "squeaky wheel" idler
Selcal........... Selective Calling
SITOR-A .... Simplex Teleprinting Over Radio, ARQ mode
SITOR-B .... Simplex Teleprinting Over Radio, FEC mode
STANAG....... Standardization Agreement (4285 is a data mode)
UK............... United Kingdom
Unid .... Unidentified
US .... United States
USCG .... US Coast Guard
V2a.............. Cuban "Atencion," 3-message variant
XM............... "Whale Sounds" and "Backward Music Station"

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 have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ( ).

518.0 "C"-ZSC, Cape Town Radio, RSA, SITOR-B Navtex at 1630. (Bob Hall-RSA)

2182.0 CAMSLANT Chesapeake-USCG, VA, working distressed fishing vessel St. Joseph off FL, at 0459. (Allan Stern-FL)

2461.5 0A-Irish Navy, Haulbowline, selcal CVVE in SITOR-A, then a radio check with Le Ciara, at 2334. (Day Watson-UK)

2474.0 PBB-Dutch Navy, Den Helder, RTTY channel availability marker at 1959. (Watson-UK)

2789.0 FUE-French Navy, Brest, RTTY test loop at 0727. (Tom Sevart-KS)

2872.0 Gander-North Atlantic air traffic control, Canada, selcal check with unknown aircraft at 0559. (Sevart-KS)

3000.0 Unid-Center frequency of possible 2-tone beacon, sequential tones with a 2-kHz shift every 15 seconds, unknown mode at 0644. Also cycling through 4100, 6000, and 8000, sometimes using a 3-kHz shift. (Sevart-KS)

3016.0 Santa Maria-North Atlantic air traffic control, Azores, working Speedbird 208 at 0622. (Sevart-KS)

3203.6 "L"-Russian CW solitary channel marker (MX), Tirana, Albania, at 2037. (Ary Boender-Netherlands)

3594.7 "D"-Russian CW cluster beacon (MX), Odessa, also 4557.7, 5153.7, 7038.7, and 8494.7, at 2249. (Boender-Netherlands)

3594.8 "P"-Russian CW cluster beacon (MX), Kaliningrad, also 4557.8 and 5153.8, at 2249. (Boender-Netherlands)

3595.0 "C"-Russian CW cluster beacon (MX), Moscow, also 4558 and 5154, at 2249. (Boender-Netherlands)

3828.9 "The Squeaky Wheel"-Descriptively named channel-idle noise from a Russian voice station (S32), at 2239. (Boender-Netherlands)

3890.0 UWS3-Kiev Radio, Russia, fast CW traffic for vessel *Gorckow*, at 2054. (Watson-UK)

4079.6 Unid-Pirate CW temperature beacon, sends "TMP" plus degrees Fahrenheit; TMP55 at 0228, and TMP53 at 0711. (Hugh Stegman-CA)

4211.0 BR-Petrobras, Brazil, RTTY test loop and Portuguese traffic, at 0550. (Hall-RSA)

4270.7 CFH-Canadian Forces, Halifax, NS, RTTY weather codes at 0601. (Hall-RSA)

4316.0 NMN-USCG CAMSLANT Chesapeake, Portsmouth, VA, weather at 1135. (Sevart-KS)

4318.0 NMG-USCG, New Orleans, satellite image FAX at 0803. (Sevart-KS)

4325.8 "R"-Russian CW solitary channel marker (MX), Ustinov, also on 5465.8. (Boender-Netherlands)

4346.0 NMC-USCG CAMSPAC Point Reyes, CA, schedule in FAX at1141. (Sevart-KS)

4372.0 "3-V-F"-US Navy, Link 11/16 coordination with "9-H-W," "F-8-D," "E-6-N," and "T-7-J," at 1905. (Mark Cleary-SC)

4414.0 Echo Foxtrot-US Navy, Link-11 coordination with Golf, Kilo, and Hotel, at 0629. (Cleary-SC)

4558.1 "A"-Russian CW cluster beacon (MX), Astrakhan, also 5154.1 and 7039.1, at 2249. (Boender-Netherlands)

4739.0 Wafer 21-US Navy P-3C, working Goldenhawk (USN, ME), at 0009. (Cleary-SC)

4740.0 "The Whales"-Unknown circuit malfunction with spooky moaning sounds (XM), at 0739. (Sevart-KS) *[Possibly associated with US Navy on 4739. -Hugh]*

4840.0 "121 Oblique 25"-Unknown "numbers" callup, then 5-figure groups (E11a), at 2031. (Chris Smolinski-MD)

5097.0 CFH-Canadian Forces, Halifax, RTTY marker at 2154. (Watson-UK)

5100.0 VMW-Charleville Meteo, Australia, grainy FAX chart at 1935. (Watson-UK)

5153.9 "S"-Russian CW cluster beacon (MX), Arkhangelsk, at 2037. (Boender-Netherlands)

5170.0 VLB3987Z567-Abnormal Israeli Intelligence callup (E10a), at 1903. (Boender-Netherlands)

5223.0 RIR86-Russian Navy, working RIR96, CW at 2306. (Watson-UK)

5254.0 UD30-Algerian Army, working RM30, ALE at 0617. (Watson-UK)

5263.0 HA52-Algerian Army, working HA48, ALE at 0603. (Watson-UK)

5286.0 TXX2-Spanish Guardia Civil Headquarters, working TYMC2 in ALE, at 0719. (Watson-UK)

5290.0 GB3RAL-Automated amateur CW beacon, Didcot, England, 1-minute CW transmission at 1545. GB3WES, Cumbria, England, CW at 1546. GB3ORK, Orkney, Scotland, CW at 1547. (Watson-UK)

5320.0 USCG Cutter *Cochito* calling Sector Hampton Roads, at 1408. (Cleary-SC)

5600.0 GHAT-Libyan Military, Ghat, working HQ6 in ALE at 1927. (Watson-UK)

5696.0 Coast Guard 2129-USCG, telling CAMSLANT the search is complete and negative, at 1329. (Mark Cleary-SC) Coast Guard 2120, breaking off search and returning with a bad engine, working CAMSLANT at 2248. (Stern-FL)

5708.0 UKE306-UK Royal Air Force E-3, ALE to ADW, then voice patch as Vulcan 01 via Andrews to Squadron Ops, at 2138. (Cleary-SC)

5732.0 OPB-DEA, Bahamas, ALE with aircraft X93, then voice as Panther working 93A over a Haitian vessel, at 0559. (Cleary-SC)

5865.0 TWVS2-Spanish Guardia Civil, Salamanca, calling TXX2 in ALE, at 0711. (Watson-UK)

6391.0 Unid-CW station repeating "583 583 583 28333," at 1356. (Watson-UK)

6392.0 Unid-CW station repeating "139 139 139 27049 27049," ended "139 139 000" at 0712. (Watson-UK) *[Definitely "numbers," but with several possibilities. - Hugh]*

6532.0 CO1477-Continental flight sending HFDL position to Shannon, Ireland, at 2228. (Patrice Privat-France)

6586.0 NOS 131-Neos Air, position and selcal check for New York at 0810. (Stern-FL)

6739.0 Andrews-US Air Force, Andrews AFB, MD, with a 60-character

EAM at 0159. (Jeff Haverlah-TX)

6867.0 Cuban Spanish AM "numbers" female (V2a), 5-number groups in progress at 1631. (Sevart-KS)

6914.0 VENI99-Unknown, raised VENI97 in ALE, then passed encrypted serial data, at 0909. (Watson-UK)

6915.1 VCO-Canadian Coast Guard, Sydney, NS, FAX ice chart at 1145. (Watson-UK)

6925.1 G1X2-Unknown CW station calling S9N0 and OC6Q, at 0836. (Watson-UK)

6959.0 "Lincolnshire Poacher"-British intelligence (E3), signing off with Poacher tune at 2245. (Sevart-KS)

6993.0 Andrews-US Air Force, MD, working Lucky Hit (rotating Nightwatch net tactical call) for FLASH priority traffic on frequency Fox-117, at 2128. (Haverlah-TX)

7325.0 Andrews-US Air Force, MD, calling Out Cross (rotating Nightwatch net tactical call), no joy at 2151. (Haverlah-TX)

7527.0 705-USCG, ALE with LNT, then voice as Coast Guard 1705 with position for CAMSLANT, at 1407. (Cleary-SC)

7887.0 Cuban Spanish AM "numbers" (V2a), callup 34741 26871 37401, at 2000. (Sevart-KS) Callup 47643 83903 90033, also at 2000. (Camilo Castillo-Panama)

7975.0 Cuban CW "cut numbers" (M8a), 5-figure groups in progress at 1600. (Castillo-Panama)

8010.0 Cuban Spanish AM "numbers" (V2a), in progress at 1709. (Sevart-KS)

8084.3 ISC7-Unknown CW station calling DZK2, at 0951. (Watson-UK)

8097.0 Cuban Spanish AM "numbers" (V2a), in progress at 1906. (Sevart-KS) Callup 78381 29961 25721 at 1800. Callup 78383 29963 25723 two days later, at 1800 and 1900. (Castillo-Panama)

8200.0 N'djamena-French Embassy, Chad, calling Baltazar, ALE at 2110. (Watson-UK)

8294.0 Falcon 40-US military, clear and secure with Shark 27, at 1338. (Cleary-SC)

8424.0 SVO4-Olympia Radio, Greece, SITOR-B maritime news in Greek, simulkeyed on 16830.5, at 1306. (Watson-UK)

8453.0 FUO-French Navy, Toulon, STANAG 4285 test loop at 1715. (Watson-UK)

8478.5 FUF-French Navy, Ft. de France, Martinique, STANAG 4285 test loop, also 13031.2, at 2302. (Watson-UK)

8503.9 NMG-USCG, New Orleans, satellite FAX at 1407. (Sevart-KS)

8834.0 ZS-SNH-South African Airways flight 221, an A340, working Johannesburg in HFDL, at 0657. (Hall-RSA)

8912.0 Coast Guard 1720-USCG HC-130, setting guard with CAMS-LANT at 2147. (Cleary-SC)

8971.0 Fighting Tiger 24-US Navy P-3C, getting weather from Fiddle (USN, Jacksonville, FL), at 2309. (Cleary-SC)

8983.0 Coast Guard 2120-USCG, position for CAMSLANT on a search off New York, at 2120. (Stern-FL)

8992.0 Bike Wing-US military, trying to set up data with Puerto Rico HF-GCS, suggested 10330, finally went to 7224 but no joy there, back to 8992, at 1545. (Don Storck-MI) Cotter Pin-US military, scheduling 4-tone data with Andrews HF-GCS, at 1629. (Haverlah-TX)

9000.0 HQ4-Libyan Military, calling OBARI in ALE, at 0848. (Watson-UK)

9025.0 Reach 8057-US Air Force Air Mobility Command C-17A, patch via Andrews to flight manager at 2331. (Cleary-SC)

9056.7 Unid-Egyptian MFA, Cairo, ARQ encrypted and plain Arabic traffic, at 0555. (Hall-RSA)

9063.0 Cuban Spanish AM "numbers" (V2a), in progress at 0712. (Sevart-KS)

10375.0 BU1-Romanian IPJ (County Police Inspectorate), Bucharest, calling CRA, ALE at 0807. DEV, Deva, calling BU3 at 0838. BUZ, Buzau, calling BU4 at 0957. (Watson-UK)

10377.0 RGT77-Russian Air Force, highly formatted CW messages at 0832, 1053, and 1124. RGT397, CW 5-letter groups at 1027. (Watson-UK)

11175.0 Red Talon 71L-US Navy, patch to Fiddle (FL) via Puerto HF-GCS at 2143. (Cleary-SC) Van Buren-US military, patch via Ascension HF-GCS at 2151. (Haverlah-TX)

11220.0 Mill Run-US military, another rotating Nightwatch net call, taking data from Andrews at 2058. (Haverlah-TX)

11232.0 Sentry 51-US Air Force E-3, patch via Trenton to Charlie Flight at Tinker AFB, OK, at 2155. (Cleary-SC)

11244.0 Unknown-US military aircraft, possibly a TACAMO (TAke Charge And Move Out), faded before identifying after a 28-character EAM, at 2320. (Haverlah-TX)

11318.0 CM0447-Copa Panama flight sending HFDL position to Santa Cruz, Bolivia, at 2250. (Privat-France)

11327.0 CM0453-Copa Panama flight sending HFDL position to Auck-

land, New Zealand, at 0842. (Privat-France)

11565.0 Cuban Spanish AM "numbers" (V2a), in progress at 1318. (Castillo-Panama)

12486.5 9VDB3-Singapore registry container ship *Wan Hai 263*, formatted AMVER position plot for NMO (USCG, HI), rogered on 12589 via NMO by automated NMC control point (CAMSPAC, CA), at 2346. (Stegman-CA)

12579.0 NMF-USCG, Boston, SITOR-B weather, simulkeyed on 16806.5, at 1636. (Watson-UK)

12603.0 "Lincolnshire Poacher"-British intelligence (E3), female callup and message at 1910. (Sevart-KS)

12603.5 SVO5-Olympia Radio, Greece, SITOR-B maritime news in Greek, at 1304. (Watson-UK)

12745.5 JJC-Tokyo Radio, Japan, Kyodo News FAX at 60/576, at 1530. (Hall-RSA)

12788.0 NMN-USCG CAMSLANT, VA, female reading weather, parallel on 13089, at 1717. (Sevart-KS)

13245.0 Heavy Arm-US military, rotating Nightwatch call, data for Andrews at 1957. (Cleary-SC)

13321.0 ZS-SFH-South African Airways flight 41, an A319, HFDL position for Johannesburg at 0703. (Hall-RSA)

13375.0 "Lincolnshire Poacher"-British intelligence (E3), 5-figure groups in progress at 1505. (Sevart-KS)

13537.8 ZSJ-South African Navy, Cape Town, RTTY weather at 1700. (Watson-UK)

13907.0 93A-DEA, working Panther 400 (Bahamas) 2157. (Cleary-SC)

13927.1 Dixie 43-US Air National Guard tanker, patch via AFA1WP, US Air Force MARS, regarding refueling a B-52H, at 1947. (Stern-FL)

14389.1 Ghost 04-US Air Force, morale patch via AFA1WP, at 2045. (Stern-FL)

16260.0 P6Z-French MFA, Paris, FEC idler at 1230. (Hall-RSA)

16331.9 "S"-Russian CW single-letter beacon, Arkhangelsk, at 1413. (Watson-UK)

16332.0 "C"-Russian CW single-letter beacon, Moscow, at 1412. (Watson-UK)

16710.5 Unid-Unknown vessel working Kaliningrad, Russia, SITOR-A at 1027. (Watson-UK)

16747.0 Unid-Probable Philippine ship, broadcasting unscheduled SITOR-B news at 1934. (Sevart-KS)

16804.5 3ECE9-Panamanian cargo vessel *Amber*, DSC safety test to Rio de Janeiro, at 1242. C6003-Bahamian vessel *Atlantic Prestige*, DSC safety test to Lyngby, at 1247. (Watson-UK)

16812.5 NRV-USCG, Guam, rogering an AMVER from an unknown vessel in SITOR-A as "NMC" (CAMSPAC control point, CA), then back to marker at 0942. (Watson-UK)

16816.5 NMC-USCG CAMSPAC, CA, CW identifier in SITOR-A marker at 1545. (Glenn Blum-TX)

16821.0 VRX-Hong Kong Radio, CW identifier in SITOR-A channel-idle marker, at 0948. (Watson-UK)

16833.5 UIW-Kaliningrad Radio, Russia, working a vessel in SITOR-A, then back to marker at 1024. (Watson-UK)

16880.0 XSQ-Guangzhou Radio, China, CW identifier in SITOR-A marker at 1004. (Watson-UK)

16906.7 FUV-French Forces, Djibouti, RTTY test loop at 1524. (Hall-RSA)

16906.9 FUV-French Navy, Djibouti, RTTY marker at 1303. (Watson-UK)

16951.5 6WW-French Navy, Dakar, Senegal, RTTY test loop at 1520. (Hall-RSA)

16961.5 FUF-French Navy, Ft De France, STANAG 4285 marker at 1706. (Watson-UK)

16976.0 PWX33-Brazilian Navy, Rio De Janeiro, RTTY test loop, then weather in Portuguese, at 1847. (Watson-UK)

16986.0 CTP-Portuguese Navy, Lisbon, RTTY marker at 1141. (Watson-UK)

17146.4 NMG-USCG, New Orleans, unscheduled FAX satellite image at 1737. (Watson-UK)

18238.0 ZSJ-South African Navy, Capetown, weather FAX at 1535. (Watson-UK)

22383.5 WLO-Mobile Radio, AL, CW identifier in SITOR-A marker at 1455. (Watson-UK)

22387.5 SVO7-Olympia Radio, SITOR-B maritime news at 1303. (Watson-UK)

22389.5 NMN-USCG CAMSLANT Chesapeake, VA, CW identifier in SITOR-A marker at 1506. (Watson-UK)

22527.0 NMC-USCG CAMSPAC, FAX schedule and wave chart at 2337. (Sevart-KS)

28116.3 "AA"-CW fish net locator buoy, at 1930. "MD"-CW fishing buoy at 1935. (Castillo-Panama)

28240.9 "IC"-CW fishing buoy at 1940. (Castillo-Panama)

DIGITAL DIGEST

Algerian Digital Profile

This month we continue our country profiles of digital HF users by taking a look at Algeria. But before we do that, here is some news of an interesting system that is putting excellent signals into northeastern US most evenings.

❖ Swiss System Emerges

The system is quite distinctive, being made up of two channels of 100bd FSK and 170Hz shift with the channels separated by 1 kHz. To date, traffic always appears to be fully encrypted and shows no autocorrelation.

Since this system has the same tone arrangement as that believed to have been used by the Spanish Navy for ALE (Automatic Link Establishment), this is what I thought it was until a post by Pete Poelstra on WUN pointed to this new signal originating from the Swiss Air Force. The Spanish system was last heard in late 2000.

Here are the two sets of frequencies attributed to this system (center frequency of lower channel).

Swiss AF Frequencies:
3448.5, 4193.5, 4529.5, 4712.5, 4793.5, 4905.5, 5463.5, 5705.5, 5723.5 and 6714.5 kHz
Spanish Navy Frequencies:
5252.7, 5292.7, 6767.2, 7673.7, 8090.7, 11156.7, 12087.2, 14732.7 and 15984.7 kHz

❖ Algerian Digital Profile

The Algerians have been another long-term user of HF digital systems for diplomatic, internal and military communications, and they remain an active fixture today.

❖ Algerian MFA and Embassies

While some embassies have transitioned to newer equipment, most notably Racal (now Thales) Skyfax and the rumored Alcatel 801 HF modems, there is still a reasonable level of activity using the venerable 8 tone Coquelet system that can be heard daily. Here are some recently active frequencies:
11428.37, 16278.72, 16338.3, 18183.41, 18529.45 and 19036.35 kHz

MFA Algiers uses a semi-duplex system, with the MFA on one frequency and the embassies acknowledging messages or sending their own traffic on a different frequency. Good pairs to check include 16338 and 16278 for Algiers and 19036 for embassies. Most traffic is in French and in the clear. Usually, three letter abbreviations are used by the operators to denote the receiving embassy e.g. "bko" for Bamako or "mpt" for Maputo during chatter.

It is usually easy to spot embassies sending traffic as the message starts with "vci off <name>" ie "voici office <name>" or "here is the embassy at <name>." There is frequent retransmission of messages by embassies with more powerful equipment acting as regional relays, so it is important to compare message headers which indicate sender "exp" and destination "dest" with operator chatter in between messages.

It is also useful to note that Coquelet will sometimes be set to operate at 13.3bd rather than 26.6bd when conditions get rough. The difference in speed is quite noticeable by ear and most decoders can accommodate the new setting.

Over the past years, many embassies have been equipped with the Skyfax modem, which is triggered by standard MIL-188-141A ALE. The MFA uses the identifier MAE and embassies use the same three letter identifiers used on the Coquelet system. For example, Tripoli uses TRP and Tunis uses TNS. ALE has been heard on the following frequencies:
8021, 9080, 9120, 10375, 10995, 11427.5, 11470, 11475, 11570, 14422, 16080, 16335, 18205.5, 18348, 18635, 19140, 19945, 20340 and 20452kHz (USB)

❖ Customs and Border Patrol

The Algerian Customs offices use the same Coquelet-8 equipment and operating practices as the diplomatic service, although the three letter abbreviations are the locations of the offices: for example "alg" or "dgd" (Directeur General de Douanes) for Algiers, "ana" for Annaba and so on.

They have also flirted with PacTOR equipment from time to time. Again, these frequencies are active most days and pretty much around the clock. One can read reports of stolen cars, passport checks, seized contraband and many other interesting things. Frequencies to listen to customs activity are as follows:
6911.38, 7746.37, 7808.62, 7813.38, 10011.39, 10467.39, 11251.38, 13898.65, 13933.64, 13934.80 and 13936.39kHz

❖ Army, Civil Defense, National Guard and Navy

The Army has been heard using encrypted Baudot 75bd RTTY with 850 Hz shift. Messages begin with a characteristic "bpxlbpxl..." lead-in. Frequencies include 12127, 12333 and 16124 kHz.

There are two more extensive ALE networks which appear to emanate from Algeria and are likely connected to Army or MOI (Ministries of the Interior) operations. The long-standing, and perhaps now defunct "KARIM" network formerly operating with RTTY equipment has transitioned to ALE:

Frequencies:
3620.0 5860.0 6945.0 6966.0 8130.0 and 9175.0kHz (USB)
Identifiers:
KARIM, B12, B92, C13, C95, E13, H11, K13, K23 and K33

The other network operates an extensive pool of channels below 10 MHz with letter + letter + number + number style identifiers:

Frequencies:
3858, 3900, 4505, 4798, 5035, 5263, 7502, 7752, 7785, 8010, 8130, 9295kHz (USB)
Identifiers:
BJ20-30, HA33-HA66, UM22, UM42, UM54, YA11-YA54, YK20-23

The Algerian Navy operates a reasonable sized fleet of Frigates, Corvettes, Submarines and small Missile Patrol Craft in the Mediterranean from its bases near Algiers, Annaba and Mers El Kebir.

The Navy has been heard using SITOR-A and B on 9115.7 and 11162.7 kHz. Callsigns heard include GF14, KJ85, ML10, PM01 and ZM88.

It is interesting to note the similarity between these callsigns and those of the previous ALE network.

❖ Algerian Oil and Gas Fields

Like its more well-known neighbor Libya, Algeria has extensive oil and gas reserves under its southern desert regions. There is also a very well-developed network of pipelines, pumping stations and refineries to transport this valuable commodity to terminals on the coast from which it is sent by further pipelines and by ship to Europe, Asia and the US. The whole operation runs under the auspices of SONTRACH, the Algerian government's oil and gas company.

Most of this infrastructure is supported by a SCADA (supervisory and control data) system which appears to be linked via HF radio ALE. Here are the frequencies on which the system can be heard:

5362, 6981, 7969, 8055, 9315, 10244, 11240, 11466, 11488, 11489 and 18062 kHz (USB)

5784, 6790, 7739, 10211, 10275 and 10285 kHz (LSB)

Algeria provides a host of accessible listening: give it a try one day soon.

RESOURCES

UMC Algerian Diplo Profile
www.chace-ortiz.org/umc/mfatext/Algeria.txt
UMC SONATRACH Profile
www.chace-ortiz.org/umc/oil/Algeria.txt
UMC Algerian Customs Profile
www.chace-ortiz.org/umc/moi/customs/Algeria.txt
SONATRACH
www.sonatrach-dz.com

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

DRM Forges Ahead

Despite the lack of *Digital Radio Mondiale* receivers in the hands of the general listening public, DRM expands, at least for the benefit of the few experimenters who can try to pick it up.

Per *News Snippets* from the Fellowship of European Broadcasters (via Dr Hansjoerg Biener, *BC-DX*), the newly formed Centre for Christian Broadcasting in the UK has contracted with Norway to transmit two new DRM digital stations (max power 500 kW), for 15 years, beginning in the next few months. The stations aim to cover the UK, Ireland, and most of Western Europe with "live" transmissions on DRM. They are already searching for programming and partners. The first will provide Bible-based radio and the second will provide news and current affairs from a Christian viewpoint.

On RNZI *Mailbox*, Adrian Sainsbury said they hoped to start parallel DRM service sometime in April. He had been visiting various Pacific islands installing DRM reception equipment for stations relaying RNZI, and only had about three to go, later this year. Registered DRM channels, on a rather flexible schedule, are 13730, 11675, 9615, 9440, 7145, 6095 kHz.

ANATEL, National Telecommunications Agency has authorized DRM testing in Brazil. The department of technology of Brasília University should test this year on 25885 to evaluate both audio quality and signal strength of the 1 kW signal using a Croatian-built RIZ transmitter into a 12.5 m dipole antenna, says Cristiano Torres (via Célio Romais, translated by Carlos Gonçalves, *DX LISTENING DIGEST*). This is intended for groundwave, but could skip out with unusual propagation.

ALBANIA R. Tirana A-06 English, daily exc Sun/UT Mon: Eu 1845-1900 7465, 1931-2000 9920, 2130-2200 7465; NAm 0145-0200 & 0230-0300 6115, 7455. Albanian daily to NAm: 2300-0030 7455 (Drita Cico, RT, *BC-DX*) Don't be surprised if R. Tirana is inaudible. One of the transmitters at Shijak was down for a few days in March, waiting for Chinese engineers to replace a failed part (via Christopher Lewis, Erik Køie, Wolfgang Büschel)

BANGLADESH 7185, (tentative), Bangladesh Betar at 1238-1300 in English under very strong CNR 1 in Mandarin. BB with S. Asian music, and a periodic word definitely in English, sign-off at 1300. No ID heard under CNR 1, but language and broadcast conforms to reported schedule for BB and so is probable (Mark Taylor, WI, NASWA *Flashsheet*) To our frustration, this is the *only* active SW frequency from Bangladesh, and China has to block it (gh)

BOLIVIA Last month we were unsure if a theft at the FM transmitter site also affected Radio Pio XII on SW. No: I talked on the phone with personnel there, who said they remained active on SW (Gabriel Iván Barrera, *condig* list) Heard on 5952.427 at 1056 but cut off at 1058 (Robert Wilkner, FL, *Japan Premium*) Had extended transmission for New Year past 0400 (Hideki Watanabe, Japan, *Radio Nuevo Mundo*)

New Bolivian heard on 5680.7, R. San Rafael, San Rafael, Cochabamba, mid-March at 2218-2230 in Spanish, Aymara, with Taquipayanakus folk festival coverage (Nicolás Eramo with Arnaldo Slaen, Enrique Wembagher, Marcelo Cornachioni and Hector Goyena, Chascomús DX camp, Argentina, *DXLD*) Actually a reactivation of Radio LV del Campesino, Sipe Sipe on 5680.7 (ex 6537). Since it's near my home, I offer to help get QSLs if you send complete reports to me at *rogfara@yahoo.com.br* (Rogildo Fontenelle Aragão, Quillacollo, Bolivia, *DXLD*)

Another month went by and still no DX reports of new R. Logos, Santa Cruz, 6165, so we asked our contact about it again (gh) Yes, on the air, and in the local area they are pleased with the signal, 3 to 4 dB above the 6135 station. Regular schedule is 1000-2300. Planned to replace temporary 5 kW transmitter with a 1 kW to save power. Sounds like the NVIP antenna is doing its job (Wayne Borthwick, VA7GF, *DXLD*)

BURMA [and non] Aye Chan Naing, director of the Democratic Voice of Burma, which broadcasts into the country from shortwave transmitters in several locations, including the Radio Netherlands Madagascar relay station, says it is no longer being jammed by the Burmese government. These days even the military junta is making use of the DVB. "In the beginning it was risky to listen to the radio station and the government would jam it, but not any more. Gradually even the civil servants started listening to us, as it is the only way to get reliable information." (Inter Press Service News Agency via *Media Network*)

CANADA Fishing for "soul" in Pickle Lake – A long, rambling story from Galcom, provider of fixed-tuned radios for evangelistic purposes only, again mentions plans for FM and a *shortwave* station at this town in the remote middle of northern Ontario (March Galcom newsletter). We are not aware of any application yet for such a station. There have been no new Canadian SW stations authorized in decades. The few remaining ones are relics of the 1930s (gh)

Strangeness at Sackville: 1) A spur on 9405 at 1435-1500 mixing CBC Northern Quebec 9625 and RCI 9515 carrying the same program (Brian Alex-

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-06=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

ander, PA, *DXLD*)

2) DRM buzz on 15235-15245 one morning, before and after 1430 when the R. Sweden relay is supposed to be in analog, going from Swedish to English; later in the half-hour, back to analog. Perhaps they were carried away at Sackville fiddling with the DRM on/off switch, or DRM proponent R. Sweden was testing, to the detriment of the huge majority of analog-only would-be listeners. RCI French on 11845 until 2200 was hit by DRM, presumably Bonaire too early (gh)

3) Why would RCI with CBC *World at Six* be bubble-jammed, on 11990 as around 2220? Nothing suspicious listed on 11990, but here is a remote possibility: 5995, Fu Hsing Broadcasting from Taiwan to China, but not scheduled until 2300 – if perchance they were on as early as 2200 (or the jammer against them was) and it puts out a second harmonic. But the same errant jamming was heard on 11990 around 1600 marring Kuwait, another unlikely target unless it's programming just too secular for some tastes (gh)

CHILE Surprised to hear something other than the usual pop and gospel rock on CVC La Voz, Spanish on 17680, Sunday at 1330 with short selections of classical and semi-classical music, a pleasant respite. According to program grid at **www.vozcristiana.com/article/frontpage/49** Sunday at 1300-1400 this is *Arte y Cultura* con Marisol Popovitz. But that is the only hour out of 168 per week which departs from the usual fare, as I can tell from looking over the entire schedule. However, concluding at 1358, program was called *El Mundo del Arte*. Some evangelism interspersed (gh)

CHINA CRI heard on 18160 at 1144 (Tim Bucknall, England, harmonics yg) Not an integral harmonic; what's it doing here? (gh) What's the Chinese on 18160 at 1000-1100? (Brian Mulleady, GM0KWL, UK, HCDX) Mixture of 16mb Beijing site channels, but spur formula does puzzle up the DXer community yet (Wolfgang Büschel, ibid.) Also here, very loud at 2330-2400* very commercial style in Asian language; anybody doing anything to get them off the ham band? (Roy Geldart, BC, VE7DXU, **DXLD**) China National Radio first program // 17550. The strange thing is that at top of every hour (0800, 0900, 1000) they dropped audio feed during news right after time signal and then came back at 5 minutes past the hour! (Mauno Ritola, Finland, HCDX) Heard besides CNR1 on 18160 a separate Firedrake, clearly indicating something is being intentionally jammed, but what? (Olle Alm, Sweden, DXLD) Could be related to another unexplained Chinese frequency, 17310. These may be the only evidence we have of even more as yet unknown opposition stations (gh)

[non] Sound of Hope Radio Network (SOH), headquartered in California, transmitters in Taiwan, increased schedule in March to 6 hours a day: 1600-1700 UT 11765 kHz, 2200-2300 9635, 2300-2400 7310, 1100-1300 7280, 1300-1400 7310. **http://www.soundofhope.org/** (*Media network*)

[non] Another Falun Dafa station has begun SW to Mainland China, Minghui (MH) Radio, per **http://clearwisdom.net/** Readers can also listen online or download programs at **http://www.mhradio.org** (via Andy Sennitt, *DXLD*) Says schedule since Dec. 30, 2005 is: 2200-2300 7105, 1300-1400 6030, 1500-1600 11700 (Takahito Akabayashi, *DXLD*) Hearing mindboggling jamming on 7105 at 22-23, two CNRs with a deliberate delay as well as Firedrake in the background! (Dan Goldfarb, England, ibid.)

COLOMBIA R. Líder vanished from 6140v in mid-Feb and was still missing a month later. Also

missing, LV de tu Conciencia, 6010v and Marfil Estéreo, 5910 – shortly after Ukraine went to the trouble of moving to 5880 to avoid it. What's going on in Loma Linda? (gh)

In the midst of deploying thousands of Galcom solar radios tuned to our frequencies, we are having trouble keeping our SW transmitters on the air. Something is wrong with the electricity arriving at Lomalinda and the voltage regulators to our transmitters keep burning up. We are at our wit's end trying to solve the problem as we have spent every available financial resource and still do not have a solution (*Colombia Para Cristo* Newsletter)

CUBA [non] On at least three dates in March, R. Martí was heard on spurious unjammed frequencies – a new tactic? The Delano 15330 transmitter was first accompanied by weak, wobbly spurs plus and minus 138 kHz on 15192 and 15468 at 1506, the lower one better. Unfortunately, a week later they had shifted to 15195.4 and 15464.6, so the lower one collided with Turkey in Arabic (gh)

CYPRUS, TURKISH NORTHERN I sent an email inquiring about the status of Radio Bayrak, as there was a question whether they were still on. Here is the reply:

We do have transmissions on SW 6150 kHz from Northern Cyprus. This is a 24 h transmission with manual operation from 0430 to 2200 UT and automated broadcast from 2200 to 0430 UT (00:00 to 06:30 local time). Regards, Mustafa TOSUN, Head, Transmissions Dept., BRTK, *mustafa. tosun@brtk.net* (Steve Lare, MI, *DXLD*) But is anyone hearing them? Not reported for ages (gh)

CZECH REPUBLIC R. Prague, A-06 English, 27 minutes: 0700 UT 9880 11600 kHz; 0900 9880 21745; 1030 9880 11665; 1300 13580 17540; 1600 5930 17485; 1700 5930 17485; 2000 5930 11600; 2130 9410 11600; 2230 7345 9415; 0000 7345 9440; 0100 6200 7345; 0300 7345 9870; 0330 9445 11600 (via Andreas Volk, ADDX, BC-DX) No mention of Sackville relay which in B-05 was at 04 on 6100, but never appeared on RP's schedule! (gh)

FRANCE [and non] RFI A-06 English as modified May 7, until Sept 2. Issoudun site, *u.o.s.* S = South Africa. Frequencies in () replace a preceding one from Sept. 3; to various parts of Africa, Asia only:

0400-0430	9805
0400-0500	11700
0500-0530	13680 15160 (11995)
0600-0630	15160 17800
0700-0800	17800 (21620)
1200-1230	17525 17800 (21620)
1400-1500	15700 17605 (21620)
1600-1700	7170S 11615 15160S
1700-1730	15605 17605 (via *BCDX*)

GREECE Radio Station Macedonia, Thessaloniki, 9935, heard with brief English news around 1255 (Christopher Lewis, England, *DXLD*) Should have shifted now during DST to 1155 UT (gh) Daily, time varies anywhere from 1100 to 1245 (Dimitris Keramidas, Tasos Glias, RSM via John Babbis, *World Of Radio*) Another day for only two minutes at 1257 including weather (Christer Brunström, Sweden, *SW Bulletin*) Weekdays only, Greek weekends (Edwin Southwell, BDXC-UK *Communication*) Maybe that's when the time varies earlier (gh) 9935 is Avlis-1 transmitter at 288 degrees (John Babbis, MD)

VOG A-06 includes Kavala-2 at 1400-2000 on 7430 at 172 degrees for the foreign language block. And new 12120 at 292 degrees for Africa at 05-10 from Avlis-1. Avlis 3 is on 9420 at 323 degrees toward NAm continuously from 1200 to 1000. Delano relay: 1200-1500 9775 75 degrees, 1600-2200 17705 75 degrees, 0600-0800 15190 296 degrees; Greenville relay still 2000-2200 17565 164 degrees. Summer timings of weekly English hours not known, but check 9775 on Saturdays, perhaps at 1500 as in B-05 (via John Babbis, gh) The 0600 hour UT Sunday carried some wonderful music in an Orthodox service, but that was before the time shift, and on B-05 channel 9775 (gh) see also USA!

GUAM For AWR Wavescan on Sundays at 2230, try 15320 from KSDA, replacing 11655 during the B-season (gh)

HUNGARY R. Budapest in danger: workers planned a two-hour strike to protest government plans for a drastic budget cut and possible closure of all foreign programs, as announced on the Italian service (Dario Monferini, Italy, *DXLD*) About 80% of the workers from all fields participated in the warning strike. Longer strikes threatened if the plan is not withdrawn (Sergio Pérez, Spanish section, via Héctor Frías, Chile, *ibid*.) Pérez asked for solidarity from listeners (Rubén Guillermo Margenet, Argentina, *ibid*.)

R. Budapest A-06 English. All antennas from Diosd and Szekesfehervar have been moved to Jaszbereny. No broadcasts via Rimavska-Sobota in Slovakia any more. Sundays only 1500-1530 6025 9690; daily: 1900-1930 3975 6025; 2100-2130 6025 9525; 0100-0130 9590; 0230-0300 9795; also check afternoon Hungarian hour to NAm at 2000 on 11695 (R Budapest via Andreas Volk, ADDX, BCDX)

IRAQ The only audible Iraqi SW station as of March is former clandestine Voice of Iraqi Kurdistan on 6335 (Anker Petersen, Denmark, DSWCI *DX Window*)

ISRAEL IBA A-05 English, as modified 1 May; () frequencies are replacements from 1 September (and until 1 May): 0330-0345 17600 13720 (7530) 11590 (9345); 0930-0945 15760 13680; 1730-1745 13675 11590 9345; 1900-1925 15640 11590 9400 (via Doni Rosenzweig, *DXLD*)

JAPAN 1 April brought a new fiscal year to R. Japan, budget cuts, and programming changes, including termination of *44 Minutes*, the weekday newsmagazine, and *Hello from Tokyo*, the weekend listener contact show (gh) Several long-time presenters are leaving. However, *DX-Corner* will be continued in a new feature, as listener feedback has been positive (Toshimichi Ohtake, Japan, DSWCI *DX Window*) Will continue a bi-weekly

listeners letterbox/DX/cultural program (Mick Delmage, AB, *DXLD*) Its new name is *World Interactive* (Md. Azizul Alam Al-Amin, Bangladesh, *ibid.*)

Japanese Vice Minister of Internal Affairs and Communications Shogo Hayashi said the ministry will consider accepting advertisers' sponsorships to fund programs that NHK airs abroad (Kyodo via *Media Network; Japan Times* via Dan Say) Unclear whether this refers only to TV, but don't be surprised to hear ads on R. Japan, NHK Warido (gh)

LIBYA [and non] The radio war between clandestine Sawt al-Amal and Libyan jammers and their proxies described in last month's lead continued the following month, with SAA habitually shifting frequency in the middle of the two-hour broadcast at 1300, but the jammers quickly following. Sometimes they were on 17680, way under Chile here but apparently not a problem in Eurafrica. Highest frequency sometimes used was 17695. The African music station continued to run until 1530 or so, but Noel Green, UK, found that Africa Number One, Gabon, resumed broadcasting before then on its usual 17630, presumably activating another transmitter to make it less obvious that ANO was also the source of the jamming.

The Arabic music and drumming station stayed on 17660, identified by José Miguel Romero as Libya's Voice of Africa service, though SAA had quit using 17660. Tarek Zeidan in Egypt, who can actually understand SAA programs, found them running the same ones over and over for a week before changing them. Wolfgang Büschel concluded: there are at least four Libyan stations to jam/shadow Al-Amal: one constant on 17660 kHz, another very strong one hopping on various 17670/17675/17680 kHz channels, accompanied by two Libyan bubble oscillation stations. Daily monitoring reports of these, especially by Romero in Spain, appeared in *DX Listening Digest*.

MALDIVES [non] Minivan Radio, via R. Miami International, via Germany, A-06: daily 1600-1700 in Dhivehi on 13620 (WRMI via John Norfolk)

MÉXICO XEXQ, R. Universidad San Luís Potosí, 250 watts, 6045 kHz, operates M-F from 1300 to 0200, closes earlier on weekends. Heard here with SINPO of 5 at 0100 despite strong stations on nearby frequencies (Julián Santiago Díez de Bonilla, DF, *condig* list) Still very tough as close as OK (gh)

XERTA, 4810, returned late Feb in a new experimental phase, at 2300 with tech info about station; said they were testing only 300 watts to an inverted V dipole atop studios in the historic center of Mexico City (rather than on the mountain). (Julián Santiago Díez de Bonilla, DF, *DXLD*)

R. Insurgente, clandestine, continued heard on 6000 every Friday into March from as early as 2047, some weeks better than others, and despite Cuba which sometimes came on earlier than 2150 (Julián Santiago Díez de Bonilla, DF, *DXLD*) Seems Friday afternoon is a favorite time for anti-American rallies Havana has to cover, activating frequencies out of normal schedule; tough luck, Zapatistas (gh) No confusing them here; Insurgente IDs, and closes with the *Himno Zapatista* until 2157 (Santiago, *condig* list)

NETHERLANDS R. Nederland changes: now known by its full name RN Wereldomroep; new melodies, but still with carillon, and in Spanish the transmitter sites are now announced (Jaime Báguena, RN Director Artístico, via Dino Bloise, FL, *DXLD*) Also has a new logo (Claudio Guzmán, Argentina, *Noticias DX*) All part of ongoing "revitalization process." Announcing transmitter sites is only done by the Spanish. Dutch, Indonesian and English all use some non-RNW sites, and it's too complicated to do it. Other presentation changes are being phased in – new music, etc. (Andy Sennitt, *DXLD*)

NEW ZEALAND RNZI initial A-06, analog, but likely modified from early May: 0500-0705 9615, 0706-1059 9885, 1059-1259 9870, 1300-1850 7145, 1851-1950 9630, 1951-2050 11725, 2051-0458 15720 (via Carlos Gonçalves, antipodal Portugal, *DXLD*)

SOMALIA [non] R. Waaberi, via R. Miami International, via Germany, A-06: Fri 1330-1400 in Somali on 17550 (WRMI via John Norfolk)

SPAIN Following press reports of major staff cuts at RTVE, Spain's public broadcaster, I attended a news conference. REE is not being scrapped for now but will no longer have a separate news service from the rest of the network. No word on foreign language services (Marty Delfín, Media Network blog)

The 13 antennas of R. Liberty at Playa de Pals were scheduled for demolition on March 22, in a controlled explosion, provided a north wind was blowing at 90-100 km/h. A few days earlier, guided tours of the facility were available one last time. The station provided employment to many people on the Catalonian coast between 1958 and 2001. The metal will then be hauled away for recycling, and the concrete foundations also blasted. The area is to become a natural park. Still being discussed was whether to preserve one of the buildings as a Cold War museum (*televisiondigital* via José Miguel Romero, *DXLD*)

SUDAN [non] Sudan Radio Service began announcing its A-06 schedule weeks in advance: 0300-0500 11805, 0500-0600 15325, 1500-1700 17660. Presumably still weekdays only, and the final hour 1700-1800 unaccounted for; via UK sites, English for 30-45 minutes at 0300 and 1500 (gh)

SWEDEN [and non] R. Sweden A-06 English to NAm: 1230-1300 15240 direct; rest via Sackville: 1330-1400 15240, 0130-0200 & 0230-0300 6010. At same times direct to Eu, As, Pac: 1230 13580, 15735; 1330 15735. Via Madagascar to Au: 2130 7420; to As 0130 9435 (Radio Sweden homepage via Eric Zhou, China, *DXLD*)

TURKEY VOT Ankara, A-06 English: 1230-1325 Eu 15225, As/Au 15535; 1830-1925 Eu 9785; 2030-2125 As/Au 7170; 2200-2255 Eu/NAm 9830; 0300-0355 Eu/NAm 6140, Af 7270. Turkish to NAm: 2200-0100 7300, 0400-0700 9460 (TRT via Andreas Volk, ADDX, BCDX)

U K BBCWS announced in late Feb that from the end of March, after 62 years, it would cancel *Calling the Falkland Islands*. This had been only 15 minutes twice a week, Tue & Fri 2130, most recently on 11680 direct from UK.

But it would provide technical, training and programming support to the Falkland Islands Radio Service instead. Although the cost was minuscule, this was one of many shortwave cuts in order to pay for the coming new Arabic TV service (gh)

Another casualty as BBCWS 'rationalises' its programmes to even more rolling news, is *Off the Shelf*, readings from literature (*Private Eye*, via Mike Barraclough)

U S A A plan to cancel the Voice of America's flagship English-language service, *News Now*, is drawing heavy flak. At a time when other countries and even al-Jazeera are boosting international broadcasts in the world's most influential language, America itself is backing off?

Four former VOA directors, for a start, used words like "shocked," "horrified" and "appalled." They pointed out that the International Broadcasting Bureau is tinkering with an invaluable national strategic asset: America's ability to communicate globally about its culture, values and foreign policy.

As former VOA director Geoffrey Cowan (1994-96) suggests, Congress could appropriate an extra $23.7 million "to make sure that VOA remains a robust world-wide service." In the grand scheme of things, that doesn't sound like a huge sum to tack on to the proposed 2007 budget of $2.77 trillion, while America fine-tunes its Voice (*Opinion Journal* via David Cole)

The Bush administration's proposal to ax most English-language radio programming on VOA would damage America's already shaky reputation for providing accurate and balanced information to countries where media freedom is lacking.

During the first Persian Gulf War, administration officials claimed the VOA's Arabic service was "too balanced." Journalists knew this was not a compliment. The current administration does not trust the VOA to carry its message to the Arab world.

Using VOA as a strategic weapon is a mistake. How can it be regarded as credible when the government keeps deploying it in the war on terrorism? (David H. Mould, associate dean of research and graduate studies in the College of Communications at Ohio University, *Columbus Dispatch* via Artie Bigley)

''While abandoning VOA as a 'relic of the Cold War' and ignoring nearly 50 years of reputation and good standing among Middle Eastern audiences, the White House is casting about for ways to connect with Islamic audiences globally when the answer is just 10 blocks away at the VOA headquarters.'' So says John J Schulz, dean of the College of Communication at Boston University. Schulz worked for VOA as a news writer, foreign correspondent, and then as a senior news executive in the period 1975-1995. "News of events and developments related to new propaganda-funding plans would be laughable if it weren't so costly and downright tragic." (*OpEd, Boston Globe*, via Bigley)

The bedrock of the VOICE of America is English and the VOA should broadcast news and information in English 24/7 globally on shortwave. This can be supplemented with AM and FM affiliates and as many other language broadcasts as possible. The money now being poured into television projects should be redirected to an Internet product which could be vastly improved and made world class (AFGE Local 1812)

NOWHERE in the VOA Charter, or in the VOA Journalistic Code, does it state that the mission of the Voice of America is to help fight the "War on Terrorism." Yet, since the 2001 terrorist attacks, the BBG – with Kenneth Tomlinson at its helm in recent years – has accelerated the dismantling of VOA, whose journalists and broadcasters labored for decades to establish a reputation for fair and accurate journalism.

His dismissive and disrespectful characterization of those who worked in the trenches for decades as nothing more than people "[longing] for the days of banging typewriters and shortwave radio" is insulting, but to be expected from someone infected with the same kind of hubris that has afflicted the Bush administration since its inception. Shame (Concerned VOA Journalists, *DX Listening Digest*)

As America becomes increasingly involved in the global war on terrorism, the Bush administration is planning to shut down its worldwide English-language broadcasts on the Voice of America. This is a serious error (Former VOA director Richard Carlson, *OpEd, The Hill* via Mike Barraclough, Artie Bigley)

As for the other VOA languages on the chopping block, Thai is perhaps the most disconcerting. We have seen several accounts of the Thai government increasing its control over independent media. Elimination of BBC's Thai Service in December 2005 has left VOA as the only Thai-language foreign broadcaster with a substantial news service. Will Radio Free Asia have to add a Thai Service to compensate for the loss of the VOA Thai Service?

As is the case with such big decisions in U.S. international broadcasting, it was sprung upon us subordinates with no advance notice. Perhaps this was to keep the union and others from rallying opposition. But this also meant that frequencies – in many cases one of three shortwave frequencies per transmission – were dropped without giving the audience any advance notice. They may well now be former listeners (Kim Andrew Elliott, NASWA *Journal*) *SAVE AMERICA'S VOICE! DEVOTED TO SAVING VOA ENGLISH Broadcasts*: **http://savevoaenglish.blogspot.com/** (via kimandrewelliott.com)

On Feb. 24 it was announced that IBB would close down the SW and MW relays at Kavala and Rhodes, Greece. Reaction to that:

The news comes as no surprise, as a number of the languages broadcast from the Greek facilities are being eliminated in the proposed schedule effective in October 2006 (*Media Network*)

A considerable amount of Voice of Greece transmissions direct from Greece originate from Kavála as well, two transmitters most of the day (Kai Ludwig, Germany, *DXLD*) Could Greece take over Kavala and keep it on the air for itself? And what will become of the relays via Delano and Greenville, giving VOG excellent signals in North and South America, Pacific? For A-06, the schedule continues; see GREECE.

Kavala is ideally placed to cover Europe, former Soviet Union, Africa, Middle East, and even East Asia. Until another medium comes along that is less interdictable, a global SW capability is vital to U.S. interests. Those transmitters may be needed for VOA Indonesian, Russian, Bangla, etc., if the television or FM rebroadcasting outlets inside their target countries suddenly become unavailable (Kim Andrew Elliott, ''The Kavala Gap'' on his website)

WRNO New Orleans update as of late Feb: There was more damage to the site than at first thought, including to the feedline. There were difficulties negotiating with the insurance company, but that had been settled and repair work was starting. Target date: April (George Thurman, TX, *DXLD*) Keep an ear on 15420, 7395 (gh)

A new show called *"867-5309,"* hosted by WBCQ's Jennifer, debuted UT Sunday March 12 at 0100, on 7415, displacing *Church of the Subgenius Hour of Slack* to 0400 UT Mondays (Larry Will, WBCQ, *DXLD*) Barring further changes, for DST now one UT hour earlier (gh) "867-5309" is a reference to a song, *"867-5309/Jenny"* by Tommy Tutone which was released in 1981 (Steve Lare, MI, *ibid.*)

WORLD OF RADIO projected summer times: WWCR: Thu 2030 15825, Sat 1600 12160, Sun 0230 5070, 0630 3215, Wed 0930 9985; WBCQ: Wed 2200 7415, 2300 18910-CLSB, Sun & Mon 0300 9330-CLSB, Mon 0415 7415.

UZBEKISTAN Radio (oops, Internet) Tashkent, posts a mailbag script about once a month on its website at **http://ino.uzpak.uz/eng/letters_eng/letters_eng.htm** Headline in February, ''We Lose Our Listeners'', lamenting that only a few can listen on internet, compared to the abandoned shortwave service (gh)

VENEZUELA 5000, Observatorio Naval Cagigal, 0605-0810, again on the air from mid-Feb, time signals, ID every minute, QRM from WWV (Manuel Méndez, Spain, *DXLD*) Reactivated after many months, at 2246, weaker than normal but buzz and overmodulation gone; hope it's to stay, almost the only active Venezuelan SW station (Adán González, Venezuela, *WORLD OF RADIO*) E-mail for reports: shlv@dhn.mil.ve (José Elías, Venezuela, *playdx* yg)

YEMEN At first unID on 6005, Arabic and lots of North African / Middle Eastern music, phone in program, roughly between 2000 and 2200, very strong blocking Germany and BBC-Seychelles (Bernie O'Shea, Ontario, *DXLD*) Listened again (and again) to my recording, and it sounds like the Yemen ID *"Idhaa'tl Jumhuriya l'Yamaniya min Sana'a."* Until around 1500 I checked Yemen 6135 and they were rather nicely audible in parallel with 9779.5. Check 6005 for possible 9780 parallel (Jari Savolainen, Finland, *ibid.*) 6005 heard in // with 9779.6 kHz at 2000 UT with a good signal on both frequencies (JM Aubier, France, *World Of Radio*) So it is Yemen (gh) Yes indeed! Finally got enough signal on 6005, quite weak here but definitely // 9779.6 (Steve Lare, MI, *DXLD*) At 2015 Yemen ID and news (Tarek Zeidan, Egypt, *ibid.*) 6005 was used many years ago by the Democratic Yemen Broadcasting Service (Aden). 1983 *WRTH* shows 5970, 6005, 7190 and 11770 at 100 kW (Steve Lare, MI, *ibid.*) So maybe actually Aden reactivated rather than Sana'a site (gh)

After 8 tries in the last sesquidecade, finally received the long-awaited QSL from Sana'a, preceded by an acknowledgement from Eng. Ali Ahmend Tashi, Technical Department Director, ali_tashy@yahoo.com (Christoph Ratzer, Austria, OE2CRM, *A-DX* via *BCDX*)

ZIMBABWE [and non] The court case against six trustees of Voice of the People, which broadcasts into Zimbabwe from the Radio Netherlands Madagascar relay, began Feb. 28; it revealed the low level of competence of those presenting the government's case. VOP's lawyer, Beatrice Mtetwa, told journalists that the state's expert witness revealed that he did not know how the station broadcasts its programs. This is despite the fact that the location of the transmitter is routinely mentioned in press reports, and in the past has even been the subject of an official protest to the Dutch government. Presumably the "expert witness" is hoping that the court will believe the transmitter is located inside Zimbabwe; otherwise the case will surely collapse (Andy Sennitt, *Media Network*)

Harare Magistrates Court threw out a bid by VOP trustees to be removed from remand. The Court has given more time for investigators to look for fresh evidence to be used in the prosecution of the trustees, charged with broadcasting without a license. The six must return to court on 27 April (*Africa News Dimension* via *Media Network*) See an enlightening long interview with VOP trustee Isabella Matambanadzo at **http://allafrica.com/stories/200603090680.html**

One particularly interesting answer was that VOP believes it's being harassed because the government was embarrassed when it was revealed in parliament that residents in some areas cannot receive State radio or TV, but they can receive VOP (*Media Network*)

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

BROADCAST LOGS

B

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com

0000 UTC on 11665
ASCENSION ISLANDS: Radio Prague relay. Spanish. Interval signal to identification. National news and sports roundup. Item on your health and astronomy. Station ID at 0025 into symphony music to 0030* (signoff). **United Nations Radio** via Ascension Islands 17810 *1730 (sign-on) into ID and world news and sports to 1745*. (Fernando Garcia, Baltimore, MD) **Radio Japan**'s Ascension Islands relay 11855, 2135. (Howard Moser, Lincolnshire, IL)

0010 UTC on 3340
HONDURAS: HRMI. Spanish religious play *A Nombre de Dios* into Christian pop music and sermon. Station identification at 0117 and local time check. Honduran **La Voz Evangelica** 4819 at 0100. (Garcia, MD)

0010 UTC on 5010
INDIA: All India Radio-Thiruvananthapuram. Hindi. Sitar and flute melody to identification. Commercial string and jingles into twelve minutes of news. Editorial comments on Israel and Pakistan from two male hosts. (Garcia, MD) 0125-0130 (Arnaldo Slaen, Buenos Aires, Argentina) **AIR-Mumbai** 4840, *0010; **FM Gold Radio**, Chennai 7270, *1230. **AIR-Bangalore** 9445, *2045. (Garcia, MD) **AIR-Panaji** 2324-2332. (Joe Wood, Greenback, TN) **AIR-Aligarh** 11620, 2154. (Moser, IL)

0030 UTC on 4890
VENEZUELA: Radio Amazonas Int'l. Spanish. Musical program "Contigo en la distancia," Basta ya," "Solamente una vez." Local time check, ID and national anthem to 0159*. Station audible 1030 on subsequent check. **Radio Nacional de Venezuela** (via Cuba) 11655, 2052. (Moser, IL)

0105 UTC on 11805
ITALY: RAI. News item on smuggling of illegal aliens.(Bob Fraser, Belfast, ME) Caught 0100 sign on w/ IDs and news; 6120 // 7170 to Africa at 0450 (Tom Banks, Dallas, TX) 6120, *0445. (Garcia, MD)

0235 UTC on 4010
KRGYZSTAN: Kyrgysz Radio. Vernacular news bulletin from announcer duo. SINPO 25432. (Slaen, ARG)

0259 UTC on 5890
USA: Radio Thailand, Delano relay. Interval signal to ID plus "broadcasting from the Public Relations in Bangkok." Sixteen minutes of national news, followed by segment on Thailand's historic temples, and Spain's new trade agreement. Frequency schedule and interval signal to 0330*. Radio Thailand via Udon Thani 9535, *2030. (Garcia, MD)

0325 UTC 3200
SWAZILAND: Trans World Radio. Instrumental music to 0330, followed by chimes signal. Male announcer's "this is Trans World Radio." Chimes repeated several times and abruptly off at 0334. SIO 252. (Kraig Krist KG4LAC, Manassas, VA) *0500, 6120 with ID, schedules and gospel music. (Garcia, MD)

0421 UTC on 6020
TURKEY: Voice of. Turkish Album featuring items about Turkish concubines and rock music in Turkey. (Harold Frodge, Midland, MI) 5960, 2300. (Fraser, ME)

0443 UTC on 7275
NIGERIA: FRCN Radio Nigeria, Abuja. Complete station identification followed by national news bulletin. Radio Nigeria, Kaduna 4770 heard 0447 in vernacular languages. (Slaen, ARG)

0521 UTC on 5005
EQT. GUINEA: Radio Nacional (Bata). Spanish announcements to variety of Afro pop tunes and "thanks for listening" comment. (Slaen, ARG; Garcia, MD) 0551 in Spanish to ID at 0553. (Wood, TN)

0525 UTC on 4052
GUATEMALA: Radio Verdad. *Peace in the Valley* classic tune by Tennessee Ernie Ford into inspirational talk in Spanish. (Wood, TN) Guatemala's Radio Coatan 4780 at 1115. (Garcia, MD)

0530 UTC on 4777
GABON: RTV Gabonaise. First log of this station with French text into Afro pops and newscast with items on Cameroon. Radio drama and continued music. Good signal. Audible 9580, 2132-2204 with James Brown music. (Wood, TN; Slaen, ARG)

0531 UTC on 4915
GHANA: GBC. News bulletins covering local and national topics. (Slaen, ARG) 4915, 2310-2325 with local items, Afro and regional music, fair signal quality. (Banks, TX)

0930 UTC on 4871
INDONESIA: RRI-Sorong. Indonesian gamelan music with a 24332 SINPO. **RRI-Merauke**. Indonesian text SINPO 25342; **RRI-Serui** 4605, 0944. (Slaen, ARG) **RRI-Jakarta** 9524.96, 1255-1310; **RRI-Pontianak** 3976, 1505-1520.(Frank Hillton, Charleston, SC) **Voice of Indonesia** 9525, 1350-1359. (Frodge, MI)

0630 UTC on 6139
COLOMBIA: Radio Lider. First log of this station with ID, "Radio Lider Santa Fe de Bogotá." Spanish talk and mentions of Caracas and North America. News items of English/Portuguese items with Spanish translations. Good signal. (Wood, TN)

1010 UTC on 4746.2
PERU: Radio Huantas. Spanish/Quecha. Criollos music to local time check. Commercial string "Cooperativa de Ahorros y Creditos Santa Maria" Productos Agricola Internacional, Pasaportes y Fotos "Concha" to station identification. Peruvians monitored: **Radio Luz y Sonido** 3235, 1045; **Radio Victoria** 9720, 0700; **Radio Imperio** 4386, 0945; **Radio Melodia** 5939.5, 1015; **Radio Reina de la Selva** 5486.6, 1045. (Garcia, MD) **Radio Bolivar** 5460, 0305+; **Radio San Andres** 5544.8, 0309+; **Radio Cusco** 6193, 0317+; **Radio Huanta 2000** 4746.9, 0750+. (Slaen, ARG)

1300 UTC on 21675
FRANCE: Libya-Radio Jamahiriya relay. Station ID as "Voice of Africa" into peace message from Mohomar Kaddafi. Today's date and identification at 1305. Arabic vocals and item on African women's successes. Mailing address and email amid deep signal fades by 1327 // 21695. (Garcia, MD) **Radio Taiwan'**s France relay 11850, 1702-1709+. (Frodge, MI)

1425 UTC on 15140
OMAN: Radio Oman. Hip-hop and gansta rap to English world and national news. News briefs at 1458 to station ID and Arabic service at 1500. (M.R. Phillips, Charlotte, NC)

1630 UTC on 15105
ASCENSION ISLANDS: BBC World Service. Soccer match coverage for Cote d'Ivoire vs Egypt. (Greg Harris, Park Forest, IL) 15105, 1755-1802* (Frodge, MI) 15400, 2130 UTC (Wood, TN) **BBCWS French Guiana** relay 9750, 2203. (Fraser, ME) **Radio France Int'l French Guiana** relay 17630, *1800. (Garcia, MD)

2000 UTC on 7545
ISRAEL: Kol Israel. Station ID into national and world news. Sports and weather updates to 2028*. (Phillips, NC) 7545, 2021+ (Mosel, IL) 7545, 1840 // 9345, 11590. (Fraser, ME) 9435, 1531+ (Frodge, MI)

2015 UTC on 9680
SPAIN: Radio Exterior de Espana. Iberian Peninsula and Canary Island weather update. Spanish news to pop music. SIO 353 // 9595. (Frodge, MI)

2025 UTC on 9975
USA: WEWN. Nuclear Report segment on pre WW II nuclear bombs being detonated. (Fraser, ME) **KTBN** 7505, 0042 UTC. **WBCQ** 7415-2300-2323; **WINB** 13570-2118; **WTJC** 9370, 2346. (Wood, TN)

2121 UTC on 11960
LIBERIA: Star Radio. Discussion on Liberian sports and the national league status for the season remains uncertain. Good signal. (Moser, IL) **ELWA** 4760, 2218-2230+. (Frodge, MI)

2325 UTC on 17795
AUSTRALIA: Radio. *Asia Pacific* segment on medicinal biomass found in Canada. (Fraser, ME) 15515, 2134-2142. (Wood, TN) 6020, 1137 UTC; 9590, 1503-1514+ UTC (Frodge, MI)

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.

The Voice of the Pacific

As with its counterpart in the South Pacific, Radio Australia, Radio New Zealand International also has emerged stronger after hard times.

Back in 1998, RNZI was forced to cut its production hours and initially all of its Pacific islands language programs as the result of a 13% budget cut engineered by the government at the time. After a threatened complete shutdown, this result seemed to be almost a victory despite the loss of five full time positions, a halving of the station's morning productions and elimination of all of its evening programming. Pacific island governments, whose nations rely greatly on RNZI as a source of news, inter-island communication and cultural enrichment, protested mightily to New Zealand's Foreign Affairs Ministry which resulted only in a token restoration of regional language newscasts. Things did not look good at all.

But fast forward seven years to 2004, and the story becomes much, much different. Beginning in that year, a more forward looking government engineered a substantial increase in funding to enable RNZI to increase its daily broadcasts of original programming and, in particular, its coverage of Pacific current affairs. One year later came another substantial budget increase for operating costs, as well as a new digital shortwave transmitter. The Labour government's Minister for Broadcasting, Steve Maharey, taking note that "the station, with just eleven fulltime positions, consistently punches above its weight in providing a service that is well known and respected throughout the Pacific region," stated that "the service is to receive funding that will secure its future operations."

"Shortwave broadcasting remains the best possible way of reaching a large area with a reliable signal, at a low cost," stated Maharey. "The new transmitter will provide a vastly improved, high quality signal to the fourteen Pacific radio stations that rebroadcast RNZI news and programmes every day." Parliament made an international radio service to the South Pacific part of the charter obligation of the nation's public broadcaster, Radio New Zealand, and supported it in the budget.

The plan is for RNZI to broadcast in both analog and digital formats for now, gradually transitioning to an all-digital service at an appropriate time in the future. Given the fact that most listeners to RNZI in the Pacific island nations will not likely be able to afford the new, more expensive digital radios, it would appear that the digital service would be used initially as primarily a "feeder" operation for a growing network of local FM stations on the various islands.

The Service

RNZI broadcasts to the Pacific 24 hours a day. It is heard – on shortwave, via local FM, and on the internet – from Papua New Guinea in the west across to French Polynesia in the east, covering all South Pacific countries in between.

Surveys show that it is one of the most listened to, if not *the* most listened to, station(s) in the Pacific – and one of the most valued and trusted. It provides bulletins of Pacific, world, New Zealand, business and sports news, along with Pacific language news bulletins.

During the Pacific cyclone season, Radio New Zealand International provides a valuable and life-saving Cyclone Weather Service. When Cyclone Alerts are issued for South Pacific countries, it broadcasts hourly updates of weather conditions – 24 hours a day if necessary.

Programming consists of RNZI's own productions combined with relays of National Radio, one of the country's two national radio networks.

Listening In

Of course, given the nature of shortwave and the internet, RNZI can be heard worldwide. For us, it means a ready and unique source for news about the South Pacific region, especially the small island nations of the Pacific Ocean which receive virtually no attention from our own domestic media.

With the coming summer months in North America, opportunities to hear RNZI via shortwave become enhanced. Signal propagation from the South Pacific improves, even taking into account the solar minimum we are currently experiencing. When shortwave conditions won't cooperate, the internet provides a reliable alternative. This is all to the good for us, allowing for a full immersion into New Zealand's national public media, as well as a view of the world – theirs and ours – as seen and heard by Pacific islanders.

The accompanying sidebar offers a full, comprehensive schedule of the programming broadcast by RNZI. Updates and other pertinent information may be found at **www.rnzi.com**. That web address also offers a link to the full time live audio feeds, as well as about half a dozen RNZI-produced programs available on demand and a daily podcast.

Furthermore, Radio New Zealand offers a very attractive web site of its own **www.radionz.co.nz** with full time live feeds of its two domestic networks, National Radio and Concert FM, continually updated news in text format, and other special information and links

COMPREHENSIVE RNZI SCHEDULE

SUNDAY

RNZ National News on the hour, except RNZI World and Pacific News at 1800, 1900, 2000, 2100, 2200

0015
Spectrum - People, places and events in New Zealand
0040
The Arts on Sunday with Lynn Freeman - Information and analysis from the world of books, arts and movies, including:
0106 At the Movies
0304 The Sunday Drama - The best of New Zealand's writing, acting and directing talent
0406
4 'til 8 with Katrina Batten - A selection of special interest programs, including:
0406 The Sunday Feature - documentaries
0512 Spiritual Outlook - Spiritual discussion and debate with Maureen Garing
0536 Waiata – Maori Music
0606 New Zealand History feature
0704 One in Five - The issues and experience of disability
0806
Sounds Historical with Jim Sullivan - Nostalgic news, features and interviews
1012
New Music Releases - A sample of the latest Kiwi music hosted by Hana Tatere
1108
Wayne's Music - Wayne Mowat presents a selection of tunes too good to be forgotten
1204   All Night Programme -
Including: **1206** Music from Midnight; **1230** Discovery *(BBC)*; **1306** Tagata o te Moana (weekly Pacific magazine program features New Zealand and regional Pacific news, issues, information and music presented by Koro Vaka'uta); **1515** Book reading; **1530** Diversions
1605   New Music Releases
1708   Tagata o te Moana - Pacific news, interviews, and music
1800   Morning Report -
Radio New Zealand's and RNZI's 3-hour-hour breakfast news show with news and interviews, bulletins on the hour and half-hour, including: **1810** & **1910** Sports News; **1815** Pacific News; **1819** Rural News; **1827** & **2045** Waatea News; **1830** NZ News Headlines; **1835** & **1955** Pacific Business Report; **1840** News in Tongan; **1846** & **1934** Traffic; **1847** Business News; **1844** & **1941** NZ Newspapers; **1855** Pacific Weather; **1859** Pacific Money Update; **1915** Tagata Highlights; **1935** & **2035** News about New Zealand; **1940** Pacific Press Review (in French); **1942** & **2034** Sports News; **1950** NZ Newspaper Headlines; **2015** Focus on Politics; **2022** Overseas Newspapers; **2040** RNZI Feature

Sounds of NZ - birdcalls

2110   Sports News
2115   Tagata Highlights
2135   Nine to Noon (joined in progress)
Current affairs and topics of interest, including:**2245** Book reading

MONDAY-FRIDAY

RNZ National News on the hour except RNZI Pacific Regional News at 0100, 0300, 0800, 1100, 1300, 1500, 1700 and RNZI World and Pacific News at 2000, 2200 [Mon.-Thu.]

0000
Midday Report - Radio New Zealand news, followed by updates and reports until 0100, including: **0016** Business News; **0026** Sport; **0034** Rural News; **0043** Worldwatch
0106
Afternoons with Jim Mora - Information and debate, people and places around New Zealand
0308
Dateline Pacific - A daily round-up of the very latest news from the Pacific with interviews and features with all the region's news makers drawing on the work of staff and 20 Pacific journalists from around the region
0330
(M) New Music Releases
(T) Mailbox - This program is aimed at the dedicated shortwave listener. Myra Oh reads letters and news of interest, we have reports on the latest DX news, and Frequency Manager Adrian Sainsbury answers and explains technical questions. You can also hear the latest solar propagation news supplied by IPS Radio & Space Services.
Alternates with **RNZI Talk -** A fortnightly introduction to the people behind the voices. RNZI staff, along with others from National Radio, talk about their work and background. RNZI Talk will also keep you up to date with RNZI developments, projects and programs.
(**W**) **Tradewinds -** News editor *Walter Zweifel* compiles this weekly program featuring Pacific regional business and economic news and features.
(**H**) **World in Sport -** Highlights of the world's sporting week with emphasis on New Zealand and the Pacific. There are interviews, reviews and reaction, plus previews of upcoming games.
(**F**) **Pacific Correspondent** - Regional correspondents talk to Ben Lowings about political and social issues in their respective Pacific countries.
0500 **Checkpoint**
Radio New Zealand's 2-hour news and current affairs program, including: **0515** Business Headlines; **0530** News and Sport; **0545** & **6:45** Waatea News
0706 **Nights with Bryan Crump -**
Entertainment and information, including at **0904:**
(M) Insight - A weekly in-depth current affairs program of national and international interest)
(T) Tuesday Feature
(W) Wednesday Drama
(H) Our Changing World with Veronika Meduna and Dean Williams - Science, environment and health stories
(F) Country Life - A weekly program of issues and stories of particular concern to the rural community, and also of interest to a general audience.
Preempted on *RNZI* for one hour as follows:
0808
Dateline Pacific - A daily round-up of the very latest news from the Pacific with interviews and features with all the region's news makers drawing on the work of staff and 20 Pacific journalists from around the region.
0830
(M) Mailbox alternates with **RNZI Talk**
(T) Tradewinds
(W) World in Sport
(H) Pacific Correspondent
(F) Linda Clark - Current affairs and interviews
1000
News and Late Edition - Radio New Zealand national and international news, including the day's best interviews from National Radio
1108
Dateline Pacific
1130
(M) Mailbox alternates with **RNZI Talk**
(T) Tradewinds
(W) World in Sport
(H) Pacific Correspondent
(F) Linda Clark
1200
News and Late Edition (repeat of 1000 program)
1308
Dateline Pacific

1330
(M) Mailbox alternates with **RNZI Talk**
(T) Tradewinds
(W) World in Sport
(H) Pacific Correspondent
(F) Linda Clark
1406
All Night Programme (joined in progress) Including:
(M) 1405 In a Mellow Tone *(RNZ)*; **1515** Book reading; **1530** What's the Word? **1605** Book Reading; **1630** Global Business *(BBC)*
(T) 1515 Book reading; **1530** Books; **1605** Book reading; **1636** Musical Chairs
(W) 1515 Book reading; **1530** The Word *(BBC)*; **1605** Book reading; **1620** Playing Favourites *(BBC)*
(H) 1515 Book reading; **1530** Steemson's Auckland; **1605** Book reading; **1630** The Sampler
(F) 1515 Book reading; **3:30** The Week that Was; **1630** Waiata - Maori Music
1708
Dateline Pacific
1730
(M) Pacific Press Review (in French)
(T) Tradewinds
(W) World in Sport
(H) Pacific Correspondent
(F) Linda Clark
1800
Morning Report - Radio New Zealand's and RNZI's 3-hour breakfast news show with news and interviews, bulletins on the hour and half-hour, including: **1810, 1910** & **2010** Sports News; **1815** & **2015** Dateline Pacific; **1835** & **2035** News about New Zealand; **1844** New Zealand Newspapers; **1846** & **1934** Traffic; **1847** Business News; **1850** & **1955** Pacific Weather Forecast; **1855** News in Niuean; **1930** NZ News Headlines; **1935** & **2055** Pacific Business Report; **1940** News in Tongan; **1959** Pacific Money Update ; **2022** Overseas Newspapers; **2034** Sports News
2040
(M) News in Solomon Island Pijin
(T-H) RNZI Feature
(F) Saturday Morning with Kim Hill
(A) Saturday morning mixture of current affairs and feature interviews
2050
(M-H) NZ Newspaper Headlines

Sounds of NZ: bird calls

2110
(M-H) Sports Report
2115
(M) News in Solomon Island Pijin
(T) Tradewinds
(W) World in Sport
(H) Pacific Correspondent
2140
(M-H) RNZI Feature
2210
(M-H) Sports Report
2215
(M-H) Dateline Pacific
2235
(M-H) Nine to Noon (joined in progress) - Current affairs and topics of interest, including: **2245** Book reading

SATURDAY

0010
This Way Up: A Manual for a Modern World with Simon Morton - Simon Morton explores the things we use and consume
0204
Music 101 with Sarah McMullan - Sarah McMullan presents the best songs, music-related stories, interviews, live music, industry news and music documentaries from New Zealand and the world, including: **0330 Musical Chairs** - National Radio's weekly New Zealand music profile
0510
Focus on Politics - Analysis of significant political issues presented by Radio New Zealand's parliamentary reporting team
0530
Tagata o te Moana - Pacific news, interviews and music

0606
Great Encounters - In-depth interviews selected from National Radio's feature programmes during the week
0704
Saturday Night with Peter Fry - Four hours of music, reminiscences, requests and entertainment, including: **0806 The Saturday Whimsy -** Alison Lloyd Davies introduces a recorded curiosity
1106
Wayne's Music - Wayne Mowat presents a selection of tunes too good to be forgotten
1204
All Night Programme Including: **1206** Going Solo; **1315** Euroquest; **1405** Spiritual Outlook; **1430** Hymns; **1459** Earthshock 7.9; **1515** Book Reading; **1530** Through Younger Eyes; **1630** Masterpiece *(BBC)*; **1740** Little Mysteries
1808
Storytime - New Zealand stories for children
1906
Hymns for Sunday Morning
1935
Weekend Worldwatch - International news and news reports
2010
Sunday Morning with Chris Laidlaw - Discussion, features and music until midday, including: **2012** Sportsworld; **2110** Mediawatch; **2206** The Sunday Group; **2230** Hidden Treasures with Trevor Reekie; **2305** Ideas

Until June and our semi-annual round-up of where and how to hear the BBC World Service, good listening!

11250.0*	11262.0	11265.0*	11271.0*	13212.0
13215.0	13218.0	13221.0	13224.0	13227.0
13230.0	13233.0	13236.0	13245.0	13251.0
13254.0	13257.0*	15010.0	15016.0	15019.0
15022.0	15031.0*	15034.0***	15037.0	15073.0
17976.0	17982.0	17994.0*	18000.0	18009.0
18012.0*	18015.0	18018.0	18024.0	18027.0
23250.0*				

Any frequency without an asterisk can be used by CanForce as a discrete for selected communications with their aircraft. If you spend some time monitoring CanForce frequencies, you will also be pleasantly surprised how many U.S. military aircraft use their frequencies, especially JStars and AWACS type aircraft.

And finally, before you ask which frequency you should listen to, the short answer is "all of them." The reason why there are so many HF frequencies is that, unlike what you would find in the VHF spectrum, conditions on HF are constantly changing. Day/night, seasonal patterns and the sunspot cycle will determine the active frequency being used.

And it is very important to keep one thing in mind: The ground station will select frequencies based on propagation between their station and the stations they are serving. That may mean they will use frequencies that might not be propagating to your station, since you aren't the intended audience. So, if you aren't hearing them on a given frequency, they either aren't using it or you do not have propagation into their area on that frequency.

Now here's some advice that applies to everybody reading this column: You will only learn where you should be listening by actually monitoring. That is the best experience you can get. Learn when and where on your tuning dial is most active by turning the radio on and getting a feel for what is actually in use.

And that does it for this month. Until next time, 73 and good hunting.

QSL Focus on Logbook of the World

With *MT*'s focus on amateur radio this month, here's a QSL source that has taken off like a rocket!

ARRL's *Logbook of the World* (*LoTW*) is a repository of amateur log records submitted by users from around the world. When both participants in a QSO (a one-on-one contact), submit their QSO records to *Log Book of the World*, the result is a cardless QSL that can be used for ARRL credit.

The League's QSL-cardless awards and contact credit system has proven to be a huge hit with the amateur community. *LoTW* has acquired more than 2200 registered participants. Another 2400 applications are pending, and the QSO database of 4900 uploaded logs has topped over eight million.

LoTW is open to all amateur radio operators, and applying for a digital certificate is the first step toward taking advantage of the system. The digital certificate authenticates the user's identity. For more information about this popular QSL source, refer to the *Logbook of the World* website at: **www.arrl. org/lotw/**
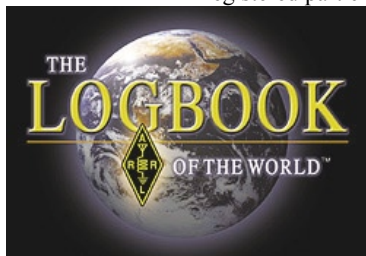
AMATEUR RADIO

Australia-VK5GN, 20 meters SSB. Full data card. Received in two months via ARRL bureau. (Larry Van Horn, NC)

Belgium-ON5UR, 10 meters SSB. Full data color photo card. Received in 313 days via ARRL bureau. (Van Horn, NC)

Mexico-XF1K (IOTA NA-165 Santa Ines Island DXpedition. Full data color photo card. Received in 16 days for a SASE via Fred K. Stenger N6AWD-QSL Manager, 6000 Hesketh Drive, Bakersfield, CA 93309 Usa. (Van Horn, NC)

Sweden-SM0EUI, 10 meters PSK31. Full data photo card. Received in two months via ARRL bureau. (Van Horn, NC)

Switzerland-4UG0UN, United Nations Headquarters Station, 20 meters CW. Full data QSL card verified by HB9BOU-QSL Manager. Received in two months for a SWL card and one US dollar. Station address: Rte Du Moulin 1, CH 1782 Belafaux, Switzerland. (Greg Harris WDX9KHY, Park Forest, IL)

USA- WX4NHC, National Hurricane Center Amateur Radio Station, 14325 kHz USB. Full data card with personal note signed by Julio Ripoll. Received in 148 days for an English report of Hurricane Katrina weather broadcast, an SASE and an applause card. Station address: Amateur Radio Station WX4NHC, c/o Julio WD4R, 14855 SW 67 Lane, Miami, FL 33193 USA. (Joe Wood, Greenback, TN)

DIEGO GARCIA

Armed Forces Radio, 4319 USB. Personal letter with freq only signed by IC2 (SW) Marshall C. Bennett, plus aerial photo of Diego Garcia. Received in 45 days for two US dollars. QSL address: U.S. Naval Support Facility, P.O. Box 2, ASC 466, FPO AP 96595. Return address listed as, P.O. Box 14. (Scott Barbour, Intervale, NH) Website: **www.afrts.osd.mil/**

MEDIUM WAVE

Japan-J0WM, 1071 kHz AM Obihiro. Full data card and letter signed by Y. Matsuza-ki-Technical Section, plus sticker. Received in 80 days for a CD and two US dollars. Station address: STV Radio Broadcasting Co., Ltd., Nishi 8-chome, Kita 1-jo, Chuo-ku, Sapporo, 060-8705, Japan. (Patrick Martin, Seaside, OR)

KAGV (*Alaska's Gospel Voice*) 1110 kHz AM Big Lake, Alaska. Full data verification letter signed by David Horning-Station Manager. This is my 56th Alaskan QSL. Received in ten days for a CD report. Station address: P.O. Box 96, Houston, AK 99694. (Martin, OR) Website: **www.vfcm. org/kagv.htm**

KKLF, 1700 kHz AM, Richardson, Texas. *QSL Certificate* signed by Hue Beavers-Tech. Dept. Received in 32 days for an AM report. All three veries for the call/locations for this one, makes Texas # 72. Station address: 3500 Maple Avenue # 1600, Dallas, TX 75219-3945. (Martin, OR)

WJTO, 730 kHz AM. Full data card (serial # 26) signed by Bob Bittner. Received in six days for an email report of DX Test. Power was 1 kW. Station address: P.O. Box 308, Bath, ME 04530 USA. (Mike Hardester, NC) *Nice catch from Maine*. GVH

WNAX, (*The Voice of the Midwest*) 570 kHz AM. Partial data verification on station letterhead, signed by John Cyr-Chief Engineer. Received in nine days for an AM report and one US dollar. Station address: 1609 E. Hwy 50, Yankton, SD 57078. (Bill Wilkins, Springfield, MO) Website: **www. wnax.com/**

WTKA, 1050 kHz AM. Prepared QSL card returned as verified and signed by Chief Engineer with illegible signature. Received in seven days for an AM report, SASE and prepared card. Station address: 1100 Victors Way # 100, Ann Arbor, MI 48108. (Harris, IL) Website: **www.wtka. com/main.html**

SWEDEN

Radio Sweden, 15240 kHz. Full data aerial view photo of Stockholm. Received in 74 days for an English report. Station address: SE-105 10 Stockholm, Sweden. (Joe Wood, Greenback, TN) Website: **www.sr.se/rs** (or) **www.radiosweden.org**

TURKEY

Voice of Turkey, 15155 kHz. Full data QSL with front photo from the TRT Archives, unsigned, plus program schedule. Envelope had a colorful selection of commenrative Turkish postage stamps. Received in 15 days for an email report to: **englishdesk@trt.net.tr** Station address: P.O. Box 333, 06443 Yenisehir, Turkey. (Kraig Krist KG4LAC, Manassas, VA) Website: **www.trt.net.tr**

UNITED ARAB EMIRATES

Bible Voice Broadcasting via Dhabayya 7210 kHz. Full data *Reaching Nations* card with site. Received in 100 days for a follow up report to Toronto. QSL address: High Adventure Gospel Communication Ministries, P.O. Box 425, Station E, Toronto, ON M6H 4E3 Canada. Web: **www.biblevoice. org** (Edward Kusalik, Alberta, Canada)

USA

Standard Time & Frequency Station, WWVH 15000 kHz. Full data card signed by Dean Okayama-Engineer in Charge, plus station photo and literature. Received in 15 days for an English report. Station address: U.S. Dept. Of Commerce, NIST Radio Station WWNH. P.O. Box 417, Kekaha, HI 96752-0417 USA. (Wood, TN) Website: **http://tf.nist.gov/stations/wwvh.htm**

United Radio Broadcasters of New Orleans (URBONO), 15285 kHz via WHRI. Full data Hurricane Katrina card, signed by Joe Polett-Chief Engineer, plus internet news releases about the station. Received in one week for one US dollar. Station address: P.O. Box 3777, Memphis, TN 38173-0777. (Wilkins, MO) 9840 kHz via WHRI, Katrina card # 23 in 15 days. (Kusalik, CAN)

ZAMBIA

Radio Christian Voice, 4965 kHz. Full data card. Received in 132 for an English report, post card and two IRCs. Station address: Radio Christian Voice (Zambia), Private Bag E606, Lusaka, Zambia. (Wood, TN) 4965 kHz, received in 25 months for a taped report. (Martin, OR)

HOW TO USE THE SHORTWAVE GUIDE

● ●

0000-0100 twhfa   USA, Voice of America   5995am   6130ca   7405am   9455af
① ② ⑤   ③   ④   ⑥ ⑦

Convert your time to UTC.

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

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

Find the station you want to hear.

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

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

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

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

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

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

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before print deadline.

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

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

MT MONITORING TEAM

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𝒯hank 𝒴ou …
Additional Contributors to This Month's Shortwave Guide:
ADDX; Rich D'Angelo, Alokesh Gupta, New Delhi, India*; DX Mix News; NASWA Flash Sheet*; *BCL News; Cumbre DX;* Adrian Sainsbury, RNZ Intl; Daniel Sampson/*Prime Time-SW*; Anker Petersen, *DX Window; Observer*, Bulgaria; BCL News; *ODXA/DX Ontario*; Larry Van Horn N5FPW, MT Asst. Editor; *Hard Core DX; NASWA Journal;* WWDX.

Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes
Note 1   Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
Note 2   Broadcasters can use this frequency range on a (NIB) non-interference basis only.
Note 3   WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007. They are only authorized on a non-interference basis until that date.
Note 4   WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

GLENN HAUSER'S WORLD OF RADIO
http://www.worldofradio.com

For the latest DX and programming news, amateur nets, DX program schedules, audio archives and much more!

0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

Start	End	Days	Station	Freq	Freq	Freq	Freq
0000	0015	vl	Cambodia, National Radio	11940as			
0000	0015		Japan, Radio Japan/NHK World	13680as			
			17810as				
0000	0030		Australia, HCJB	15530as			
0000	0030		Burma, Dem Voice of Burma	5955eu			
0000	0030		Egypt, Radio Cairo	11885na			
0000	0030		Thailand, Radio	9680af			
0000	0030		UK, BBC World Service	3915as	5970as		
			6195as	9410as	9740as	11945as	
0000	0030		USA, Voice of America	6235as	7405as		
			11760va	15185va	15290va	17740va	
0000	0045		India, All India Radio	9705as	9950as		
			11620as	11645as	13605as		
0000	0057		Canada, Radio Canada Intl	11700as			
0000	0059		Spain, Radio Exterior Espana	6055na			
0000	0100		Anguilla, Caribbean Beacon	6090am			
0000	0100		Australia, ABC NT Alice Springs	2310irr			
			4835do				
0000	0100		Australia, ABC NT Katherine	5025do			
0000	0100		Australia, ABC NT Tennant Creek	4910do			
0000	0100		Australia, Radio	9660pa	12080pa	13630pa	
			13670va	15240pa	17715va	17750as	
			17775as	17795pa			
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		Canada, Radio Canada Intl	9755am			
0000	0100		China, China Radio Intl	6020na	6075as		
			7130as	7345as	9570na		
0000	0100		Costa Rica, University Network	5030va	6150va		
			7375va	9725va			
0000	0100		Germany, Deutsche Welle	9695as	9825as		
			9885as				
0000	0100		Guyana, Voice of	3290do			
0000	0100		Japan, Radio Japan/NHK World	6145na			
0000	0100		Malaysia, RTM/Trax FM	7295as			
0000	0100	vl	Namibia, Namibian BC Corp	3270do	3290do		
			6060do	6175do			
0000	0100		Netherlands, Radio	9845na			
0000	0100		New Zealand, Radio NZ Intl	15720pa			
0000	0100	vl	Papua New Guinea, Wantok R.Light	7120va			
0000	0100		Singapore, MediaCorp Radio	6150do			
0000	0100		UK, BBC World Service	5975ca			
0000	0100	DRM	UK, BBC World Service	6010na			
0000	0100		USA, Armed Forces Radio/AFRTS	4319usb			
			5446usb	5765usb	6350usb	7590usb	
			7812usb	10320usb	12133usb	12579usb	
			13362usb	13855usb			
0000	0100		USA, KAIJ Dallas TX	5755na			
0000	0100		USA, KTBN Salt Lake City UT	7505na			
0000	0100		USA, KWHR Naalehu HI	17655as			
0000	0100		USA, WBCQ Kennebunk ME	5110na	7415na		
			9330na				
0000	0100		USA, WBOH Newport NC	5920am			
0000	0100		USA, WEWN Birmingham AL	6875va	7540va		
			11870va	13615va			
0000	0100		USA, WHRA Greenbush ME	5850na	5875na		
			6195na				
0000	0100		USA, WHRI Noblesville IN	7315am	7490am		
			15665am				
0000	0100		USA, WINB Red Lion PA	9265am			
0000	0100	twhfa	USA, WRMI Miami FL	7385am	9955am		
0000	0100		USA, WTJC Newport NC	9370na			
0000	0100		USA, WWCR Nashville TN	3215na	5070na		
			7465na	13845na			
0000	0100		USA, WWRB Manchester TN	3270na	5050na		
			5745na				
0000	0100		USA, WYFR Okeechobee FL	6065am	9505am		
			17805am				
0000	0100		Zambia, The Voice-Africa	4965af			
0013	0030	twhf	Austria, Radio Austria Intl	7325ca			
0015	0030	sm	Austria, Radio Austria Intl	7325ca			
0015	0030	a	Austria, Radio Austria Intl	7325ca			
0030	0045	s	Germany, Pan American BC	5945as			
0030	0100		Australia, Radio	15415as			
0030	0100	fas	Germany, Bible Voice Broadcasting	6010as			
0030	0100		Lithuania, Radio Vilnius	9875na			
0030	0100		Thailand, Radio	5890na			
0030	0100		UK, BBC World Service	11955as	15280as		
			15310as	17655as	17790as		
0030	0100		UK, BBC World Service	5970as	6195as		
			9410as	9740as	11955as	15280as	
			15310as	15360as	17790as		
0030	0100		USA, Voice of America	7130va	9620va		
			11805va	15185va	15205va		
0033	0100	sm	Austria, Radio Austria Intl	7325va			
0040	0058	twhf	Austria, Radio Austria Intl	7325na			
0040	0100		Vatican City, Vatican Radio	7335as	9865as		
0043	0058	a	Austria, Radio Austria Intl	17855va			
0045	0100		Pakistan, Radio	7445as	9340as		
0055	0100		Italy, RAI Intl	11800na			

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

Start	End	Days	Station	Freq	Freq	Freq	Freq
0100	0115	m	Australia, HCJB	15405as			
0100	0115		Italy, RAI Intl	11800na			
0100	0115		Pakistan, Radio	7445as	9340as		
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na		
			9440na				
0100	0129	s	Germany, Universal Life	7145as			
0100	0130		Australia, Radio	17775as			
0100	0130		Hungary, Radio Budapest	9590na			
0100	0130		Slovakia, Radio Slovakia Intl	7230na	9440sa		
0100	0130		Vietnam, Voice of	6175na			
0100	0156		Romania, Radio Romania Intl	6150na	9615na		
0100	0159		Canada, Radio Canada Intl	9755am	13710na		
0100	0200		Anguilla, Caribbean Beacon	6090na			
0100	0200		Australia, ABC NT Katherine	5025do			
0100	0200		Australia, ABC NT Tennant Creek	4910do			
0100	0200		Australia, Radio	9660pa	12080pa	13630pa	
			13670va	15415as	15240pa	17715as	
			17750as	17795pa			
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		China, China Radio Intl	6005na	6020na		
			6075as	7180as	9570na	9580na	
0100	0200		Costa Rica, University Network	5030va	6150va		
			7375va	9725va			
0100	0200		Cuba, Radio Havana	6000na	6060na		
			9820na				
0100	0200		Guyana, Voice of	3291do			
0100	0200		Indonesia, Voice of	9525as	11785pa		
			15150al				
0100	0200		Japan, Radio Japan/NHK World	5960va			
			11720va	11935sa	15325as	17685oc	
			17810as	17825va	17845as		
0100	0200		Malaysia, RTM/Trax FM	7295as			
0100	0200	vl	Namibia, Namibian BC Corp	3270do	3290do		
			6060do	6175do			
0100	0200		Netherlands, Radio	9845na			
0100	0200		New Zealand, Radio NZ Intl	15720pa			
0100	0200		North Korea, Voice of	7140as	9345as		
			9730am	11735ca	13760ca	15180ca	
0100	0200	vl	Papua New Guinea, Wantok R.Light	7120va			
0100	0200		Singapore, MediaCorp Radio	6150do			
0100	0200		Taiwan, Radio Taiwan Intl	15465na	11875sa		
0100	0200		UK, BBC World Service	6195as	9410as		
			11955as	15280as	15310as	15360as	
			17790as				
0100	0200		Ukraine, Radio Ukraine Intl	5830na			
0100	0200		USA, Armed Forces Radio/AFRTS	4319usb			
			5446usb	5765usb	6350usb	7590usb	
			7812usb	10320usb	12133usb	12579usb	
			13362usb	13855usb			
0100	0200		USA, KAIJ Dallas TX	5755na			
0100	0200		USA, KTBN Salt Lake City UT	7505na			
0100	0200		USA, KWHR Naalehu HI	17655as			
0100	0200		USA, Voice of America	7200va	11705va		
			11820va				
0100	0200		USA, WBCQ Kennebunk ME	5110na	7415na		
			9330na				
0100	0200		USA, WBOH Newport NC	5920am			
0100	0200		USA, WEWN Birmingham AL	6875va	7540va		
			11870va	13615va			
0100	0200		USA, WHRA Greenbush ME	5850na	5875na		
0100	0200	twhfa	USA, WHRI Noblesville IN	5835am	5860am		
0100	0200	sm	USA, WHRI Noblesville IN	7315am	7490am		
0100	0200		USA, WINB Red Lion PA	9265am			
0100	0200	twhfa	USA, WRMI Miami FL	7385am	9955am		
0100	0200		USA, WTJC Newport NC	9370na			
0100	0200		USA, WWCR Nashville TN	3215na	5070na		
			5935na	7465na			
0100	0200		USA, WWRB Manchester TN	3270na	5050na		
			5745na				
0100	0200		USA, WYFR Okeechobee FL	6065am	9505am		
			15060am				
0100	0200		Zambia, The Voice-Africa	4965af			
0115	0130	twhf	Armenia, FEBA	5885eu			
0130	0200		Australia, HCJB	15405as			
0130	0200		Iran, Voice of the Islamic Rep	6120am	9665am		
0130	0200		Sweden, Radio	6010na	9435va		
0130	0200	twhfa	USA, Voice of America	7315va	7405va		
0145	0200	mtwhfa	Albania, Radio Tirana	6115eu	7455eu		

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

Start	End	Days	Station	Freq	Freq
0200	0220		Vatican City, Vatican Radio	7335as	9865as
0200	0227		Iran, Voice of the Islamic Rep	6120am	9665am
0200	0230	s	Australia, HCJB	15405as	
0200	0300		Anguilla, Caribbean Beacon	6090am	
0200	0300	twhfa	Argentina, RAE	11710am	
0200	0300		Australia, ABC NT Alice Springs	2310irr	
			4835do		

Start	End	Days	Station				
0200	0300		Australia, ABC NT Katherine	5025do			
0200	0300		Australia, ABC NT Tennant Creek	4910do			
0200	0300		Australia, Radio	9660pa	12080pa	13630pa	
				13670va	15415as	15240pa	15515pa
				17750as	21725va		
0200	0300		Bulgaria, Radio	9700na	11700na		
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		China, China Radio Intl	11770as	13640as		
0200	0300		Costa Rica, University Network	5030va	6150va		
				7375va	9725va		
0200	0300		Cuba, Radio Havana	6000na	6060na		
				9820na			
0200	0300		Egypt, Radio Cairo	7270na			
0200	0300		Guyana, Voice of	3291do			
0200	0300		Malaysia, RTM/Trax FM	7295as			
0200	0300	vl	Namibia, Namibian BC Corp	3270do	3290do		
				6060do	6175do		
0200	0300		New Zealand, Radio NZ Intl	15720pa			
0200	0300		North Korea, Voice of	13650as	15100as		
0200	0300	vl	Papua New Guinea, Wantok R.Light	7120va			
0200	0300		Philippines, Radio Pilipinas	11885va	15270va		
				17665va			
0200	0300		Russia, Voice of	7180na	7250na	7350na	
				15425na	15475na	15595na	
0200	0300		Singapore, MediaCorp Radio	6150do			
0200	0300		South Korea, KBS World Radio				9560na
				11810sa	15575na		
0200	0300		UK, BBC World Service	5975ca	6195me		
				9750af	9825ca	11955as	12095ca
				15280as	15310as	15360as	17790as
0200	0300		USA, Armed Forces Radio/AFRTS				4319usb
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
0200	0300		USA, KAIJ Dallas TX	5755na			
0200	0300		USA, KJES Vado NM	7555na			
0200	0300		USA, KTBN Salt Lake City UT	7505na			
0200	0300		USA, KWHR Naalehu HI	17655as			
0200	0300		USA, WBCQ Kennebunk ME	5110na	7415na		
				9330na			
0200	0300		USA, WBOH Newport NC	5920am			
0200	0300		USA, WEWN Birmingham AL	6875va	7540va		
				11870va	13615va		
0200	0300		USA, WHRA Greenbush ME	5850na	5875na		
0200	0300	twhfa	USA, WHRI Noblesville IN	5835na	5860na		
0200	0300	sm	USA, WHRI Noblesville IN	7315na	7490na		
0200	0300		USA, WINB Red Lion PA	9265am			
0200	0300	twhfa	USA, WRMI Miami FL	7385na	9955am		
0200	0300		USA, WTJC Newport NC	9370na			
0200	0300		USA, WWCR Nashville TN	3215na	5070na		
				5765na	5935na		
0200	0300		USA, WWRB Manchester TN	3270na	5050na		
				5745na			
0200	0300		USA, WYFR Okeechobee FL	5985am	9505am		
				11855am			
0200	0300		Zambia, The Voice-Africa	4965af			
0200	3000		Taiwan, Radio Taiwan Intl	5950na	9680na		
0215	0230		Nepal, Radio	3230as	5005as	6100as	
				7165as			
0230	0300	mtwhfa	Albania, Radio Tirana	6115eu	7455eu		
0230	0300		Hungary, Radio Budapest	9765eu			
0230	0300		Sweden, Radio	6010na			
0230	0300		Vietnam, Voice of	6175na			
0245	0300		Myanmar, Radio	9730do			
0250	0300		Vatican City, Vatican Radio	7305am	9605am		

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

Start	End	Days	Station				
0300	0315	vl	Croatia, Croatian Radio	7285va			
0300	0320		Vatican City, Vatican Radio	7305am	9605am		
0300	0327		Czech Rep, Radio Prague Intl	7345na	9870na		
0300	0330	mtwhfa	Belarus, Radio	5970eu	6155eu	7210eu	
0300	0330	s	Belarus, Radio	5970eu	6155eu	7210eu	
0300	0330		Egypt, Radio Cairo	7270na			
0300	0330		Myanmar, Radio	9730do			
0300	0330		Philippines, Radio Pilipinas	11885va	15270va		
				17665va			
0300	0330		Thailand, Radio	5890na			
0300	0330		UK, BBC World Service	3255af	5975ca		
				6005af	6190af	6195me	7160as
				11760me	11765af	12035af	15280as
				15310as	17760as	17790as	21660as
0300	0330		USA, KJES Vado NM	7555na			
0300	0330		Vatican City, Vatican Radio	7360af			
0300	0330	vl	Vietnam, Voice of	6175am			
0300	0400		Anguilla, Caribbean Beacon	6090am			
0300	0400		Australia, ABC NT Alice Springs				2310irr
				4835do			
0300	0400		Australia, ABC NT Katherine	5025do			
0300	0400		Australia, ABC NT Tennant Creek	4910do			
0300	0400		Australia, CVC International	13685as			
0300	0400		Australia, Radio	9660pa	12080pa	13630pa	
				13670va	15415as	15240pa	15515pa
				17750as	21725va		
0300	0400	twhfas	Canada, CBC NQ SW Service	9625na			
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		China, China Radio Intl	9690na	9790na		
				11770as	15110as	15120as	
0300	0400		Costa Rica, University Network	5030va	6150va		
				7375va	9725va		
0300	0400		Cuba, Radio Havana	6000na	6060na		
				9820na			
0300	0400		Guyana, Voice of	3291do			
0300	0400		Japan, Radio Japan/NHK World				21610oc
0300	0400		Malaysia, RTM/Trax FM	7295as			
0300	0400		Malaysia, Voice of	6175as	9750as	15295as	
0300	0400	vl	Namibia, Namibian BC Corp	3270do	3290do		
				6060do	6175do		
0300	0400		New Zealand, Radio NZ Intl	15720pa			
0300	0400		North Korea, Voice of	7140as	9345as		
				9730na			
0300	0400	vl	Oman, Radio Oman	15355as			
0300	0400	vl	Papua New Guinea, Wantok R.Light	7120va			
0300	0400		Russia, Voice of	7180na	7350na	15425na	
				15475na	15595na		
0300	0400	vl	Rwanda, Radio	6055do			
0300	0400		Singapore, MediaCorp Radio	6150do			
0300	0400		South Africa, Channel Africa	3345af	7390af		
0300	0400		Taiwan, Radio Taiwan Intl	5950na	15215sa		
				15310as			
0300	0400		Turkey, Voice of	6140va	7270va		
0300	0400	vl/ mtwhf	UK, Sudan Radio Service	7120va			
0300	0400		Ukraine, Radio Ukraine Intl	5810na			
0300	0400		USA, Armed Forces Radio/AFRTS				4319usb
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
0300	0400		USA, KAIJ Dallas TX	5755na			
0300	0400		USA, KTBN Salt Lake City UT	7505na			
0300	0400		USA, KWHR Naalehu HI	17655as			
0300	0400		USA, Voice of America	4930af	6035af		
				6080af	7290af	7340af	9885af
0300	0400		USA, WBCQ Kennebunk ME	5110na	7415na		
				9330na			
0300	0400		USA, WBOH Newport NC	5920am			
0300	0400		USA, WEWN Birmingham AL	6875va	7540va		
				11870va	13615va		
0300	0400		USA, WHRA Greenbush ME	5850na	5875na		
0300	0400	twhfa	USA, WHRI Noblesville IN	5835na	5860am		
0300	0400	sm	USA, WHRI Noblesville IN	7315am	7490am		
0300	0400		USA, WINB Red Lion PA	9265am			
0300	0400	twhfa	USA, WRMI Miami FL	7385am	9955am		
0300	0400		USA, WTJC Newport NC	9370na			
0300	0400		USA, WWCR Nashville TN	3215na	5070na		
				5765na	5935na		
0300	0400		USA, WWRB Manchester TN	3270na	5050na		
				5745na			
0300	0400		USA, WYFR Okeechobee FL	6065am	9505am		
				11740am	15255am		
0300	0400		Zambia, The Voice-Africa	4965af			
0300	0400	vl	Zimbabwe, ZBC Corp	5975do			
0330	0345		Israel, Kol Israel	7530va	9345va	11590va	
				13720va	17600pa		
0330	0357		Czech Rep, Radio Prague Intl	9445va	11600va		
0330	0400		UK, BBC World Service	3255af	6005af		
				6190af	7160af	11765af	12035af
				15420af			
0330	0400		USA, Voice of America	4930af	6035af		
				6045af	6080af	7290af	9885af

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

Start	End	Days	Station				
0400	0430		France, Radio France Intl	7315va	9555va		
				9805va	11995va		
0400	0430		USA, Voice of America	4930af	4960af		
				6080af	7290af	9575af	9775af
				9885af			
0400	0430	vl	Vietnam, Voice of	6175na			
0400	0456		Romania, Radio Romania Intl	6115na	9515na		
				9690as	11895as		
0400	0458		New Zealand, Radio NZ Intl	15720pa			
0400	0500		Anguilla, Caribbean Beacon	6090am			
0400	0500		Australia, ABC NT Alice Springs				2310irr
				4835do			
0400	0500		Australia, ABC NT Katherine	5025do			
0400	0500		Australia, ABC NT Tennant Creek				4910do
0400	0500		Australia, CVC International	13685as			
0400	0500		Australia, Radio	9660pa	12080pa	13670va	
				15240pa	15515pa	17750as	21725va
0400	0500	twhfas	Canada, CBC NQ SW Service	9625na			
0400	0500		Canada, CFRX Toronto ON	6070do			
0400	0500		Canada, CKZN St John's NF	6160do			

Start	End	Day	Station	F1	F2	F3	F4
0400	0500		Canada, CKZU Vancouver BC	6160do			
0400	0500		China, China Radio Intl	6190na	9755na		
0400	0500		Costa Rica, University Network	5030va	6150va		
				7375va	9725va		
0400	0500		Cuba, Radio Havana	6000na	6060na		
				9820na			
0400	0500		Germany, Deutsche Welle	7225af	9630af		
				12045af	15445af		
0400	0500		Guyana, Voice of	3291do			
0400	0500		Malaysia, RTM/Trax FM	7295as			
0400	0500		Malaysia, Voice of	6175as	9750as	15295as	
0400	0500	vl	Namibia, Namibian BC Corp	3270do	3290do		
				6060do	6175do		
0400	0500		Nigeria, Radio/Kaduna	6090do			
0400	0500	vl	Papua New Guinea, Wantok R.Light	7120va			
0400	0500		Russia, Voice of	7150na	7180na	7350na	
				9840na	12010na	15475na	
0400	0500	DRM	Russia, Voice of	15595na			
0400	0500	vl	Rwanda, Radio	6055do			
0400	0500		Singapore, MediaCorp Radio	6150do			
0400	0500		South Africa, Channel Africa	7390af			
0400	0500	vl	Uganda, Radio	4976do	5026do	7196do	
0400	0500		UK, BBC World Service	3255af	6005af		
				6195eu	7130eu	7160af	11760me
				11765af	12035af	15280as	15310as
				15575me	15420af	17760as	17790as
				21660me			
0400	0500	DRM	UK, BBC World Service	6010na			
0400	0500	vl/ mtwhf	UK, Sudan Radio Service	7120va			
0400	0500		USA, Armed Forces Radio/AFRTS	4319usb			
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
0400	0500		USA, KAIJ Dallas TX	5755na			
0400	0500		USA, KTBN Salt Lake City UT	7505na			
0400	0500		USA, KWHR Naalehu HI	17655as			
0400	0500		USA, WBCQ Kennebunk ME	5110na	7415na		
				9330na			
0400	0500		USA, WBOH Newport NC	5920am			
0400	0500		USA, WEWN Birmingham AL	6875va	7540va		
				11870va	13615va		
0400	0500		USA, WHRA Greenbush ME	5850na	5875na		
0400	0500	twhfa	USA, WHRI Noblesville IN	6100am	7315am		
0400	0500	sm	USA, WHRI Noblesville IN	7315na	7490na		
0400	0500		USA, WMLK Bethel PA	9265eu	9955eu		
0400	0500	twhfa	USA, WRMI Miami FL	7385na	9955am		
0400	0500		USA, WTJC Newport NC	9370na			
0400	0500		USA, WWCR Nashville TN	3215na	5070na		
				5765na	5935na		
0400	0500		USA, WWRB Manchester TN	3270na	5050na		
				5745na			
0400	0500		USA, WYFR Okeechobee FL	6065va	6855va		
				7780va	9505va	9715va	
0400	0500		Zambia, The Voice-Africa	6065af			
0400	0500	vl	Zimbabwe, ZBC Corp	5975va			
0400	5000		Netherlands, Radio	9845na			
0430	0500		Australia, Radio	15415as			
0430	0500		Nigeria, Radio/Ibadan	6050do			
0430	0500		Nigeria, Radio/Kaduna	4770do			
0430	0500		Nigeria, Radio/Lagos	3326do	4990do		
0430	0500		Swaziland, TWR	3200af	4775af		
0430	0500		USA, Voice of America	4930af	4960af		
				6080af	9575af	9775af	
0445	0500		Italy, RAI Intl	5965af	6120af	7170af	

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

Start	End	Day	Station	F1	F2	F3	F4
0500	0507	twhfas	Canada, CBC NQ SW Service	9625na			
0500	0530		France, Radio France Intl	11850va	11995va		
				15155va			
0500	0530	vl	Rwanda, Radio	6055do			
0500	0530		UK, BBC World Service	6005af	6190af		
				7160af	11765af	11955as	15280as
				15310as	15420af	17640af	17760as
				17790as	21660as		
0500	0530		Vatican City, Vatican Radio	7360af	9660af		
				11625af			
0500	0600		Anguilla, Caribbean Beacon	6090am			
0500	0600		Australia, ABC NT Alice Springs	2310irr			
				4835do			
0500	0600		Australia, ABC NT Katherine	5025do			
0500	0600		Australia, ABC NT Tennant Creek	4910do			
0500	0600		Australia, CVC International	13685as			
0500	0600		Australia, Radio	9660pa	12080pa	13630pa	
				13670pa	15160va	15240pa	15515pa
				17750as			
0500	0600		Bhutan, BBS	6035as			
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		China, China Radio Intl	5960na	6190na		
				7220af	9590af	11750as	15350as
				15465as	17505va	17540as	
0500	0600		Costa Rica, University Network	5030va	6150va		
				7375va	9725va		
0500	0600		Cuba, Radio Havana	6000va	6060va		
				9550va	9820va	11760va	
0500	0600		Germany, Deutsche Welle	9630af	9700af		
				15410af	17800af		
0500	0600		Guyana, Voice of	3291do			
0500	0600		Japan, Radio Japan/NHK World	5975eu			
				6110na	7230eu	15195as	17810as
				21755oc			
0500	0600		Malaysia, RTM/Trax FM	7295as			
0500	0600		Malaysia, Voice of	6175as	9750as	15295as	
0500	0600	vl	Namibia, Namibian BC Corp	3270do	3290do		
				6060do	6175do		
0500	0600		New Zealand, Radio NZ Intl	9615pa			
0500	0600		Nigeria, Radio/Ibadan	6050do			
0500	0600		Nigeria, Radio/Kaduna	4770do	6090do		
0500	0600		Nigeria, Radio/Lagos	3326do	4990do		
0500	0600		Nigeria, Voice of	7255af			
0500	0600	vl	Papua New Guinea, Wantok R.Light	7120va			
0500	0600		Russia, Voice of	7150na	7180na	12010na	
				15425na			
0500	0600		Singapore, MediaCorp Radio	6150do			
0500	0600		South Africa, Channel Africa	7240af	11875af		
0500	0600		Swaziland, TWR	3200af	4775af	9500af	
0500	0600	vl	Uganda, Radio	4976do	5026do	7196do	
0500	0600		UK, BBC World Service	6195va	9410va		
				11870me	12095eu	15575me	
0500	0600		UK, CVC International	9430af			
0500	0600	vl/ mtwhf	UK, Sudan Radio Service	9525va			
0500	0600		USA, Armed Forces Radio/AFRTS	4319usb			
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
0500	0600		USA, KAIJ Dallas TX	5755na			
0500	0600		USA, KTBN Salt Lake City UT	7505na			
0500	0600		USA, KWHR Naalehu HI	11565as	15610as		
0500	0600		USA, Voice of America	6035af	6080af		
				6105af	7295af	13710af	
0500	0600		USA, WBCQ Kennebunk ME	5110na	7415na		
				9330na			
0500	0600		USA, WBOH Newport NC	5920am			
0500	0600		USA, WEWN Birmingham AL	5850va	7540va		
				7570va	11870va		
0500	0600		USA, WHRA Greenbush ME	5875na	7555na		
0500	0600	twhfa	USA, WHRI Noblesville IN	6100am	7315am		
0500	0600	sm	USA, WHRI Noblesville IN	7315na	7490am		
0500	0600		USA, WMLK Bethel PA	9265eu	9955eu		
0500	0600	twhfa	USA, WRMI Miami FL	7385am			
0500	0600		USA, WTJC Newport NC	9370na			
0500	0600		USA, WWCR Nashville TN	3215na	5070na		
				5765na	5935na		
0500	0600		USA, WWRB Manchester TN	3185na			
0500	0600		USA, WYFR Okeechobee FL	6855am	9355va		
0500	0600		Zambia, The Voice-Africa	6065af			
0500	0600	vl	Zimbabwe, ZBC Corp	5975do			
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do		
0530	0600		Australia, Radio	15415as			
0530	0600		Thailand, Radio	13770eu			
0530	0600	mtwhf	UK, BBC World Service	17885af			
0530	0600		UK, BBC World Service	11955as	15310as		
				15360as	17760as	17790as	21660as
0545	0600	vl	Rwanda, Radio	6055do			

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

Start	End	Day	Station	F1	F2	F3	F4
0600	0615as		South Africa, TWR	11640af			
0600	0630		UK, BBC World Service	6005af	6190af		
				6195af	7160af	9410af	11765af
				11940af	17640af		
0600	0630		USA, Voice of America	6035af	6080af		
				6105af	7295af	11835af	11995af
				13710af			
0600	0630		Vatican City, Vatican Radio	4005af	5885eu		
				7250eu			
0600	0645	mtwhf	South Africa, TWR	11640af			
0600	0658		France, Radio France Intl	9865af	15155af		
				17800af			
0600	0700		Anguilla, Caribbean Beacon	6090am			
0600	0700		Australia, ABC NT Alice Springs	2310irr			
				4835do			
0600	0700		Australia, ABC NT Katherine	5025do			
0600	0700		Australia, ABC NT Tennant Creek	4910do			
0600	0700		Australia, CVC International	15355as			
0600	0700		Australia, Radio	9660pa	11880pa	12080pa	
				13630pa	13670va	15160pa	15240pa
				15415as	15515pa	17750as	
0600	0700		Canada, CFRX Toronto ON	6070do			
0600	0700		Canada, CFVP Calgary AB	6030do			
0600	0700		Canada, CKZN St John's NF	6160do			
0600	0700		Canada, CKZU Vancouver BC	6160do			
0600	0700		China, China Radio Intl	6115na	9590af		
				11750af	11880as	15140as	15465as
				17540as	17540as		
0600	0700		Costa Rica, University Network	5030va	6150va		

Start	End	Days	Station				
				7375va	9725va	11870va	
0600	0700		Cuba, Radio Havana	6000va	6060va		
				9550va	9820va	11760va	
0600	0700		Germany, Deutsche Welle	6140eu	7170af		
				15275af	17860af		
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do		
0600	0700	as	Greece, Voice of 9775va				
0600	0700		Guyana, Voice of 3291do				
0600	0700		Japan, Radio Japan/NHK World			11715eu	
				11740as	11760eu	13630va	15195as
				17870pa	21755oc		
0600	0700		Liberia, ELWA 4760do				
0600	0700		Malaysia, RTM/Trax FM	7295as			
0600	0700		Malaysia, Voice of 6175as	9750as	15295as		
0600	0700	vl	Namibia, Namibian BC Corp	3270do	3290do		
				6060do	6175do		
0600	0700		Netherlands, Radio	9700pa			
0600	0700		New Zealand, Radio NZ Intl	9615pa			
0600	0700		Nigeria, Radio/Ibadan	6050do			
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do		
0600	0700		Nigeria, Radio/Lagos	3326do	4990do		
0600	0700		Nigeria, Voice of 15120af				
0600	0700	vl	Papua New Guinea, Wantok R.Light		7120va		
0600	0700		Russia, Voice of 17665oc	17805oc			
0600	0700	irreg/ vl	Sierra Leone, SLBS 3316do				
0600	0700		Singapore, MediaCorp Radio	6150do			
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do		
0600	0700		South Africa, Channel Africa	7240af	15255af		
0600	0700		Swaziland, TWR 4775af	6120af	9500af		
0600	0700as		UK, BBC World Service	17855af			
0600	0700		UK, BBC World Service	6195eu	9410eu		
				11955as	12095eu	15310as	15360as
				15565eu	15575me	17760me	17790as
0600	0700		UK, CVC International	9430af			
0600	0700		USA, Armed Forces Radio/AFRTS				4319usb
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
0600	0700		USA, KAIJ Dallas TX	5755na			
0600	0700		USA, KTBN Salt Lake City UT	7505na			
0600	0700		USA, KWHR Naalehu HI	11565as	15610as		
0600	0700		USA, WBCQ Kennebunk ME	5110na	7415na		
0600	0700		USA, WBOH Newport NC	5920am			
0600	0700		USA, WEWN Birmingham AL	5850va	7540va		
				11870va			
0600	0700		USA, WHRA Greenbush ME	6135na	7555na		
0600	0700	thas	USA, WHRI Noblesville IN	5860am	5875am		
				6125am			
0600	0700	smtw	USA, WHRI Noblesville IN	7315sa			
0600	0700		USA, WMLK Bethel PA	9265eu	9955eu		
0600	0700	twhfa	USA, WRMI Miami FL	7385am			
0600	0700		USA, WTJC Newport NC	9370na			
0600	0700		USA, WWCR Nashville TN	3215na	5070na		
				5765na	5935na		
0600	0700		USA, WWRB Manchester TN	3185na			
0600	0700		USA, WYFR Okeechobee FL	5745va	7780va		
				11530va	11580va		
0600	0700	vl	Vanuatu, Radio 4960do				
0600	0700		Yemen, Rep of Yemen Radio	9780me			
0600	0700		Zambia, The Voice-Africa	6065af			
0600	0700	vl	Zimbabwe, ZBC Corp	5975do			
0605	0630	s	Austria, Radio Austria Intl	17870me			
0630	0656		Romania, Radio Romania Intl	7180eu	9690eu		
				15135pa	17780pa		
0630	0700		Bulgaria, Radio	9500eu	11500eu		
0630	0700		UK, BBC World Service	6005af	6190af		
				6195va	7160af	9410af	11765af
				11940af	15400af	17640af	
0630	0700	as	UK, BBC World Service	17885af			
0630	0700		USA, Voice of America	6080af	7295af		
				11835af			
0630	0700		Vatican City, Vatican Radio	9660af	11625af		
				13765af			
0630	0700		Vatican City, Vatican Radio	9660af	11625af		
				13765af			
0645	0700	s	Albania, TWR Europe	11865eu			
0645	0700	s	Monaco, TWR 9800eu				

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

Start	End	Days	Station				
0700	0705		New Zealand, Radio NZ Intl	9615pa			
0700	0710		Vatican City, Vatican Radio	4005va	5885eu		
				6185eu	7250eu	9645eu	11740eu
				15595eu			
0700	0715		UK, BBC World Service	6005af	6190af		
				9410af	11765af	11940af	12095af
				15400af	15485af	17640af	17830af
0700	0715	as	UK, BBC World Service	17885af			
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu		
0700	0730		Slovakia, Radio Slovakia Intl	13715pa	15460pa		
0700	0730		UK, BBC World Service	11760me	15575me		
0700	0800	smtwhf	Albania, TWR Europe	11865eu			
0700	0800		Anguilla, Caribbean Beacon	6090am			
0700	0800		Australia, ABC NT Alice Springs		2310irr		
				4835do			
0700	0800		Australia, ABC NT Katherine	5025do			
0700	0800		Australia, ABC NT Tennant Creek		4910do		
0700	0800		Australia, CVC International	15355as			
0700	0800		Australia, HCJB	11750pa			
0700	0800		Australia, Radio	9660pa	9710pa	11880pa	
				12080pa	13630pa	15160pa	15240pa
				15415as	17750as		
0700	0800		Canada, CFRX Toronto ON	6070do			
0700	0800		Canada, CFVP Calgary AB	6030do			
0700	0800		Canada, CKZN St John's NF	6160do			
0700	0800		Canada, CKZU Vancouver BC	6160do			
0700	0800		China, China Radio Intl	11785eu	11880eu		
				15350as	15465as	17490eu	17540as
0700	0800		Costa Rica, University Network	5030va	6150va		
				7375va	9725va	11870va	
0700	0800		Eqt Guinea, Radio Africa	15190af			
0700	0800		France, Radio France Intl	11725af			
0700	0800		Germany, Deutsche Welle	6140eu			
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do		
0700	0800		Guyana, Voice of 3291do	5950do			
0700	0800		Italy, IRRS	13840va			
0700	0800		Liberia, ELWA 4760do				
0700	0800		Liberia, Star Radio 9525af				
0700	0800		Malaysia, RTM/Trax FM	7295as			
0700	0800		Malaysia, Voice of 6175as	9750as	15295as		
0700	0800	smtwhf	Monaco, TWR	9800eu			
0700	0800		Myanmar, Radio	9730do			
0700	0800	vl	Namibia, Namibian BC Corp	3270do	3290do		
				6060do	6175do		
0700	0800		Netherlands, Radio	9700pa			
0700	0800		Nigeria, Radio/Ibadan	6050do			
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do		
0700	0800		Nigeria, Radio/Lagos	3326do	4990do		
0700	0800	vl	Papua New Guinea, Wantok R.Light		7120va		
0700	0800		Russia, Voice of 17665oc	17805oc			
0700	0800	irreg/ vl	Sierra Leone, SLBS 3316do				
0700	0800		Singapore, MediaCorp Radio	6150do			
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do		
0700	0800	vl	South Africa, Channel Africa	11825af			
0700	0800		Swaziland, TWR 4775af	6120af	9500af		
0700	0800		Taiwan, Radio Taiwan Intl	5950na			
0700	0800		UK, BBC World Service	9410eu	11955as		
				12095eu	15310as	15360as	15565eu
				17760as	17790as	21660me	
0700	0800		UK, CVC International	15640af			
0700	0800		USA, Armed Forces Radio/AFRTS				4319usb
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
0700	0800		USA, KAIJ Dallas TX	5755na			
0700	0800		USA, KTBN Salt Lake City UT	7505na			
0700	0800		USA, KWHR Naalehu HI	11565as	15610as		
0700	0800		USA, WBCQ Kennebunk ME	5110na	7415na		
0700	0800		USA, WBOH Newport NC	5920am			
0700	0800		USA, WEWN Birmingham AL	5850va	7540va		
				11870va			
0700	0800		USA, WHRA Greenbush ME	6135na	7465na		
0700	0800		USA, WHRI Noblesville IN	5860am	5875am		
				7315sa			
0700	0800		USA, WMLK Bethel PA	9265eu	9955eu		
0700	0800	twhfa	USA, WRMI Miami FL	7385am			
0700	0800		USA, WTJC Newport NC	9370na			
0700	0800		USA, WWCR Nashville TN	3215na	5070na		
				5765na	5935na		
0700	0800		USA, WWRB Manchester TN	3185na			
0700	0800		USA, WYFR Okeechobee FL	5985va	6855va		
				7780va	9505va	9715va	9930va
0700	0800	vl	Vanuatu, Radio 4960do				
0700	0800		Zambia, The Voice-Africa	6065af			
0706	0800		New Zealand, Radio NZ Intl	9885pa			
0715	0730	a	Monaco, TWR	9800eu			
0715	0750	a	Albania, TWR Europe	11865eu			
0715	0800		UK, BBC World Service	6190af	9410af		
				11765af	11940af	12095af	15400af
				15485af	17640af	17830af	
0715	0800	as	UK, BBC World Service	17885af			
0730	0745		Vatican City, Vatican Radio	4005va	5885va		
				6185va	7250va	9645va	11740va
				15595va			
0730	0800	as	Germany, Bible Voice Broadcasting		5945eu		
0730	0800	sm	Guam, TWR/KTWR 17570as				
0730	0800		UK, BBC World Service	11760me	15575me		
0740	0800	twhfa	Guam, TWR/KTWR 17570as				

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

Start	End	Days	Station		
0800	0820	smtwhf	Albania, TWR Europe	11865eu	
0800	0820	smtwhf	Monaco, TWR	9800eu	
0800	0830		Australia, ABC NT Katherine	5025do	
0800	0830		Australia, ABC NT Tennant Creek		4910do
0800	0830		Liberia, ELWA 4760do		
0800	0830		Malaysia, Voice of 6175as	9750as	
0800	0830		Myanmar, Radio	9730do	

Start	End	Note	Station	Freq 1	Freq 2	Freq 3	Freq 4
0800	0830		Swaziland, TWR	4775af	6120af	9500af	
0800	0900		Anguilla, Caribbean Beacon	6090am			
0800	0900		Australia, ABC NT Alice Springs		2310irr		
			4835do				
0800	0900		Australia, CVC International	15355as			
0800	0900		Australia, HCJB	11750pa			
0800	0900		Australia, Radio	5995pa	9580pa	9590pa	
				9710pa	12080pa	13630pa	15240as
				17750as			
0800	0900		Bhutan, BBS	6035as			
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		China, China Radio Intl	11785eu	11880as		
				15350as	15465as	17490eu	17540as
0800	0900		Costa Rica, University Network	5030va	6150va		
				7375va	9725va	11870va	
0800	0900		Eqt Guinea, Radio Africa	15190af			
0800	0900	as	Germany, Bible Voice Broadcasting		5945eu		
0800	0900		Germany, Deutsche Welle	6140eu			
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do		
0800	0900		Guam, TWR/KTWR	11840as	17570as		
0800	0900		Guyana, Voice of	3291do	5950do		
0800	0900		Indonesia, Voice of	9525as	11785pa		
			15150al				
0800	0900	vl	Italy, IRRS	13840va			
0800	0900		Liberia, Star Radio	9525af			
0800	0900		Malaysia, RTM/Trax FM	7295as			
0800	0900		Malaysia, Voice of	15295as			
0800	0900		New Zealand, Radio NZ Intl	9885pa			
0800	0900		Nigeria, Radio/Ibadan	6050do			
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do		
0800	0900		Nigeria, Radio/Lagos	3326do	4990do		
0800	0900		Papua New Guinea, Catholic Radio	4960do			
0800	0900		Papua New Guinea, NBC	4890do			
0800	0900	vl	Papua New Guinea, Wantok R.Light	7120va			
0800	0900		Russia, Voice of	17495oc	17665oc	17805oc	
0800	0900	irreg/ vl	Sierra Leone, SLBS	3316do			
0800	0900		Singapore, MediaCorp Radio	6150do			
0800	0900	vl	Solomon Islands, SIBC	5020do	9545do		
0800	0900	s	South Africa, Radio League	7205af	17700af		
0800	0900		South Korea, KBS World Radio		9570as		
			9640eu				
0800	0900		Taiwan, Radio Taiwan Intl	9610as			
0800	0900		UK, BBC World Service	6190af	6195as		
				9740as	11760me	11940af	15280as
				15310as	15360as	15400af	15485af
				15575me	17640af		
0800	0900		UK, CVC International	15640af			
0800	0900		USA, Armed Forces Radio/AFRTS		4319usb		
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
0800	0900		USA, KAIJ Dallas TX	5755na			
0800	0900		USA, KNLS Anchor Point AK	9615as			
0800	0900		USA, KTBN Salt Lake City UT	7505na			
0800	0900		USA, KWHR Naalehu HI	9930as	11565as		
0800	0900		USA, WBOH Newport NC	5920am			
0800	0900		USA, WEWN Birmingham AL	5850na	7540na		
			11870va				
0800	0900		USA, WHRA Greenbush ME	6135na	7465na		
0800	0900		USA, WHRI Noblesville IN	5860am	5875am		
			7315sa				
0800	0900		USA, WMLK Bethel PA	9265eu	9955eu		
0800	0900	twhfa	USA, WRMI Miami FL	7385am			
0800	0900		USA, WTJC Newport NC	9370na			
0800	0900		USA, WWCR Nashville TN	3215na	5070na		
				5765na	5935na		
0800	0900		USA, WWRB Manchester TN	3185na			
0800	0900		USA, WYFR Okeechobee FL	5950va	5985va		
				6855va	9930va		
0800	0900	vl	Vanuatu, Radio	4960do			
0800	0900		Zambia, The Voice-Africa	9865af			
0815	0900	f	Germany, Bible Voice Broadcasting		5945eu		
0815	0900	sm	Guam, TWR/KTWR	11840as			
0830	0900		Australia, ABC NT Katherine	2485do			
0830	0900		Australia, ABC NT Tennant Creek		2325do		
0830	0900		Australia, Radio	15415as			

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

Start	End	Note	Station	Freq 1	Freq 2	Freq 3	Freq 4
0900	0900		USA, WBCQ Kennebunk ME	5110na	7415na		
0900	0915	a	Germany, Bible Voice Broadcasting		5945eu		
0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do		
0900	0927		Czech Rep, Radio Prague Intl	9880eu	21745va		
0900	0930		Guam, TWR/KTWR	11840as			
0900	0945	s	Germany, Bible Voice Broadcasting		5945eu		
0900	0957		China, China Radio Intl	15210pa	17490eu		
				17690pa	17750as		
0900	1000		Anguilla, Caribbean Beacon	6090am			
0900	1000		Australia, ABC NT Alice Springs		2310do		
			4835irr				
0900	1000		Australia, ABC NT Katherine	2485do			

Start	End	Note	Station	Freq 1	Freq 2	Freq 3	Freq 4
0900	1000		Australia, ABC NT Tennant Creek		2325do		
0900	1000		Australia, CVC International	11955as			
0900	1000		Australia, Radio	9580pa	9590pa	11880as	
				15240as			
0900	1000		Canada, CFRX Toronto ON	6070do			
0900	1000		Canada, CFVP Calgary AB	6030do			
0900	1000		Canada, CKZN St John's NF	6160do			
0900	1000		Canada, CKZU Vancouver BC	6160do			
0900	1000		Costa Rica, University Network	5030va	6150va		
				7375va	9725va	11870va	13750va
0900	1000		Eqt Guinea, Radio Africa	15190af			
0900	1000		Germany, Deutsche Welle	6140eu			
0900	1000		Guyana, Voice of	3291do	5950do		
0900	1000	vl	Italy, IRRS	13840va			
0900	1000		Malaysia, RTM/Trax FM	7295as			
0900	1000		Malaysia, Voice of	15295as			
0900	1000	vl	Namibia, Namibian BC Corp	3270do	3290do		
				6060do	6175do		
0900	1000		New Zealand, Radio NZ Intl	9885pa			
0900	1000		Nigeria, Radio/Ibadan	6050do			
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do		
0900	1000		Nigeria, Radio/Lagos	3326do	4990do		
0900	1000		Papua New Guinea, Catholic Radio		4960do		
0900	1000		Papua New Guinea, NBC	4890do			
0900	1000	vl	Papua New Guinea, Wantok R.Light	7120va			
0900	1000		Russia, Voice of	17495oc	17665oc		
0900	1000	DRM	Russia, Voice of	12060eu			
0900	1000	vl	Rwanda, Radio	6055do			
0900	1000	irreg/ vl	Sierra Leone, SLBS	3316do			
0900	1000		Singapore, MediaCorp Radio	6150do			
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do		
0900	1000		UK, BBC World Service	6190af	6195as		
				9605as	9740as	11760me	11940af
				15280as	15310as	15360as	15400af
				15485af	15575me	17640af	17830af
				17760as	17790as	17885af	21470af
				21660af			
0900	1000		USA, Armed Forces Radio/AFRTS		4319usb		
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
0900	1000		USA, KAIJ Dallas TX	5755na			
0900	1000		USA, KTBN Salt Lake City UT	7505na			
0900	1000		USA, KWHR Naalehu HI	9930as	11565as		
0900	1000		USA, WBCQ Kennebunk ME	5110na	7415na		
0900	1000		USA, WBOH Newport NC	5920am			
0900	1000		USA, WEWN Birmingham AL	5850na	7540na		
			11870va				
0900	1000		USA, WHRA Greenbush ME	6135na			
0900	1000		USA, WHRI Noblesville IN	5875am	7315sa		
			7520am				
0900	1000		USA, WRMI Miami FL	7385am			
0900	1000		USA, WTJC Newport NC	9370na			
0900	1000		USA, WWCR Nashville TN	3215na	5070na		
				5765na	5935na		
0900	1000		USA, WWRB Manchester TN	3185na			
0900	1000		USA, WYFR Okeechobee FL	5985va	6885va		
				9450va	9755va		
0900	1000	vl	Vanuatu, Radio	4960do			
0900	1000		Zambia, The Voice-Africa	9865af			
0930	0945		Israel, Kol Israel	13680eu	15760eu		
0930	1000		Australia, Radio	15415as			

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

Start	End	Note	Station	Freq 1	Freq 2	Freq 3	Freq 4
1000	1030		Mongolia, Voice of	12085as			
1000	1057		China, China Radio Intl	7135as	7215as		
				15190as	15210pa	17490eu	17690pa
1000	1059		New Zealand, Radio NZ Intl	9885pa			
1000	1100		Anguilla, Caribbean Beacon	11775am			
1000	1100		Australia, ABC NT Alice Springs		2310do		
			4835irr				
1000	1100		Australia, ABC NT Katherine	2485do			
1000	1100		Australia, ABC NT Tennant Creek		2325do		
1000	1100	DRM	Australia, CVC International	9760eu			
1000	1100		Australia, CVC International	11955as			
1000	1100		Australia, Radio	9580pa	9590pa	11880as	
				15240as	15415as		
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, University Network	5030va	6150va		
				7375va	9725va	11870va	13750va
1000	1100		Guyana, Voice of	3291do	5950do		
1000	1100		India, All India Radio	13710oc	15020as		
				15260as	15235as	17510oc	17800as
				17895oc			
1000	1100	vl	Italy, IRRS	13840va			
1000	1100		Japan, Radio Japan/NHK World		6120na		
				9695as	11730as	17585va	17720me
				21755oc			
1000	1100		Malaysia, RTM/Trax FM	7295as			
1000	1100		Malaysia, Voice of	15295as			

Start	Stop		Station	Freq	Freq
1000	1100		Netherlands, Radio	12065as	13710as
			13820as		
1000	1100	DRM	Netherlands, Radio	7240eu	
1000	1100		Nigeria, Voice of	7255af	
1000	1100		North Korea, Voice of	6185as	6285am
			9335ca	9850as	
1000	1100		Palau, KHBN	15725as	
1000	1100		Papua New Guinea, Catholic Radio	4960do	
1000	1100		Papua New Guinea, NBC	4890do	
1000	1100	vl	Papua New Guinea, Wantok R.Light	7120va	
1000	1100		Singapore, MediaCorp Radio	6150do	
1000	1100	vl	Solomon Islands, SIBC	5020do	9545do
1000	1100	vl	South Africa, Channel Africa	11825af	
1000	1100		UK, BBC World Service	6190af	6195va
			9605as	9740as	11760me	11940af
			15280as	15310as	15360as	15485af
			15575me	17640af	17790me	17885af
			21470af		
1000	1100	as	UK, BBC World Service	15400af	17830af
1000	1100		USA, Armed Forces Radio/AFRTS		4319usb
			5446usb	5765usb	6350usb	7590usb
			7812usb	10320usb	12133usb	12579usb
			13362usb	13855usb	
1000	1100		USA, KAIJ Dallas TX	5755na	
1000	1100		USA, KNLS Anchor Point AK	9615as	
1000	1100		USA, KTBN Salt Lake City UT	7505na	
1000	1100		USA, KWHR Naalehu HI	9930as	11565as
1000	1100		USA, WBCQ Kennebunk ME	5110na	
1000	1100		USA, WBOH Newport NC	5920am	
1000	1100		USA, WEWN Birmingham AL	5850na	7540na
			11870va		
1000	1100		USA, WHRA Greenbush ME	6135na	
1000	1100		USA, WHRI Noblesville IN	6095am	7520am
			9495am		
1000	1100		USA, WRMI Miami FL	9955am	
1000	1100		USA, WTJC Newport NC	9370na	
1000	1100		USA, WWCR Nashville TN	5070na	5765na
			5935na	9985na	15825na
1000	1100		USA, WWRB Manchester TN	3185na	
1000	1100		USA, WYFR Okeechobee FL	5950va	5985va
			6855va	9450va	
1000	1100		Zambia, The Voice-Africa	9865af	
1030	1045	mtwhf	Ethiopia, Radio	5990af	7110af	9704af
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11665va
1030	1100		Australia, HCJB	15400as	
1030	1100	s	Germany, Bible Voice Broadcasting		5895as
1030	1100		Iran, Voice of the Islamic Rep	15460as	15480as
1030	1100		UK, BBC World Service	6195as	9740as
			11945as	15310as	17790as

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

Start	Stop		Station	Freq	Freq
1100	1127		Iran, Voice of the Islamic Rep	15460as	15480as
1100	1130		Australia, HCJB	15400as	
1100	1130		Australia, Radio	15240as	
1100	1130		UK, BBC World Service	6190af	6195as
			9740as	11760me	11855ca	11940af
			11945as	15310as	15400af	15485af
			15575me	17640af	17790as
1100	1159		Germany, Overcomer Ministries		6110eu
			9855eu		
1100	1159	s	Germany, Universal Life	6055me	
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 Creek	2325do	
1100	1200		Australia, CVC International	13635as	
1100	1200		Australia, Radio	5995pa	6020pa	9475as
			9560as	9580pa	9590pa	11880as
			12080pa		
1100	1200	as	Canada, CBC NQ SW Service	9625na	
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		China, China Radio Intl	5960na	13665eu
			17490eu		
1100	1200		Costa Rica, University Network	5030va	6150va
			7375va	9725va	11870va	13750va
1100	1200		Ecuador, HCJB	12005am	21455am
1100	1200	vl	Italy, IRRS	13840va	
1100	1200		Japan, Radio Japan/NHK World		6120na
			9695as	11730as	
1100	1200		Malaysia, RTM/Trax FM	7295as	
1100	1200		Malaysia, Voice of	15295as	
1100	1200		Netherlands, Radio	11675na	
1100	1200		New Zealand, Radio NZ Intl	9870pa	
1100	1200		Nigeria, Voice of	7255af	
1100	1200		Papua New Guinea, Catholic Radio	4960do	
1100	1200		Papua New Guinea, NBC	4890do	
1100	1200	vl	Papua New Guinea, Wantok R.Light	7120va	
1100	1200		Singapore, Radio Singapore Intl		6080as
			6150as		

Start	Stop		Station	Freq	Freq
1100	1200	vl	South Africa, Channel Africa	11825af	
1100	1200		Taiwan, Radio Taiwan Intl	7445as	
1100	1200		Ukraine, Radio Ukraine Intl	9950eu	
1100	1200		USA, Armed Forces Radio/AFRTS		4319usb
			5446usb	5765usb	6350usb	7590usb
			7812usb	10320usb	12133usb	12579usb
			13362usb	13855usb	
1100	1200		USA, KAIJ Dallas TX	5755na	
1100	1200		USA, KTBN Salt Lake City UT	7505na	
1100	1200		USA, KWHR Naalehu HI	9930as	11565as
1100	1200		USA, Voice of America	15615va	
1100	1200		USA, WBOH Newport NC	5920am	
1100	1200		USA, WEWN Birmingham AL	5850na	7540na
			11870na		
1100	1200		USA, WHRA Greenbush ME	6135na	
1100	1200		USA, WHRI Noblesville IN	6095am	7520am
			9495am		
1100	1200		USA, WINB Red Lion PA	9265am	
1100	1200		USA, WRMI Miami FL	9955am	
1100	1200		USA, WTJC Newport NC	9370na	
1100	1200		USA, WWCR Nashville TN	5070na	5765na
			5935na	9985na	15825na
1100	1200		USA, WWRB Manchester TN	3185na	
1100	1200		USA, WWRB Manchester TN	3185na	
1100	1200		USA, WYFR Okeechobee FL	5950va	5985va
			7780va	9550va	9625va	9755va
1100	1200		Zambia, The Voice-Africa	9865af	
1130	1159	a	Germany, Universal Life	6055me	
1130	1200		Australia, HCJB	15425as	
1130	1200		Bulgaria, Radio	11700eu	15700eu
1130	1200	a	Germany, Bible Voice Broadcasting		15950as
1130	1200	s	Germany, Bible Voice Broadcasting		15950as
1130	1200		Guam, AWR/KSDA	15435as	
1130	1200		UK, BBC World Service	6190af	11940af
			15485af	17640af	17830af	17885af
			21470af		
1130	1200		Vatican CIty, Vatican Radio	15595va	17515va
1145	1200	vl	Libya, Voice of Africa	17695af	21675af
			21695af		

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

Start	Stop		Station	Freq	Freq
1200	1215	vl	Cambodia, National Radio	11940as	
1200	1228		France, Radio France Intl	15275af	21620af
1200	1230		Malaysia, Voice of	15295as	
1200	1230		UAE, AWR Africa	15365as	
1200	1230		USA, Voice of America	9645va	9760va
			11705va	15665va	
1200	1259		Canada, Radio Canada Intl	9660as	15170as
1200	1259		New Zealand, Radio NZ Intl	9870pa	
1200	1300		Anguilla, Caribbean Beacon	11775am	
1200	1300		Australia, ABC NT Alice Springs		2310do
			4835irr		
1200	1300		Australia, ABC NT Katherine	2485do	
1200	1300		Australia, ABC NT Tennant Creek	2325do	
1200	1300		Australia, CVC International	13635as	
1200	1300		Australia, Radio	5995pa	6020pa	9475as
			9560pa	9580pa	9590pa	11880pa
1200	1300	as	Canada, CBC NQ SW Service	9625na	
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, China Radio Intl	9730as	9760pa
			11760pa	11980as	13685eu	13790eu
			17490eu		
1200	1300		Costa Rica, University Network	9725va	11870va
			13750va		
1200	1300		Ecuador, HCJB	12005am	21455am
1200	1300	vl	Italy, IRRS	13840va	
1200	1300		Malaysia, RTM/Trax FM	7295as	
1200	1300		Malaysia, Voice of	6175as	
1200	1300	DRM	Netherlands, Radio	7240eu	
1200	1300		Nigeria, Voice of	7255af	
1200	1300		Papua New Guinea, Catholic Radio	4960do	
1200	1300		Papua New Guinea, NBC	4890do	
1200	1300	vl	Papua New Guinea, Wantok R.Light	7120va	
1200	1300		Singapore, Radio Singapore Intl		6080as
			6150as		
1200	1300		South Korea, KBS World Radio	9650na	
1200	1300		Taiwan, Radio Taiwan Intl	7130na	
1200	1300		UK, BBC World Service	6190af	6195as
			9605ca	9740as	11760me	11855ca
			11940af	11945as	15190ca	15310as
			15485af	15575me	17640af	17790as
			17885af	21470af	
1200	1300		USA, Armed Forces Radio/AFRTS		4319usb
			5446usb	5765usb	6350usb	7590usb
			7812usb	10320usb	12133usb	12579usb
			13362usb	13855usb	
1200	1300		USA, KAIJ Dallas TX	5755na	
1200	1300		USA, KNLS Anchor Point AK	7355as	9615as
1200	1300		USA, KTBN Salt Lake City UT	7505na	
1200	1300		USA, KWHR Naalehu HI	9930as	12130as

Start	Stop	Note	Station	Frequencies
1200	1300		USA, WBCQ Kennebunk ME	9330na 18910na
1200	1300		USA, WBOH Newport NC	5920am
1200	1300		USA, WEWN Birmingham AL	5850na 7540na 11870na
1200	1300		USA, WHRA Greenbush ME	11785na 15665na
1200	1300		USA, WHRI Noblesville IN	6095am 7520am 9495am 9840am
1200	1300		USA, WINB Red Lion PA	9265am
1200	1300		USA, WRMI Miami FL	9955am
1200	1300		USA, WTJC Newport NC	9370am
1200	1300		USA, WWCR Nashville TN	5070na 5765na 5935na 9985na 15825na
1200	1300		USA, WWRB Manchester TN	3185na
1200	1300		USA, WYFR Okeechobee FL	5950am 5985am 17505am
1200	1300		Zambia, The Voice-Africa	9865af
1215	1300		Egypt, Radio Cairo	17835as
1230	1245	s	Germany, Bible Voice Broadcasting	15950as
1230	1300		Bangladesh, Bangla Betar	7185as
1230	1300		Sweden, Radio	13580va 15105va 15240na 15735va
1230	1300		Thailand, Radio	9810va
1230	1300		Turkey, Voice of	15225eu 15535va
1230	1300		USA, Voice of America	9645va 11705va 15665va

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

Start	Stop	Note	Station	Frequencies
1300	1327		Czech Rep, Radio Prague Intl	13580as 17540na
1300	1330		Ecuador, HCJB	12005am 21455am
1300	1330		Egypt, Radio Cairo	17835as
1300	1330	DRM	Netherlands, Radio	7240eu
1300	1330		Turkey, Voice of	15225eu 15535oc
1300	1356		Romania, Radio Romania Intl	15105eu 17745eu
1300	1400		Anguilla, Caribbean Beacon	11775am
1300	1400		Australia, CVC International	13635as
1300	1400		Australia, Radio	5995pa 6020pa 9560pa 9580pa 9590pa
1300	1400	as	Canada, CBC NQ SW Service	9625na
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		Canada, Radio Canada Intl	9515am 13655am 17800am
1300	1400		China, China Radio Intl	9570na 11760pa 11885pa 11900pa 11980as 13610eu 13790eu 15230na
1300	1400		Costa Rica, University Network	9725va 11870va 13750va
1300	1400		Germany, Deutsche Welle	6140eu
1300	1400		Germany, Overcomer Ministries	6110eu 9855eu
1300	1400	mtwhf	Italy, IRRS	13840va
1300	1400	as	Italy, IRRS	15740va
1300	1400		Jordan, Radio	11690na
1300	1400	vl	Libya, Voice of Africa	21675af 21695af
1300	1400		Malaysia, RTM/Trax FM	7295as
1300	1400		Malaysia, Voice of	6175as
1300	1400		New Zealand, Radio NZ Intl	7145pa
1300	1400		Nigeria, Voice of	7255af
1300	1400		North Korea, Voice of	7570eu 9335na 11710na 12015eu
1300	1400		Papua New Guinea, Catholic Radio	4960do
1300	1400		Papua New Guinea, NBC	4890do
1300	1400	vl	Papua New Guinea, Wantok R.Light	7120va
1300	1400		Poland, Radio Polonia	9525eu 11850eu
1300	1400		Singapore, Radio Singapore Intl	6080as 6150as
1300	1400		South Korea, KBS World Radio	9570na 9770na
1300	1400		UK, BBC World Service	6190af 6195as 9740as 11760me 11940af 11945as 15190ca 15310as 15420af 15485af 15575me 17640af 17790as 17830af 17885af 21470af
1300	1400		USA, Armed Forces Radio/AFRTS	4319usb 5446usb 5765usb 6350usb 7590usb 7812usb 10320usb 12133usb 12579usb 13362usb 13855usb
1300	1400		USA, KAIJ Dallas TX	5755na
1300	1400		USA, KTBN Salt Lake City UT	7505na
1300	1400		USA, KWHR Naalehu HI	9930as 12130as
1300	1400		USA, Voice of America	9645va 9760va 11705va
1300	1400		USA, WBCQ Kennebunk ME	7415na 9330na 18910na
1300	1400		USA, WBOH Newport NC	5920am
1300	1400		USA, WEWN Birmingham AL	9955na 11645na 15745na
1300	1400		USA, WHRA Greenbush ME	11785na 15665na
1300	1400		USA, WHRI Noblesville IN	7520am 9840am 12020am
1300	1400	as	USA, WHRI Noblesville IN	9495am
1300	1400		USA, WINB Red Lion PA	13570am
1300	1400		USA, WRMI Miami FL	7385am
1300	1400		USA, WTJC Newport NC	9370na
1300	1400		USA, WWCR Nashville TN	7465na 9985na 13845na 15825na
1300	1400		USA, WWRB Manchester TN	9385na
1300	1400		USA, WYFR Okeechobee FL	7580va 11560va 11830va 11865va 11910va 17750va
1300	1400		Zambia, The Voice-Africa	9865af
1305	1320	am	Austria, Radio Austria Intl	17885va
1305	1330	s	Austria, Radio Austria Intl	17855va
1330	1400	s	Australia, HCJB	15405as
1330	1400	DRM	Canada, Radio Canada Intl	7240eu
1330	1400	twhfa	Guam, AWR/KSDA	15275as
1330	1400		Guam, TWR/KTWR	9585as
1330	1400		India, All India Radio	9690as 11620as 13710as
1330	1400		Laos, National Radio	7145as
1330	1400		Sweden, Radio	15240na 15735va
1345	1400	mtwhf	Austria, Radio Austria Intl	17855va
1350	1400	vl	Turkmenistan, Turkmen Radio	5015eu

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

Start	Stop	Note	Station	Frequencies
1400	1430	a	Germany, Pan American BC	13820as
1400	1430		Thailand, Radio	9725va
1400	1500		Anguilla, Caribbean Beacon	11775am
1400	1500		Australia, CVC International	13635as
1400	1500		Australia, HCJB	15390as
1400	1500		Australia, Radio	5995pa 6020pa 6080as 7240pa 9590pa 9625as 11750as
1400	1500	as	Canada, CBC NQ SW Service	9625na
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		China, China Radio Intl	9560eu 9700eu 9795eu 11765eu 11775as 13610eu 13675na 13685af 13740na 15230na 17630af
1400	1500		Costa Rica, University Network	9725va 11870va 13750va
1400	1500		France, Radio France Intl	7180as 9580as 17515as
1400	1500	as	Germany, Bible Voice Broadcasting	13645as
1400	1500		Germany, Deutsche Welle	6140eu
1400	1500		Germany, Overcomer Ministries	6110eu 9855eu 13810eu
1400	1500		Guam, TWR/KTWR	9975as
1400	1500		India, All India Radio	9690as 11620as 13710as
1400	1500	mtwhf	Italy, IRRS	13840va
1400	1500	as	Italy, IRRS	15740va
1400	1500		Japan, Radio Japan/NHK World	7200as 11730as 11840oc
1400	1500		Jordan, Radio	11690na
1400	1500		Malaysia, RTM/Trax FM	7295as
1400	1500		Malaysia, Voice of	6175as
1400	1500		Netherlands, Radio	9345as 9890as 11835as
1400	1500		New Zealand, Radio NZ Intl	7145pa
1400	1500		Nigeria, Voice of	7255af
1400	1500	vl	Oman, Radio Oman	15140as
1400	1500	vl	Papua New Guinea, Wantok R.Light	7120va
1400	1500	DRM	Russia, Voice of	5820eu
1400	1500		Singapore, MediaCorp Radio	6150do
1400	1500	vl	South Africa, Channel Africa	11825af
1400	1500		Taiwan, Radio Taiwan Intl	15265as
1400	1500		UK, BBC World Service	5970af 6190af 6195as 9740as 11940af 11760me 12095eu 15310as 15485af 15565eu 15575me 17640eu 17790af 17830af 21470af 21660af
1400	1500	a	UK, BBC World Service	12095af
1400	1500		USA, Armed Forces Radio/AFRTS	4319usb 5446usb 5765usb 6350usb 7590usb 7812usb 10320usb 12133usb 12579usb 13362usb 13855usb
1400	1500		USA, KAIJ Dallas TX	13815na
1400	1500		USA, KJES Vado NM	11715na
1400	1500		USA, KNLS Anchor Point AK	9655as
1400	1500		USA, KTBN Salt Lake City UT	7505na
1400	1500		USA, KWHR Naalehu HI	9930as
1400	1500		USA, Voice of America	7125va 9645va 9760va
1400	1500		USA, WBCQ Kennebunk ME	7415na 9330na 18910na
1400	1500		USA, WBOH Newport NC	5920am
1400	1500		USA, WEWN Birmingham AL	9955na 11645na 15745na
1400	1500		USA, WHRA Greenbush ME	11530na 15665na
1400	1500	as	USA, WHRI Noblesville IN	9495am 15105am
1400	1500		USA, WHRI Noblesville IN	9840am 11785am 12020am 13790am
1400	1500		USA, WINB Red Lion PA	13570am

Start	End		Station				
1400	1500		USA, WRMI Miami FL	7385am			
1400	1500		USA, WTJC Newport NC	9370na			
1400	1500		USA, WWCR Nashville TN	7465na	9985na		
			13845na	15825na			
1400	1500		USA, WWRB Manchester TN	9385na			
1400	1500		USA, WYFR Okeechobee FL	7580va	11560va		
			11830va	11910va	13695va	17750va	
1400	1500		Zambia, The Voice-Africa	9865af			
1415	1430		Nepal, Radio	3230as	5005as	6100as	
			7165as				
1430	1445	s	Germany, Pan American BC	13800as			
1430	1500		Australia, Radio	9475as	11660as		
1430	1500	DRM	South Korea, KBS World Radio	9770eu			

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

Start	End		Station				
1500	1500		France, Radio France Intl	7180as	17515as		
1500	1515	vl	Turkmenistan, Turkmen Radio	5015eu			
1500	1530		Australia, HCJB	15425as			
1500	1530	s	Hungary, Radio Budapest	6025eu	9690eu		
1500	1530		Mongolia, Voice of	12015eu			
1500	1530		UK, BBC World Service	6190af	11860af		
			11940af	12095af	15400af	15420af	
			15485af	17830af	21490af	21660af	
1500	1530	DRM	Vatican City, Vatican Radio	7240eu			
1500	1545	as	Germany, Bible Voice Broadcasting	13645as			
1500	1545		Seychelles, FEBA	7320as			
1500	1555	mtwhf	Italy, IRRS	13840va			
1500	1557		Canada, Radio Canada Intl	11675as	15360as		
			17720as				
1500	1600		Anguilla, Caribbean Beacon	11775am			
1500	1600		Australia, CVC International	13635as			
1500	1600		Australia, Radio	5995pa	6080pa	7240pa	
			9475as	9590pa	9625as	11660as	
1500	1600	as	Canada, CBC NQ SW Service	9625na			
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		China, China Radio Intl	6100af	7160as		
			9435eu	9525eu	9785as	11775as	
			13685na	13740af	17630af		
1500	1600		Costa Rica, University Network	9725va	11870va		
			13750va				
1500	1600	a	Germany, Bible Voice Broadcasting	12035as			
1500	1600		Germany, Deutsche Welle	6140eu			
1500	1600	a	Germany, Overcomer Ministries	6110eu			
			9855eu	13810eu			
1500	1600		Greece, Voice of	9420va	9775va	12105va	
			15485va	15630va			
1500	1600		Japan, Radio Japan/NHK World			6190as	
			7200as	9505va	11730as		
1500	1600		Jordan, Radio	11690na			
1500	1600		Malaysia, RTM/Trax FM	7295as			
1500	1600		Malaysia, Voice of	6175as			
1500	1600		Netherlands, Radio	9345as	9890as		
			11835as				
1500	1600		New Zealand, Radio NZ Intl	7145pa			
1500	1600		North Korea, Voice of	7570eu	9335na		
			11710na	12015eu			
1500	1600	vl	Papua New Guinea, Wantok R.Light	7120va			
1500	1600		Russia, Voice of	6205as	7260as	7350as	
			7415as				
1500	1600	DRM	Russia, Voice of	5820eu			
1500	1600		Singapore, MediaCorp Radio	6150do			
1500	1600	vl	South Africa, Channel Africa	17770af			
1500	1600		UK, BBC World Service	5970as	5975as		
			6195as	9740as	12095eu	15310as	
			15565eu	17640eu	17790as		
1500	1600		UK, CVC International	15680af			
1500	1600	vl/ mtwhf	UK, Sudan Radio Service	15575va			
1500	1600		USA, Armed Forces Radio/AFRTS			4319usb	
			5446usb	5765usb	6350usb	7590usb	
			7812usb	10320usb	12133usb	12579usb	
			13362usb	13855usb			
1500	1600		USA, KAIJ Dallas TX	13815na			
1500	1600		USA, KJES Vado NM	11715na			
1500	1600		USA, KTBN Salt Lake City UT	7505na			
1500	1600		USA, KWHR Naalehu HI	9930as			
1500	1600		USA, Voice of America	6110va	7125va		
			7175va	9645va	9685va	11895va	
			13600va	13865af	15460va	17715af	
			17895af				
1500	1600		USA, WBCQ Kennebunk ME	7415na	9330na		
			18910na				
1500	1600		USA, WBOH Newport NC	5920am			
1500	1600		USA, WEWN Birmingham AL	9955na	11645na		
			15745na				
1500	1600		USA, WHRA Greenbush ME	11530na	15665na		
1500	1600		USA, WHRI Noblesville IN	9840am	11785am		
			13760am	13790am			
1500	1600as		USA, WHRI Noblesville IN	15105am			
1500	1600		USA, WINB Red Lion PA	13570am			
1500	1600		USA, WRMI Miami FL	7385am			

Start	End		Station				
1500	1600		USA, WTJC Newport NC	9370na			
1500	1600		USA, WWCR Nashville TN	9985na	13845na		
			12160na	13845na	15825na		
1500	1600		USA, WWRB Manchester TN	9385na	11915na		
1500	1600		USA, WYFR Okeechobee FL	6280va	11830va		
			11910va	15520va	15770va	17750va	
1500	1600		Zambia, The Voice-Africa	9865af			
1500	1600	f DRM	Taiwan, Radio Taiwan Intl	9770eu			
1530	1600	mh	Germany, Bible Voice Broadcasting	12035as			
1530	1600		Iran, Voice of the Islamic Rep	7330as	9940as		
1530	1600		UAE, AWR Africa	15225as			
1530	1600		UK, BBC World Service	6190af	11940af		
			12095af	15400af	15485af	17830af	
			21470af	21660af			
1530	1600		Vatican City, Vatican Radio	9310as	11850as		
			13765as				
1545	1600	w	Germany, Bible Voice Broadcasting	12035as			
1545	1600	s	Germany, Pan American BC	13820me			

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

Start	End		Station				
1600	1615		Pakistan, Radio	6215as	9375af	11570af	
			15725af				
1600	1615		UK, BBC World Service	6190af	11940af		
			12095af	15400af	15485af	17820af	
			17830af	21660af			
1600	1627		Czech Rep, Radio Prague Intl	5930eu	17485af		
1600	1627		Iran, Voice of the Islamic Rep	7330as	9940as		
1600	1629	a	Germany, Universal Life	15640me			
1600	1630	s	Germany, Pan American BC	13820me			
1600	1630		Guam, AWR/KSDA	11640as	11680as		
1600	1630		Myanmar, Radio	9730do			
1600	1659	vl/ mtwhf	UK, Sudan Radio Service	15575va			
1600	1700		Anguilla, Caribbean Beacon	11775am			
1600	1700		Australia, CVC International	13635as			
1600	1700		Australia, Radio	5995pa	6080pa	7240pa	
			9475as	9710pa	11660as	11750as	
1600	1700	a	Canada, CBC NQ SW Service	9625na			
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		China, China Radio Intl	6100af	7255eu		
			9435eu	9525eu	9570af	11900eu	
1600	1700		Costa Rica, University Network	11870va	13750va		
1600	1700		Ethiopia, Radio	5990af	7110af	7165af	
			9560af	9704af	11800af		
1600	1700		France, Radio France Intl	9730va	11615va		
			15160va	15365va	15605va	17850va	
1600	1700		Germany, Deutsche Welle	6170as	9485as		
			17595as				
1600	1700	a	Germany, Overcomer Ministries	9855eu			
1600	1700		Italy, IRRS	5785va			
1600	1700	DRM	Japan, Radio Japan/NHK World	9770eu			
1600	1700		Jordan, Radio	11690na			
1600	1700		Malaysia, RTM/Trax FM	7295as			
1600	1700		Malaysia, Voice of	6175as			
1600	1700		New Zealand, Radio NZ Intl	7145pa			
1600	1700		North Korea, Voice of	9990va	11545va		
1600	1700	vl	Papua New Guinea, Wantok R.Light	7120va			
1600	1700		Russia, Voice of	4965as	4975as	6005va	
			6130eu	7260as	7320eu	7415as	
			9470me				
1600	1700		South Korea, KBS World Radio	5975va			
1600	1700		Taiwan, Radio Taiwan Intl	11550va			
1600	1700		UK, BBC World Service	3915as	5975as		
			6195as	7160as	7285eu	9410as	
			9740as	12095eu	15105as	15310as	
1600	1700		UK, CVC International	15680af			
1600	1700		USA, Armed Forces Radio/AFRTS				4319usb
			5446usb	5765usb	6350usb	7590usb	
			7812usb	10320usb	12133usb	12579usb	
			13362usb	13855usb			
1600	1700		USA, KAIJ Dallas TX	13815na			
1600	1700		USA, KJES Vado NM	11715na			
1600	1700		USA, KTBN Salt Lake City UT	15590na			
1600	1700		USA, KWHR Naalehu HI	9930as			
1600	1700		USA, Voice of America	4930af	9685va		
			11835va	13600va	15240va	17640va	
			17715af	17895af			
1600	1700	mtwhf	USA, Voice of America	6160va	7125va		
			9645va	9760va			
1600	1700		USA, WBCQ Kennebunk ME	7415na	9330na		
			18910na				
1600	1700		USA, WBOH Newport NC	5920am			
1600	1700		USA, WEWN Birmingham AL	11645va	13615va		
			15745va	15785va			
1600	1700		USA, WHRA Greenbush ME	11530na	17650na		
1600	1700		USA, WHRI Noblesville IN	9840am	13760am		
			15105am				
1600	1700		USA, WINB Red Lion PA	13570am			
1600	1700	mtwhfa	USA, WMLK Bethel PA	9265eu			
1600	1700		USA, WRMI Miami FL	9955am			
1600	1700		USA, WTJC Newport NC	9370na			

Start	End	Days	Station	Freq1	Freq2	Freq3	Freq4
1600	1700		USA, WWCR Nashville TN	9985na	12160na		
				13845na	15825na		
1600	1700		USA, WWRB Manchester TN	9385na	11915na		
1600	1700		USA, WYFR Okeechobee FL	6085va	11830va		
				11865va	12010va	13695va	15220va
				17750va	18980va	21455va	21525va
1600	1700		Zambia, The Voice-Africa	9865af			
1605	1620	asm	Austria, Radio Austria Intl	13675na			
1615	1630	twhf	Austria, Radio Austria Intl	13675na			
1615	1700		UK, BBC World Service	6190af	11940af		
				12095af	15400af	15420af	15485af
				17820af	21660af		
1615	1700	as	UK, BBC World Service	11860af	21490af		
1630	1700		Egypt, Radio Cairo	11785af			
1630	1700	s	Germany, Bible Voice Broadcasting		9460me		
1630	1700		Guam, AWR/KSDA	11975as			
1640	1700	mtwhf	Germany, Bible Voice Broadcasting		9460me		
1645	1700	m	Austria, Radio Austria Intl	13675na			
1645	1700	a	Germany, Bible Voice Broadcasting		9460me		

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

Start	End	Days	Station	Freq1	Freq2	Freq3	Freq4
1700	1710	mtwh	Moldova, Radio PMR	5960eu			
1700	1715	mtwf	Germany, Bible Voice Broadcasting		9460me		
1700	1720	f	Moldova, Radio PMR	5960eu			
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485va		
1700	1730		France, Radio France Intl	11615va	15605va		
1700	1730		Jordan, Radio	11690na			
1700	1730		Swaziland, TWR	3200af			
1700	1745	h	Germany, Bible Voice Broadcasting		9460me		
1700	1800		Anguilla, Caribbean Beacon	11775am			
1700	1800		Australia, CVC International	13635as			
1700	1800		Australia, Radio	5995pa	6080as	7240pa	
				9475as	9580pa	9710pa	11880pa
1700	1800	a	Canada, CBC NQ SW Service	9625na			
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		China, China Radio Intl	6100eu	7255eu		
				9570af	11900af		
1700	1800		Costa Rica, University Network	11870va	13750va		
1700	1800		Egypt, Radio Cairo	11785af			
1700	1800		Eqt Guinea, Radio Africa	15190af			
1700	1800	as	Germany, Bible Voice Broadcasting		9460me		
1700	1800		Italy, IRRS	5785va			
1700	1800		Japan, Radio Japan/NHK World		9535va		
				11970eu	15355af		
1700	1800		Malaysia, RTM/Trax FM	7295as			
1700	1800		Malaysia, Voice of	6175as			
1700	1800		New Zealand, Radio NZ Intl	7145pa			
1700	1800		Nigeria, Voice of	15120na			
1700	1800	vl	Papua New Guinea, Wantok R.Light		7120va		
1700	1800		Russia, Voice of	5910as	7320eu	7360va	
				7415as	9470me		
1700	1800		South Africa, Channel Africa	15285af			
1700	1800		Taiwan, Radio Taiwan Intl	11850af			
1700	1800		UK, BBC World Service	3915as	5975as		
				6195eu	7160as	9410eu	9740as
				12095eu	15105eu	15310as	
1700	1800		UK, CVC International	15680af			
1700	1800	vl/ mtwhf	UK, Sudan Radio Service	11705va			
1700	1800		USA, Armed Forces Radio/AFRTS				4319usb
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
1700	1800		USA, KAIJ Dallas TX	13815na			
1700	1800		USA, KTBN Salt Lake City UT	15590na			
1700	1800		USA, KWHR Naalehu HI	9930as			
1700	1800		USA, Voice of America	13710af	15240af		
				15445af			
1700	1800	as	USA, Voice of America	4930af			
1700	1800		USA, WBCQ Kennebunk ME	7415na	9330na		
				18910na			
1700	1800		USA, WBOH Newport NC	5920am			
1700	1800		USA, WEWN Birmingham AL	11645va	13615va		
				15745va	15785va		
1700	1800		USA, WHRA Greenbush ME	11530na	17650na		
1700	1800		USA, WHRI Noblesville IN	9840am	11885am		
				13760am	15105am		
1700	1800		USA, WINB Red Lion PA	13570am			
1700	1800	mtwhfa	USA, WMLK Bethel PA	9265eu	15265eu		
1700	1800	mtwhfa	USA, WMLK Bethel PA	9265eu	15265eu		
1700	1800		USA, WRMI Miami FL	9955am			
1700	1800		USA, WTJC Newport NC	9370na			
1700	1800		USA, WWCR Nashville TN	9985na	12160na		
				13845na	15825na		
1700	1800		USA, WWRB Manchester TN	9385na	11915na		
				15250na			
1700	1800		USA, WYFR Okeechobee FL	3955va	13695va		
				17795va	18980va	21680va	21860va
1700	1800		Zambia, The Voice-Africa	4965af			

Start	End	Days	Station	Freq1	Freq2	Freq3	Freq4
1715	1730		Vatican City, Vatican Radio	4005va	5885va		
				7250va	9645va	9755va	
1730	1745		Israel, Kol Israel	9345va	11590va	13675va	
1730	1745	vl	Libya, Voice of Africa	11860af			
1730	1745	mtwhf	UK, United Nations Radio	7170af	9565me		
				17810af			
1730	1800		Bulgaria, Radio	9500eu	11500eu		
1730	1800		Guam, AWR/KSDA	9385as			
1730	1800		Liberia, ELWA	4760do			
1730	1800		Philippines, Radio Pilipinas	11720va	15190va		
				17720va			
1730	1800		Slovakia, Radio Slovakia Intl	5915eu	6055eu		
1730	1800		Swaziland, TWR	3200af	9500af		
1730	1800		Sweden, Radio	6065va			
1730	1800		USA, Voice of America	9830af	12080af		
				17785af			
1730	1800		Vatican City, Vatican Radio	9755af	11625af		
				13765af			
1745	1800		Bangladesh, Bangla Betar	7185eu			
1745	1800	t	Germany, Bible Voice Broadcasting		9460me		
1745	1800		India, All India Radio	7410eu	9445eu		
				9950eu	11620eu	11935eu	13605af
				15075af	15155as	17670af	
1745	1800	vl	Libya, Voice of Africa	15220af	15615af		
				15660af	17695af		
1745	1800		UK, BBC World Service	3255af	6190af		
				6195af	12095af	15400af	15420af
				17820af	17830af	21470af	

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

Start	End	Days	Station	Freq1	Freq2	Freq3	Freq4
1800	1810		Zanzibar, Radio Tanzania	11735af			
1800	1815	a	Germany, Bible Voice Broadcasting		7210me		
1800	1829	s	Germany, Universal Life	15675af			
1800	1830		Austria, AWR Europe	15315af			
1800	1830		Egypt, Radio Cairo	11785af			
1800	1830	a	Germany, Bible Voice Broadcasting		9460me		
1800	1830		South Africa, AWR Africa	3215af	3345af		
				9600af			
1800	1830		Swaziland, TWR	3200af	9500af		
1800	1830		UK, BBC World Service	3255af	5975as		
				6190af	6195af	9740as	12095af
				13700af			
1800	1830	as	USA, Voice of America	4930af			
1800	1830		USA, Voice of America	6035af	11975af		
				13710af	15240af	17895af	
1800	1830		Vietnam, Voice of	5955eu			
1800	1850		New Zealand, Radio NZ Intl	7145pa			
1800	1855	f	Italy, IRRS	9380va			
1800	1856		Romania, Radio Romania Intl	7120eu	9640eu		
1800	1859		Canada, Radio Canada Intl	9530af	11765af		
				13730af	15255af		
1800	1900		Anguilla, Caribbean Beacon	11775am			
1800	1900	mtwhf	Argentina, RAE	9690eu	15345eu		
1800	1900		Australia, Radio	6080pa	7240pa	9475as	
				9580pa	9710pa	11880pa	
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		China, China Radio Intl	6100af			
1800	1900		Costa Rica, University Network	11870va	13750va		
1800	1900		Eqt Guinea, Radio Africa	15190af			
1800	1900	fsw	Germany, Bible Voice Broadcasting		9460me		
1800	1900	as	Germany, Bible Voice Broadcasting		9730me		
1800	1900		India, All India Radio	7410eu	9445eu		
				9950eu	11620eu	11935af	13605af
				15075af	15155as	17670af	
1800	1900		Italy, IRRS	5785va			
1800	1900		Liberia, ELWA	4760do			
1800	1900		Malaysia, RTM/Trax FM	7295as			
1800	1900		Malaysia, Voice of	6175as			
1800	1900		Netherlands, Radio	6020af	7120af		
				11655af			
1800	1900		Nigeria, Voice of	15120va			
1800	1900		North Korea, Voice of	7570eu	12015eu		
1800	1900	vl	Papua New Guinea, Wantok R.Light		7120va		
1800	1900		Philippines, Radio Pilipinas	11720va	15190va		
				17720va			
1800	1900		Poland, Radio Polonia	7220eu	7265eu		
1800	1900		Russia, Voice of	5910as	7360va	7415as	
				11519af			
1800	1900		Taiwan, Radio Taiwan Intl	3965eu			
1800	1900		UK, BBC World Service	6195eu	9410eu		
				12095eu			
1800	1900		UK, CVC International	9765af			
1800	1900		USA, Armed Forces Radio/AFRTS				4319usb
				5446usb	5765usb	6350usb	7590usb
				7812usb	10320usb	12133usb	12579usb
				13362usb	13855usb		
1800	1900		USA, KAIJ Dallas TX	13815na			

Start	End	Days	Station			
1800	1900		USA, KTBN Salt Lake City UT	15590na		
1800	1900		USA, KWHR Naalehu HI	9930as		
1800	1900		USA, WBCQ Kennebunk ME	7415na	9330na	
			18910na			
1800	1900		USA, WBOH Newport NC	5920am		
1800	1900		USA, WEWN Birmingham AL	11645va	13615va	
			15745va	15785va		
1800	1900		USA, WHRA Greenbush ME	11530na	17650na	
1800	1900		USA, WHRI Noblesville IN	9840am	11885am	
			15105am			
1800	1900		USA, WINB Red Lion PA	13570am		
1800	1900	mtwhfa	USA, WMLK Bethel PA	9265eu	15265eu	
1800	1900		USA, WRMI Miami FL	9955am		
1800	1900		USA, WTJC Newport NC	9370am		
1800	1900		USA, WWCR Nashville TN	9985na	12160na	
			13845na	15825na		
1800	1900		USA, WWRB Manchester TN	9385na	11915na	
			15250na			
1800	1900		USA, WYFR Okeechobee FL	3955va	7240va	
			13695va	13800va	17525va	17795va
			18980va			
1800	1900		Yemen, Rep of Yemen Radio	9780me		
1800	1900		Zambia, The Voice-Africa	4965af		
1815	1830	vl	Libya, Voice of Africa	9485af	11615af	
			11635af	11715af	11860af	
1815	1900		Bangladesh, Bangla Betar	7185as		
1830	1900		Swaziland, TWR	3200af		
1830	1900		Turkey, Voice of	9785eu		
1830	1900		UK, BBC World Service	3255af	5975me	
			6005af	6190af	9410af	9630af
			9740me	11945af	12095af	13700af
			15400af	15470af		
1830	1900		USA, Voice of America	4930af	6035af	
			11975af	13710af	15240af	17895af
1845	1900	mtwhfa	Albania, Radio Tirana	7465eu		
1845	1900		Congo, RTV Congolaise	4765af	5985af	
1851	1900		New Zealand, Radio NZ Intl	9630pa		

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

Start	End	Days	Station			
1900	1915		Congo, RTV Congolaise	4765af	5985af	
1900	1925		Israel, Kol Israel	9400va	11590va	15640af
1900	1929	s	Germany, Universal Life	7105me		
1900	1930	a	Germany, Bible Voice Broadcasting		6015af	
			9460me			
1900	1930		Hungary, Radio Budapest	3975eu	6025eu	
1900	1930		Lithuania, Radio Vilnius	9710eu		
1900	1930		Philippines, Radio Pilipinas	11720va	15190va	
			17720va			
1900	1930		Turkey, Voice of	9785eu		
1900	1945		India, All India Radio	7410eu	9445eu	
			9950eu	11620eu	11935af	13605af
			15075af	15155as	17670af	
1900	1950		New Zealand, Radio NZ Intl	9630pa		
1900	2000		Anguilla, Caribbean Beacon	11775am		
1900	2000		Australia, Radio	6080pa	7240pa	9500as
			9580pa	9710pa	11880pa	
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		China, China Radio Intl	7295va	9440af	
1900	2000		Costa Rica, University Network	11870va	13750va	
1900	2000		Eqt Guinea, Radio Africa	15190af		
1900	2000	as	Germany, Bible Voice Broadcasting		6015eu	
			9460me			
1900	2000		Germany, Deutsche Welle	13780af	15620af	
1900	2000		Germany, Overcomer Ministries		9495af	
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do	
1900	2000		Italy, IRRS	5785va		
1900	2000	f	Italy, IRRS	5775va	9380va	
1900	2000		Liberia, ELWA	4760do		
1900	2000		Malaysia, RTM/Trax FM	7295as		
1900	2000	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
1900	2000		Netherlands, Radio	5905af	7120af	
			11655af	17810af		
1900	2000	as	Netherlands, Radio	15315na	17735na	
			17660na			
1900	2000		Nigeria, Radio/Ibadan	6050do		
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do	
1900	2000		Nigeria, Radio/Lagos	3326do	4990do	
1900	2000		Nigeria, Voice of	15120va		
1900	2000		North Korea, Voice of	7100af	9975va	
			11535va	11910af		
1900	2000		Papua New Guinea, Catholic Radio		4960do	
1900	2000		Papua New Guinea, NBC	4890do		
1900	2000	vl	Papua New Guinea, Wantok R.Light		7120va	
1900	2000		Russia, Voice of	6175eu	7335af	7360eu
			11510af			
1900	2000	irreg/ vl	Sierra Leone, SLBS	3316do		

Start	End	Days	Station			
1900	2000	vl	Solomon Islands, SIBC	5020do	9545do	
1900	2000	vl	South Africa, Channel Africa	3345af		
1900	2000	m	South Africa, Radio League	3215af		
1900	2000		South Korea, KBS World Radio		5975va	
			7275eu			
1900	2000	a	Sri Lanka, SLBC	6010eu		
1900	2000		Swaziland, TWR	3200af		
1900	2000		Thailand, Radio	9805eu		
1900	2000	vl	Uganda, Radio	4976do	5026do	7196do
1900	2000		UK, BBC World Service	3255af	5975me	
			6005af	6190af	6195va	9410af
			9630af	9740me	12095af	13700af
			15400af	15420af	17830af	21470af
1900	2000		UK, CVC International	9765af		
1900	2000		USA, Armed Forces Radio/AFRTS		4319usb	
			5446usb	5765usb	6350usb	7590usb
			7812usb	10320usb	12133usb	12579usb
			13362usb	13535usb		
1900	2000		USA, KAIJ Dallas TX	13815na		
1900	2000		USA, KJES Vado NM	15385na		
1900	2000		USA, KTBN Salt Lake City UT	15590na		
1900	2000		USA, Voice of America	4930af	4940af	
			6035af	9785va	11975af	12015va
			13710af	15240af	15580af	17895af
1900	2000		USA, WBCQ Kennebunk ME	7415na	9330na	
			18910na			
1900	2000		USA, WBOH Newport NC	5920am		
1900	2000		USA, WEWN Birmingham AL	11645va	13615va	
			15745va	15785va		
1900	2000		USA, WHRA Greenbush ME	11530na	15665na	
1900	2000		USA, WHRI Noblesville IN	9840am	11885am	
			15285am	15665am		
1900	2000		USA, WINB Red Lion PA	13570am		
1900	2000	mtwhfa	USA, WMLK Bethel PA	9265eu	15265eu	
1900	2000		USA, WRMI Miami FL	9955am		
1900	2000		USA, WTJC Newport NC	9370am		
1900	2000		USA, WWCR Nashville TN	9975na	9985na	
			12160na	13845na	15825na	
1900	2000		USA, WWRB Manchester TN	9385na	11915na	
			15250na			
1900	2000		USA, WYFR Okeechobee FL	3230va	6020va	
			6085va	13695va	13800va	17795va
			17845va	18930va	18980va	
1900	2000		Zambia, The Voice-Africa	4965af		
1900	2000	vl	Zimbabwe, ZBC Corp	5975do		
1915	1930	vl	Libya, Voice of Africa	11635af	11715af	
1915	2000	f	Germany, Bible Voice Broadcasting		9460me	
1925	1945		Armenia, Voice of	4810eu	9965as	
1930	1945	vl	Libya, Voice of Africa	11715af		
1930	2000	mtwhfa	Albania, Radio Tirana	9920eu		
1930	2000	s	Germany, Bible Voice Broadcasting		7260af	
1930	2000	a	Germany, Pan American BC	7260af		
1930	2000		Greece, Voice of	7430eu		
1930	2000		Iran, Voice of the Islamic Rep	6010eu	7320eu	
			9855af	11695af		
1930	2000		Serbia & Montenegro, Intl Radio		6100eu	
1930	2000		Slovakia, Radio Slovakia Intl	5915eu	7345eu	
1930	2000		Sweden, Radio	6065va		
1935	1955		Italy, RAI Intl	6035eu	9760eu	
1945	2000		Rwanda, Radio	6055do		
1951	2000		New Zealand, Radio NZ Intl	11725pa		

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

Start	End	Days	Station			
2000	2015	s	Germany, Bible Voice Broadcasting		6015eu	
2000	2015	s	Germany, Pan American BC	7260af		
2000	2027		Czech Rep, Radio Prague Intl	5930va	11600va	
2000	2027		Iran, Voice of the Islamic Rep	6010eu	7320eu	
			9855af	11695af		
2000	2030	s	Germany, Bible Voice Broadcasting		6015eu	
2000	2030		Mongolia, Voice of	12015eu		
2000	2030		South Africa, AWR Africa	7180af		
2000	2030		Swaziland, TWR	3200af		
2000	2030		Vatican City, Vatican Radio	7365af	9755af	
			11625af			
2000	2050		New Zealand, Radio NZ Intl	11725pa		
2000	2059		Canada, Radio Canada Intl	5850eu	7235eu	
			11765eu	15325eu		
2000	2100		Anguilla, Caribbean Beacon	11775am		
2000	2100		Australia, ABC NT Alice Springs		2310do	
			4835irr			
2000	2100		Australia, ABC NT Katherine	2485do		
2000	2100		Australia, ABC NT Tennant Creek		2325do	
2000	2100		Australia, Radio	9500as	11650pa	11660pa
			11880pa	12080pa		
2000	2100	as	Australia, Radio	6080pa	7240pa	
2000	2100		Canada, CFRX Toronto ON	6070do		
2000	2100		Canada, CFVP Calgary AB	6030do		
2000	2100		Canada, CKZN St John's NF	6160do		
2000	2100		Canada, CKZU Vancouver BC	6160do		
2000	2100		Canada, Radio Canada Intl	17765am		

Start	End	Code	Station				
2000	2100		China, China Radio Intl	5960eu	7190eu		
				7285eu	7295eu	9440va	9490eu
				9600eu	11640af	13630af	
2000	2100		Costa Rica, University Network	13750va			
2000	2100		Eqt Guinea, Radio Africa	15190af			
2000	2100		Germany, Deutsche Welle	7130af	11795af		
			13780af	15205af			
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do		
2000	2100		Indonesia, Voice of	9525as	11785pa		
			15150al				
2000	2100		Italy, IRRS	5775va	5785va		
2000	2100		Liberia, ELWA	4760do			
2000	2100		Malaysia, RTM/Trax FM	7295as			
2000	2100	vl	Namibia, Namibian BC Corp	3270do	3290do		
			6060do	6175do			
2000	2100	as	Netherlands, Radio	15315af	17735na		
			17660af				
2000	2100		Netherlands, Radio	5905af	7120af		
			11665af	17810af			
2000	2100		Nigeria, Radio/Ibadan	6050do			
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do		
2000	2100		Nigeria, Radio/Lagos	3326do	4990do		
2000	2100		Nigeria, Voice of	15120va			
2000	2100		Papua New Guinea, Catholic Radio	4960do			
2000	2100		Papua New Guinea, NBC	4890do			
2000	2100	vl	Papua New Guinea, Wantok R.Light	7120va			
2000	2100	DRM	Russia, Voice of	5820eu			
2000	2100		Russia, Voice of	6145eu	7290eu	7330eu	
			15735ca				
2000	2100	vl	Solomon Islands, SIBC	5020do	9545do		
2000	2100	vl	South Africa, Channel Africa	3345af			
2000	2100	vl	South Korea, KBS World Radio		3955eu		
2000	2100	mtwhf	Spain, Radio Exterior Espana	9595af	9680eu		
2000	2100	vl	Uganda, Radio	4976do	5026do	7196do	
2000	2100		UK, BBC World Service	3255af	6005af		
			6190af	6195va	9410va	9630af
			12095af	15400af	17830af	
2000	2100		UK, CVC International	7285af			
2000	2100		USA, Armed Forces Radio/AFRTS		4319usb		
			5446usb	5765usb	6350usb	7590usb
			7812usb	10320usb	12133usb	12579usb
			13362usb	13855usb		
2000	2100		USA, KAIJ Dallas TX	13815na			
2000	2100		USA, KJES Vado NM	15385na			
2000	2100		USA, KTBN Salt Lake City UT	15590na			
2000	2100		USA, WBCQ Kennebunk ME	7415na	9330na		
			18910na				
2000	2100		USA, WBOH Newport NC	5920am			
2000	2100		USA, WEWN Birmingham AL	11645va	13615va		
			15745va	15785va			
2000	2100		USA, WHRA Greenbush ME	11530na	15665na		
2000	2100		USA, WHRI Noblesville IN	9840am	11885am		
			15285am	15665am			
2000	2100		USA, WINB Red Lion PA	13570am			
2000	2100	mtwhfa	USA, WMLK Bethel PA	9265eu	15265eu		
2000	2100		USA, WRMI Miami FL	9955am			
2000	2100		USA, WTJC Newport NC	9370na			
2000	2100		USA, WWCR Nashville TN	9975na	9985na		
			12160na	13845na	15825na	
2000	2100		USA, WWRB Manchester TN	9385na	11915na		
			15250na				
2000	2100		USA, WYFR Okeechobee FL	3230va	6020va		
			7360va	13800va	15195va	17725va
			17750va	17795va	17845va	18980va
2000	2100		Zambia, The Voice-Africa	4965af			
2000	2100	vl	Zimbabwe, ZBC Corp	5975do			
2000	2130		China, China Radio Intl	11640af	13630af		
2005	2100		Syria, Radio Damascus	9330eu	12085eu		
			13610al				
2020	2045	vl/ m	Vatican City, Vatican Radio	6185eu			
2025	2045		Italy, RAI Intl	5985af			
2030	2045	vl	Libya, Voice of Africa	11635af			
2030	2045		Thailand, Radio	9535eu			
2030	2100	thf	Belarus, Radio	7125eu	7340eu	7440eu	
2030	2100		Cuba, Radio Havana	9505va	11760va		
2030	2100		Egypt, Radio Cairo	15375af			
2030	2100		Turkey, Voice of	7170as			
2030	2100		USA, Voice of America	4940af	6035af		
			7595as	11975af	13710af	15240af
			15580af				
2030	2100	as	USA, Voice of America	4930af			
2045	2100		India, All India Radio	7410eu	9445eu		
			9910oc	9950eu	11620va	11715oc
2045	2100	DRM	Vatican City, Vatican Radio	9800na			
2050	2100		Vatican City, Vatican Radio	4005eu	5885eu		
			7250eu				
2051	2100		New Zealand, Radio NZ Intl	15720pa			

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

Start	End	Code	Station				
2100	2120		Vatican City, Vatican Radio	4005eu	5885eu		
			7250eu				
2100	2130		Australia, ABC NT Katherine	2485do			
2100	2130		Australia, ABC NT Tennant Creek		2325do		
2100	2130		Australia, Radio	9500as	11695as		
2100	2130		Austria, AWR Europe	11955af			
2100	2130	a	Canada, CBC NQ SW Service	9625na			
2100	2130		Cuba, Radio Havana	9505va	11760va		
2100	2130		Hungary, Radio Budapest	6025eu	9525eu		
2100	2130	vl	South Korea, KBS World Radio		3955eu		
2100	2130		Turkey, Voice of	7179as			
2100	2130	mtwhf	UK, BBC World Service	15390ca			
2100	2130		USA, Voice of America	7595as			
2100	2130	DRM	Vatican City, Vatican Radio	9800na			
2100	2145		Nigeria, Radio/Ibadan	6050do			
2100	2159		Canada, Radio Canada Intl	17765af			
2100	2200		Anguilla, Caribbean Beacon	11775am			
2100	2200		Australia, ABC NT Alice Springs		2310do		
			4835irr				
2100	2200		Australia, Radio	9660pa	7240pa	11650pa	
			11660pa	12080pa	13630pa	15515pa
2100	2200		Bulgaria, Radio	5800eu	7500eu		
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		Canada, Radio Canada Intl	9800na			
2100	2200		China, China Radio Intl	5960eu	7285eu		
			9490eu	9600eu			
2100	2200		Costa Rica, University Network	13750va			
2100	2200		Egypt, Radio Cairo	15375af			
2100	2200		Eqt Guinea, Radio Africa	15190af			
2100	2200		Germany, Deutsche Welle	9440af	11865af		
			15205af				
2100	2200	vl	Ghana, Ghana BC Corp	3366do	4915do		
2100	2200		Guyana, Voice of	3291do	5950do		
2100	2200		India, All India Radio	7410eu	9445eu		
			9910oc	9950eu	11620va	11715oc
2100	2200	mtwh	Italy, IRRS	5775va			
2100	2200		Japan, Radio Japan/NHK World		6035oc		
			6055eu	6180eu	11855af	17825va
			21670pa				
2100	2200		Liberia, ELWA	4760do			
2100	2200		Liberia, Star Radio	11960af			
2100	2200		Malaysia, RTM/Trax FM	7295as			
2100	2200	vl	Namibia, Namibian BC Corp	3270do	3290do		
			6060do	6175do			
2100	2200		New Zealand, Radio NZ Intl	15720pa			
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do		
2100	2200		Nigeria, Radio/Lagos	3326do	4990do		
2100	2200		North Korea, Voice of	7570eu	12015eu		
2100	2200		Papua New Guinea, Catholic Radio	4960do			
2100	2200		Papua New Guinea, NBC	4890do			
2100	2200	vl	Papua New Guinea, Wantok R.Light	7120va			
2100	2200	DRM	Russia, Voice of	5820eu			
2100	2200		Russia, Voice of	7330eu	15735ca		
2100	2200	vl	Rwanda, Radio	6055do			
2100	2200	irreg/ vl	Sierra Leone, SLBS	3316do			
2100	2200	vl	South Africa, Channel Africa	3345af			
2100	2200		Syria, Radio Damascus	9330eu	12085eu		
			13610al				
2100	2200		UK, BBC World Service	3255af	3915as		
			5965as	6005af	6110as	6190af
			6195eu	9410eu	9605af	11675ca
			15400af				
2100	2200		Ukraine, Radio Ukraine Intl	5830eu			
2100	2200		USA, Armed Forces Radio/AFRTS		4319usb		
			5446usb	5765usb	6350usb	7590usb
			7812usb	10320usb	12133usb	12579usb
			13362usb	13855usb		
2100	2200		USA, KAIJ Dallas TX	13815na			
2100	2200		USA, KTBN Salt Lake City UT	15590na			
2100	2200		USA, Voice of America	6035af	11975af		
			15240af	15580af			
2100	2200		USA, WBCQ Kennebunk ME	7415na	9330na		
			18910na				
2100	2200		USA, WBOH Newport NC	5920am			
2100	2200		USA, WEWN Birmingham AL	11645va	13615va		
			15745va	15785va			
2100	2200		USA, WHRA Greenbush ME	11530na	15665na		
2100	2200		USA, WHRI Noblesville IN	7315am	9840am		
			11885am	15665am			
2100	2200		USA, WINB Red Lion PA	13570am			
2100	2200		USA, WMLK Bethel PA	15265eu			
2100	2200		USA, WRMI Miami FL	7385am			
2100	2200		USA, WTJC Newport NC	9370na			
2100	2200		USA, WWCR Nashville TN	9975na	9985na		
			12160na	13845na	15825na	
2100	2200		USA, WWRB Manchester TN	9385na	11915na		
			15250na				
2100	2200		USA, WYFR Okeechobee FL	7360va	11565va		
			11655va	11875va	13800va	15195va
			17725va	17795va	15195va	17725va
			17795va	17845va	18980va	
2100	2200		Zambia, The Voice-Africa	4965af			
2100	2200	vl	Zimbabwe, ZBC Corp	5975do			

Start	End	Days	Station			
2115	2130	vl	Libya, Voice of Africa	11635af		
2115	2200		Egypt, Radio Cairo 9990eu			
2130	2156		Romania, Radio Romania Intl	7145eu	9650eu	
			9755na	11940na		
2130	2157		Czech Rep, Radio Prague Intl	9410na	11600af	
2130	2200	mtwhfa	Albania, Radio Tirana	7465eu		
2130	2200		Australia, ABC NT Katherine	5025do		
2130	2200		Australia, ABC NT Tennant Creek		4910do	
2130	2200	mtwhfa	Canada, CBC NQ SW Service	9625na		
2130	2200		Guam, AWR/KSDA 11850as			
2130	2200		Sweden, Radio 6065va	7420va		
2130	2200	t f	UK, BBC World Service	11680ca		
2130	2200		USA, Voice of America	6235as	7405as	

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

Start	End	Days	Station			
2200	2210		Syria, Radio Damascus	9330eu	12085eu	
2200	2230	s	Belarus, Radio 7125eu	7340eu	7440eu	
2200	2230		India, All India Radio	7410eu	9445eu	
			9910oc	9950eu	11620oc	11715oc
2200	2230		Papua New Guinea, NBC	9675do		
2200	2245		Egypt, Radio Cairo 9990eu			
2200	2259		Canada, Radio Canada Intl	6100na		
2200	2300		Anguilla, Caribbean Beacon	6090am		
2200	2300		Australia, ABC NT Alice Springs		2310do	
			4835irr			
2200	2300		Australia, ABC NT Katherine	5025do		
2200	2300		Australia, ABC NT Tennant Creek		4910do	
2200	2300		Australia, Radio	12010va	13620as	13630pa
			15230pa	15240as	15515pa	17785pa
			17795pa			
2200	2300	smtwhf	Canada, CBC NQ SW Service	9625na		
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		China, China Radio Intl	7170eu		
2200	2300		Costa Rica, University Network 13750va			
2200	2300		Eqt Guinea, Radio Africa	15190af		
2200	2300		Germany, Deutsche Welle	7115as		
2200	2300	DRM	Germany, Deutsche Welle	9800va		
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do	
2200	2300		Guyana, Voice of 3291do			
2200	2300		Italy, IRRS 5775va			
2200	2300		Malaysia, RTM/Trax FM	7295as		
2200	2300	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
2200	2300		New Zealand, Radio NZ Intl	15720pa		
2200	2300		Nigeria, Radio/Ibadan	6050do		
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do	
2200	2300		Nigeria, Radio/Lagos	3326do	4990do	
2200	2300		Papua New Guinea, Catholic Radio		4960do	
2200	2300	vl	Papua New Guinea, Wantok R.Light		7120va	
2200	2300	irreg/ vl	Sierra Leone, SLBS 3316do			
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do	
2200	2300	as	Spain, Radio Exterior Espana	6125eu	9595af	
2200	2300		Taiwan, Radio Taiwan Intl	9355eu		
2200	2300		Turkey, Voice of 9830eu			
2200	2300		UK, BBC World Service	5955as	5965as	
			5975as	5990as	6195as	9605af
			9740as	15400af		
2200	2300		USA, Armed Forces Radio/AFRTS		4319usb	
			5446usb	5765usb	6350usb	7590usb
			7812usb	10320usb	12133usb	12579usb
			13362usb	13855usb		
2200	2300		USA, KAIJ Dallas TX	13815na		
2200	2300		USA, KTBN Salt Lake City UT	15590na		
2200	2300	mtwhf	USA, Voice of America	7120va		
2200	2300		USA, Voice of America	6235as	15185va	
			15290va	17740va		
2200	2300		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na	18910na		
2200	2300		USA, WBOH Newport NC	5920am		
2200	2300		USA, WEWN Birmingham AL	7560va	9975va	
			11645va	15745va		
2200	2300		USA, WHRA Greenbush ME	5850na	6195na	
			15665na			
2200	2300		USA, WHRI Noblesville IN	7315am	7490am	
			11885am	15665am		
2200	2300		USA, WINB Red Lion PA	13570am		
2200	2300		USA, WRMI Miami FL	7385am		
2200	2300		USA, WRMI Miami FL	7385am		
2200	2300		USA, WTJC Newport NC	9370na		
2200	2300		USA, WWCR Nashville TN	7465na	9985na	
			12160na	13845na		
2200	2300		USA, WWRB Manchester TN	9385na	11915na	
			15250na			
2200	2300		USA, WYFR Okeechobee FL	11740va	11875va	
			15770va			
2200	2300		Zambia, The Voice-Africa	4965af		
2205	2230		Italy, RAI Intl 6090as			

Start	End	Days	Station			
2230	2257		Czech Rep, Radio Prague Intl	7345na	9415af	
2230	2300	as	Australia, HCJB 15530as			
2230	2300		Guam, AWR/KSDA 15320as			
2230	2300		USA, Voice of America	7230va	13755va	
2230	2300		Vatican City, Vatican Radio	5885as		
2245	2300		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	

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

Start	End	Days	Station			
2300	0000		Anguilla, Caribbean Beacon	6090am		
2300	0000		Australia, ABC NT Alice Springs		2310do	
			4835irr			
2300	0000		Australia, ABC NT Katherine	5025do		
2300	0000		Australia, ABC NT Tennant Creek		4910do	
2300	0000		Australia, Radio	9660pa	12010va	12080pa
			13620as	13630pa	13670va	15230pa
			17785pa	17795pa	21740pa	
2300	0000		Bulgaria, Radio 9700na			
2300	0000	smtwhf	Canada, CBC NQ SW Service 9625na			
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	5915as	5990am	
			6040na	7180as	11970na	
2300	0000		Costa Rica, University Network 9725va			
2300	0000		Cuba, Radio Havana	9550am		
2300	0000		Egypt, Radio Cairo 11885na			
2300	0000		Germany, Deutsche Welle	5955as	9890as	
			15135as	17860as		
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do	
2300	0000		Guyana, Voice of 3291do			
2300	0000		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
2300	0000		Malaysia, RTM/Trax FM	7295as		
2300	0000	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
2300	0000		New Zealand, Radio NZ Intl	15720pa		
2300	0000		Papua New Guinea, Catholic Radio		4960do	
2300	0000		Papua New Guinea, NBC	9675do		
2300	0000	vl	Papua New Guinea, Wantok R.Light		7120va	
2300	0000	irreg/ vl	Sierra Leone, SLBS 3316do			
2300	0000		Singapore, MediaCorp Radio	6150do		
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do	
2300	0000		UK, BBC World Service	3915as	5965as	
			6195as	9605as	9740as	11945as
			11955as			
2300	0000		USA, Armed Forces Radio/AFRTS		4319usb	
			5446usb	5765usb	6350usb	7590usb
			7812usb	10320usb	12133usb	12579usb
			13362usb	13855usb		
2300	0000		USA, KAIJ Dallas TX	13815na		
2300	0000		USA, KTBN Salt Lake City UT	15590na		
2300	0000		USA, Voice of America	6180va	7205va	
			11655va	15150va		
2300	0000	mtwhf	USA, Voice of America	7120va		
2300	0000		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na			
2300	0000		USA, WBOH Newport NC	5920am		
2300	0000		USA, WEWN Birmingham AL	7540va	7560va	
			9975va	11830va		
2300	0000		USA, WHRA Greenbush ME	5850na	6195na	
2300	0000		USA, WHRI Noblesville IN	7315am	7490am	
			15665am			
2300	0000		USA, WINB Red Lion PA	9265am		
2300	0000	mtwhf	USA, WRMI Miami FL	7385am		
2300	0000	as	USA, WRMI Miami FL	9955am		
2300	0000		USA, WTJC Newport NC	9370na		
2300	0000		USA, WWCR Nashville TN	5070na	7465na	
			9985na	13845na		
2300	0000		USA, WWRB Manchester TN	3270na		
2300	0000		USA, WYFR Okeechobee FL	11740am	11875am	
			15255am	17750am		
2300	2315		Nigeria, Radio/Kaduna	4770do	6090do	
2300	2315		Nigeria, Radio/Lagos	3326do		
2300	2330		Australia, Radio	15240as		
2300	2356		Romania, Radio Romania Intl	7105eu	9610na	
			9640eu	11730na		
2315	2330	vl	Croatia, Croatian Radio	7285va		
2330	0000		Australia, Radio	15415as	17750as	
2330	0000		Burma, Dem Voice of Burma	5955eu		
2330	0000		Lithuania, Radio Vilnius	7325na		
2330	0000		UK, BBC World Service	3915as	5965as	
			6035as	6170as	6195as	9605as
			9740as	11945as	11955as	
2330	0000		USA, Voice of America	6180va	7205va	
			11655va	13640va	15150va	
2335	0000	sm	Austria, Radio Austria Intl	9870sa		
2345	2358	twhfa	Austria, Radio Austria Intl	9870sa		

Hurricane Hunting on HF

The record breaking 2005 hurricane season is one we will all long remember. In 2005 it was amazing that we ran through the normal National Hurricane Center name list for the Atlantic basin and had to dip into the Greek alphabet for storm names towards the end of the season.

But the stark reality is the fact that the 2006 Atlantic basin season starts on the first day of June (just days away from now). So it is time to dust off the HF rigs and get ready to gear up for what forecasters say will be another busy season.

One of the main players on HF is the United States Coast Guard. They transmit a wide variety of weather and navigation information from several of their major communications facilities around the country.

In our *Milcom* column this month we present our guide to U.S. Coast Guard HF marine communications frequencies. Note: All frequencies are in kHz/times are UTC.

HF DISTRESS AND SAFETY WATCHKEEPING SCHEDULE

HF RADIOTELEPHONE (Single Sideband)
– Distress and Initial Contact
Authorized for the handling of distress message traffic and initial contact with Coast Guard Long Range Communication facilities (Frequencies in this section are for both ship/coast stations).

Stations NMF/NMN/NMA/NMG

4125.0	2300-1100
6215.0/8291.0	24 Hours
12290.0	1100-2300

Station NMC

4125.0/6215.0/ 8291.0/12290.0	All are 24 Hours

Station NMO

4125.0	0600-1800
6215.0	24 Hours
8291.0	24 Hours
12290.0	1800-0600

Station NOJ

4125.0/6215.0	24 Hours

Station NRV

6215.0	0900-2100
12290.0	2100-0900

Note: 8291.0 and 12290.0 kHz are available under NOJ upon request. 16420.0 kHz is available at all stations upon request.

HF RADIOTELPHONE (USB) - Working Channels
These channels are available at all Coast Guard Long Range Communication Facilities for traffic handling purposes after initial contact is established on the HF Radiotelephone (Single Sideband) - Distress and Initial Contact frequencies.

Chan	Ship	Coast	Schedule
424	4134.0	4426.0	
601	6200.0	6501.0	
816	8240.0	8764.0	
1205	12242.0	13089.0	
1625	16432.0	17314.0	

HF RADIOTELEX
(SITOR or narrow band direct printing)

NMN

Chan	Coast	Ship	Schedule
404	4212.0	4174.0	On request
604	6316.0	6264.5	2300-1100
824	8428.0	8388.0	24 Hours
1227	12592.5	12490.0	24 Hours
1627	16819.5	16696.5	24 Hours
2227	22389.5	22297.5	1100-2300

NMO

Chan	Coast	Ship	Schedule
404	4212.0	4174.0	On request
604	6316.0	6264.5	On request
827	8429.5	8389.5	24 Hours
1220	12589.0	12486.5	24 Hours
1627	16819.5	16696.5	On request
2227	22389.5	22297.5	Daytime

NMC

Chan	Coast	Ship	Schedule
412	4215.5	4178.0	On request
620	6323.5	6272.5	Nighttime
820	8426.0	8386.0	24 Hours
1242	12600.0	12497.5	On request
1620	16816.5	16693.0	Daytime
2220	22386.0	22294.0	On request

NMC using Guam remote transmitter/ receiver control (NRV)

	Coast	Ship	Schedule
412	4215.5	4178.0	On request
612	6319.5	6268.5	On request
812	8422.0	8382.0	Nighttime
1212	12585.0	12482.5	24 Hours
1612	16812.5	16689.0	24 Hours
2212	22382.0	22290.0	Daytime

NOJ remoted from NMC Pt. Reyes CA

	Coast	Ship	Schedule
407	4213.5	4175.5	Nighttime
607	6317.5	6266.0	24 Hours
807	8419.5	8379.5	Daytime

HF DIGITAL SELECTIVE CALLING (DSC)
2187.5   4207.5   6312.0   8414.5   12577.0   16804.5

RADIO FACSIMILE BROADCASTS
High seas weather maps

NMF
4235.0 (0200, 0800) 6340.5 9110.0 12750.0 (1400)
Start Broadcast: 0230 0745 1400 1720 1900
Broadcast Schedule: 0243 1405
International Ice Patrol (Seasonal Feb- Sep)
Call Letters: NIK 1600 1810

NMG
4317.9 8503.9 12789.9 17146.4 (1200, 1800)
Inoperable at the present time due to hurricane Katrina damage
Start Broadcast: 0000 0600 1200 1800
Broadcast Schedule: 2025

NOJ
2054.0 (1000, 1800) 4298.0 8459.0 12412.5 (0400, 2200)
Start Broadcast: 0400 0950 1600 2150
Broadcast Schedule: 1727
Note: All frequencies may be broadcast simultaneously at times

NMC
4346.0 (except 1900, 2300) 8682.0 12786.0 17151.2 22527.0 (1900, 2300)
Start Broadcast: 0140 0655 1120 1400 1840 2320

Broadcast Schedule: 1124 2324

KVM70
9982.5 (0533-1630) 11090.0 (Continuous) 16135.0 (1733-0437)
Start Broadcast: 0533 1030 1733 2230
Broadcast Schedule: 1045 2018
Note: This is a DoD station, not USCG.

HF SITOR-B NARROWBAND DIRECT PRINTING
Broadcast of high seas and offshore forecasts in text form.

NMF
6314.0 (0000, 0100) 8416.5 12579.0 16806.5 (1200, 1600)
Start Broadcast: 0140 1630
Ice (Seasonal Feb-Sep): 0030* 1218*
* International Ice Patrol, call letters NIK, no weather

NMC
8416.5 16806.5
Start Broadcast: 0015 1730

NMO
8416.5 12579.0 22376.0
Start (8/12/22 MHz): 0130 2030
(8/12 MHz): 0730 1330

NRV
12579.0 16806.5 22376.0
Start Broadcast 0230** 0500 0900** 1500 1900 2315
**HYDROPAC navigation message, no weather

HF HIGH SEAS VOICE BROADCAST
Broadcast of high seas forecasts and storm warnings via USB radio

NMN
4426.0 6501.0 8764.0 13089.0 17314.0
Start (4/6/8 MHz): 0330* 0515** 0930*
(6/8/13 MHz): 1115** 1530* 2130* 2315**
(8/13/17 MHz): 1715**
* Offshore Forecasts, hurricane information
** Highseas Forecast, hurricane information

NMG
4316.0 8502.0 12788.0
Start Broadcast: 0330* 0515** 0930* 1115** 1530* 1715** 2130* 2315*
* Offshore Forecasts, hurricane information
** Highseas Forecast, hurricane information

NMC
4426.0 8764.0 13089.0 17314.0
Start (4/8/13 MHz): 0430 1030
(8/13/17 MHz): 1630 2230

NOJ
6501.0
Start Broadcast: 0203 1645

NMO
6501.0 8764.0 13089.0
Start Broadcast (6/8 MHz): 0600 1200
(8/13 MHz): 0005 1800

NRV
6501.0 13089.0
Start Broadcast (6 MHz): 0930 1530
(13 MHz): 0330 2130

Note: HF voice broadcasts may be terminated if longer than the available broadcast period. This will most likely occur during the 0515, 1115, 1715 and 2315 UTC broadcast cycles from station NMG during the hurricane season, when supplementary

advisories are broadcast in addition to the routine forecasts. These broadcasts are simulcast from station NMN as an alternative. HF voice broadcasts use synthesized voice (Perfect Paul).

U.S. Coast Guard Communication Stations

NMN   Communications Area Master Station Atlantic (CAMSLANT), Chesapeake VA
NMF   Communications Area Master Station Atlantic, remotely keying transmitters at Boston, MA
NMA   Communications Area Master Station Atlantic, remotely keying transmitters at Miami, FL
NMG   Communications Area Master Station Atlantic, remotely keying transmitters at New Orleans, LA
NMC   Communications Area Master Station Pacific (CAMSPAC), Pt. Reyes CA
NRV   Communications Area Master Station Pacific, remotely keying transmitters at Guam
NMO   Communications Area Master Station Pacific, remotely keying transmitters at Honolulu HI
NOJ   Communications Station Kodiak AK
NRV   Marianas Section Guam

National Weather Service Marine Products via USCG MF Voice
2182.0 kHz   Present calling frequency
2187.5 kHz   Future calling frequency
2670.0 kHz

The U.S. Coast Guard broadcasts National Weather Service offshore forecasts and storm warnings of interest to the mariner on 2670 kHz following an initial announcement on 2182 kHz. Typical transmission range is 50-150 nautical miles during the day and 150-300 nautical miles at night. These broadcasts are prepared by the Ocean Prediction Center, Tropical Prediction Center, Anchorage Forecast Office and Honolulu Forecast Office. In the state of Alaska, medium frequency voice broadcasts are performed from National Weather Service Forecast Offices on a MF/HF frequency of 4125 kHz.

FIRST COAST GUARD DISTRICT   SCHEDULE
NMF44   Group Southwest Harbor   1135   2335
NMF31   Group Portland   1105   2305
NMF7   Group Boston   1035   2235
NMF2   Group Woods Hole   0440   1640
NMY42   Group Moriches   0010   1210

FIFTH COAST GUARD DISTRICT
NMK2   Group Atlantic City   1103   2203
NMN70   Group Eastern Shore   0233   1403
NMN80   Group Hampton Roads   0203   1333
NMN13   Group Cape Hatteras   0133   1303
NMN37   Group Fort Macon   0103   1233

SEVENTH COAST GUARD DISTRICT
NMB   Group Charleston   0420   1620
NMV   Group Mayport   0620   1820
NMA   Group Miami   0350   1550
NMR   Greater Antilles Section   0305   1505
NME   Group St. Petersburg   0320   1420

EIGHTH COAST GUARD DISTRICT
NOQ   Group Mobile   1020   1220   1620
                            2220
NMG2   Group New Orleans   0550   1035   1235
                            1635   2235
NOY   Group Galveston   1050   1250   1650
                            2250
NOY8   Group Corpus Christi 1040 1240   1640
                            2240

ELEVENTH COAST GUARD DISTRICT
NMC6   Group Humboldt Bay   0303   1503
NMC17   Group San Francisco   0203   1403
NMQ   Group Los Angeles/Long Beach   0503
                            1303   2103

THIRTEENTH COAST GUARD DISTRICT
NOW   Group Port Angeles   0615   1815
NMW   Group Astoria   0533   1733
NOE   Group North Bend   0603   1803

FOURTEENTH COAST GUARD DISTRICT
NMO2   Group Honolulu   0545   1145   1745
                            2345
NRV   Marianas Section   0705   2205

What's in a Name?

Oh yes, and what hurricane names will you see in the news this year? Here is the list of 2006 hurricane names from the hurricane center website at **http://www.nhc.noaa.gov/.**
Alberto, Beryl, Chris, Debby, Ernesto, Florence, Gordon, Helene, Isaac, Joyce, Kirk, Leslie, Michael, Nadine, Oscar, Patty, Rafael, Sandy, Tony, Valerie, and William

FAA ARTCC Frequency List

In this month's FAA Air Route Traffic Control Center report we are going to take a look at the Salt Lake Center frequencies in Table One. For the background on the Air Route Traffic Control Centers, check out our *Milcom* column in the June 2005 issue of *MT*.

So, until next month, 73 and good hunting.

SALT LAKE CITY ARTCC Frequency List

Ashton, ID
128.350/381.600   Low /High Discrete: Approach/Departure Services
132.400/338.300   Low/High

Baker, OR
128.050/387.150   Low Discrete: Approach/Departure Services

Battle Mountain, NV
128.725/352.000   High
132.250/338.350   Low Discrete: Approach/Departure Services
380.050   Low Discrete: Aerial Refueling

Big Piney, WY
128.350/381.600   Low/High Discrete: Approach/Departure Services

Billings, MT
127.750/351.900   Low/High Discrete: Approach/Departure Services

Blackfoot, ID
128.350/381.600   Low/High Discrete: Approach/Departure Services
364.800   High: Tactical Support Use Frequency (FL450 and above) (Amber 3)

Bliss, ID
118.050/363.000   Low Discrete: Approach/Departure Services
128.550/397.900   Low

Boise, ID
118.050/269.050   Low Discrete

Bozeman, MT
132.400/338.300   Low/High Discrete: Approach/Departure Services

Bryce Canyon, UT
133.600/269.250   Low Discrete

Burley, ID
118.050/363.000   Low Discrete: Approach/Departure Services

Butte, MT
132.400/338.300   Low/High: Approach/Departure Services
133.400/285.400   Low/High Discrete: Approach/Departure Services
364.800   High: Tactical Support Use Frequency (FL450 and above) (Amber 3)

Cascade, ID
121.150/399.000   High

Cedar City, UT
125.575/381.450   Low/High
243.000   High: Military Emergency
364.800   High: Tactical Support Use Frequency (FL450 and above) (Amber 3)

Delle, UT
128.550/380.050   Low/High Discrete
132.025/385.550   Low
243.000   Low/High: Military Emergency

Delta, UT
125.575/381.450   Low
370.850   Low Discrete

Elko, NV
128.725/352.000   High
132.250/338.350   Low Discrete
364.800   High: Tactical Support Use Frequency (FL450 and above) (Amber 3)
380.050   Low Discrete: Aerial Refueling

Ely, NV
133.450/317.625   Low Discrete: Approach/Departure Services

Fairfield, UT
133.900/370.850   Low Discrete

Francis Peak, UT
119.950/377.150   High Discrete: Approach/Departure Services
127.700/387.050   Low Discrete: Approach/Departure Services
135.775/257.700   Low
364.800   High: Tactical Support Use Frequency (FL450 and above) (Amber 3)

Glasgow, MT
126.850/305.200   Low/High Discrete: Approach/Departure Services

Great Falls, MT
132.425/319.000   High
133.400/285.400   Low/High Discrete: Approach/Departure Services

Green River, WY
124.350/353.500   Low/High Discrete: Approach/Departure Services

Hanksville, UT
133.600/269.250   Low/High Discrete: Approach/Departure Services

Jackson, WY
133.250/285.600   Low/High Discrete: Approach/Departure Services

Judith Mountain, MT
126.850/305.200   Low/High
133.400/285.400   Low/High Discrete

Lakeside, MT
119.750/251.150   Low/High Discrete: Approach/Departure Services
133.400/285.400   Low: Approach/Departure Services

Lovell, WY
133.250/285.600   Low/High Discrete: Approach/Departure Services

Malad City, ID
126.750/379.250   Low/High Discrete

Miles City, MT
126.850/305.200   Low/High Discrete
364.800   High: Tactical Support Use Frequency (FL450 and above) (Amber 3)

Missoula, MT
119.750/251.150   Low/High Discrete
133.400/285.400   Low: Approach/Departure Services

Myton, UT
119.950/377.150   Low Discrete
135.775/257.700   High

Rome, OR
121.150/379.100   High Discrete
128.050/387.150   Low Discrete

Salmon, ID
132.400/338.300   Low/High: Approach/Departure Services

Salt Lake City
121.500   Low/High: Civilian Emergency

Sheridan, WY
127.750/351.900   Low/High Discrete

Squaw Butte, ID
128.050/387.150   Low Discrete: Approach/Departure Services
121.150/399.000   High
364.800   High: Tactical Support Use Frequency (FL450 and above) (Amber 3)

Sunnyside, UT
125.575/381.450   Low Discrete
127.925/380.350   Low/High
133.900/370.850   Low Discrete: Approach/Departure Services

Thermopolis, WY
124.350/353.500   Low/High
133.250/285.600   Low/High Discrete: Approach/Departure Services
364.800   High: Tactical Support Use Frequency (FL450 and above) (Amber 3)

Tonopah, NV
133.450/317.625   Low/High Discrete: Approach/Departure Services
243.000   Low/High: Military Emergency

Watford City, ND
126.850/305.200   Low/High Discrete: Approach/Departure Services

Wilson Creek, NV
127.925/380.350   Low/High Discrete
133.450/317.625   Low/High Discrete
134.525/278.100   High
327.050   High

Winnemucca, NV
132.250/380.050   Low Discrete: Approach/Departure Services
338.250   Low Discrete
Additional frequencies monitored (RCAG unknown)
306.100

Federal Fire and "ICE"

Forest and wild land fire fighting involves many agencies of both the federal government and local fire protection agencies. In a major fire event, you will find both federal and local public safety frequencies being used by all the participating agencies. Interoperability is extremely important during these fires.

On the federal side, many different agencies can be involved in firefighting. The National Interagency Fire Center (NIFC), the Bureau of Land Management (BLM), the US Fish and Wildlife Service (USFW), the National Park Service (NPS), the US Forest Service (USFS) and the Bureau of Indian Affairs (BIA) are among the active participants in federal response to fires.

As with all other federal agencies, the Forest Service, BLM and others are switching to narrow band and digital technology for their new radio systems. As of 2006, all of the radios provided by the National Interagency Incident Communications Division (NIICD) are narrow-band. The new radios are APCO P-25 digital capable, but so far the digital mode is not required. You can find out more about the NIICD radio equipment at **http://www.fs.fed.us/fire/niicd/index.html**.

Table One is a list of possible frequencies used for forest fire operations. Note that some of the frequencies may be used by more than one agency. Despite the large number of possible frequencies that may be used, there are some that you should listen to at any fire. 168.3500 MHz is usually used as an *Interagency Common* channel and 168.5500 MHz is used as an *Initial Contact* frequency for agencies inbound to a fire area. 168.6250 MHz is officially known as the *National Flight Following* frequency and 168.6500 MHz is known as the *Air Safety Common* frequency.

TABLE ONE: FEDERAL FIRE FREQUENCIES

USFS = US Forest Service, Department of Agriculture
BLM = Bureau of Land Management, Department of the Interior
NIFC = National Interagency Fire Center

Freq	Agency	Freq	Agency
162.0250	USFS	163.9125	USFS, BLM
162.2250	USFS	163.9375	BLM
162.6125	USFS	163.9875	BLM
163.0000	USFS	164.0250	USFS
163.0250	BLM	164.1000	USFS, BLM
163.0500	USFS, BLM	164.1250	USFS
163.0750	BLM	164.1500	USFS, BLM
163.1000	NIFC	164.1750	USFS
163.1250	BLM	164.2000	BLM
163.1500	BLM	164.3750	USFS
163.1750	USFS, BLM	164.4375	BLM
163.3750	BLM	164.4625	BLM
163.5375	USFS	164.4875	BLM
163.7500	BLM	164.5125	BLM
163.8375	USFS, BLM	164.5250	BLM
163.8625	USFS, BLM	164.5375	BLM
163.8875	USFS, BLM	164.5500	BLM

Freq	Agency	Freq	Agency	Freq	Agency	Freq	Agency
164.5625	BLM	167.4500	USFS	169.9375	USFS	173.9625	USFS
164.5750	BLM	167.8250	BLM	169.9500	USFS	173.9875	USFS
164.5875	BLM	167.9000	BLM	169.9750	USFS	406.1500	BLM
164.6000	USFS	167.9500	BLM, NIFC	169.9875	USFS	406.2250	USFS, BLM
164.6125	BLM	168.0250	USFS, NIFC	170.0000	USFS, NIFC	406.2500	USFS
164.6250	USFS	168.0500	USFS, BLM, NIFC	170.0250	BLM	406.2750	USFS, BLM
164.6375	BLM	168.0625	USFS	170.0500	USFS, BLM	406.3000	USFS
164.6625	BLM	168.0750	USFS, BLM, NIFC	170.1000	USFS, BLM	406.3125	USFS
164.6750	BLM	168.0875	USFS	170.1250	USFS	406.3250	USFS
164.6875	BLM	168.1000	USFS, BLM, NIFC	170.1500	USFS	406.3500	USFS
164.7000	USFS	168.1250	USFS	170.1750	USFS	406.3750	USFS, BLM
164.7125	BLM	168.1500	USFS, BLM	170.3500	USFS	406.4000	USFS, BLM
164.8000	USFS, BLM	168.1750	USFS, BLM	170.3750	USFS	406.4250	USFS, BLM
164.8250	USFS	168.2000	USFS, BLM, NIFC	170.4250	USFS, BLM, NIFC	406.4500	USFS, BLM
164.9125	USFS	168.2250	BLM	170.4375	USFS	406.4750	USFS
164.9250	USFS	168.2500	BLM, NIFC	170.4500	USFS, BLM, NIFC	406.4875	USFS
164.9375	USFS, BLM	168.2750	BLM	170.4625	USFS	406.5000	USFS, BLM
164.9625	USFS	168.3000	BLM	170.4750	USFS	406.5250	USFS
164.9750	USFS	168.3250	USFS	170.4875	USFS	406.5500	USFS
164.9875	USFS	168.3500	NIFC	170.5000	USFS	406.5750	USFS
165.0375	USFS	168.3750	BLM	170.5125	USFS	407.0125	USFS
165.0875	USFS	168.4000	BLM, NIFC	170.5250	USFS	407.1250	BLM
165.2625	USFS	168.4250	BLM	170.5375	USFS	407.5375	USFS
165.4125	USFS	168.4750	BLM, NIFC	170.5500	USFS	407.8500	USFS
165.5125	USFS	168.5250	BLM	170.5750	USFS	408.2250	BLM
165.9750	BLM	168.5500	BLM, NIFC	170.6000	USFS	408.2750	BLM
166.0000	USFS	168.5750	BLM	170.7000	USFS	408.3000	BLM
166.1250	USFS	168.6000	USFS, BLM, NIFC	170.7500	USFS	408.3500	BLM
166.1500	BLM	168.6250	USFS, BLM, NIFC	170.9750	USFS, BLM, NIFC	408.3750	BLM
166.2000	USFS, BLM	168.6375	USFS	171.1500	USFS	408.4250	BLM
166.2250	USFS	168.6500	USFS, NIFC	171.4250	USFS	408.4250	BLM
166.2500	USFS	168.6750	USFS, BLM	171.4500	USFS	408.4750	BLM
166.3000	BLM	168.7000	USFS, BLM, NIFC	171.4750	USFS	408.5000	BLM
166.3250	BLM	168.7125	USFS	171.5000	USFS	408.5250	BLM
166.3500	BLM	168.7250	USFS	171.5250	USFS	408.5750	BLM
166.3750	USFS, BLM	168.7375	USFS	171.5500	USFS	408.6250	BLM
166.4875	USFS, BLM	168.7500	USFS, BLM	171.5750	USFS, BLM	408.6250	BLM
166.5625	USFS	168.7625	USFS	171.6000	USFS	408.6500	USFS
166.5750	USFS	168.7750	USFS, BLM	171.6750	BLM	408.7250	BLM
166.5875	USFS	168.8500	BLM	171.7000	USFS, BLM	408.7750	BLM
166.6125	BLM, NIFC	168.9750	BLM	171.7250	BLM	408.8000	BLM
166.6375	BLM	169.0000	BLM	171.9750	USFS	408.8250	BLM
166.6750	USFS, NIFC	169.0250	USFS, BLM	172.0750	USFS	408.8500	BLM
166.7250	BLM, NIFC	169.0750	USFS, BLM	172.2000	USFS	408.8750	BLM
166.7375	BLM	169.1000	USFS	172.2250	USFS	408.9000	USFS
166.7500	BLM	169.1250	USFS	172.2375	USFS	408.9250	BLM
166.7625	BLM	169.1375	USFS	172.2500	USFS	408.9750	BLM
166.7750	BLM, NIFC	169.1500	USFS, NIFC	172.2625	USFS	409.1500	USFS
166.8000	BLM	169.1625	USFS	172.2750	USFS, BLM	409.2250	USFS
166.8125	BLM	169.1750	USFS, BLM	172.2875	USFS	409.3250	BLM
166.8250	BLM	169.1875	USFS	172.3000	USFS	409.6000	USFS
166.8375	BLM	169.2000	USFS, NIFC	172.3125	USFS	409.6500	USFS
166.8500	BLM	169.2250	BLM	172.3250	USFS	409.7000	USFS
166.8625	BLM	169.2500	BLM	172.3375	USFS	410.0000	BLM
166.8750	BLM	169.3250	USFS, BLM	172.3500	USFS	410.1250	BLM
166.8875	BLM	169.3500	BLM, NIFC	172.3625	USFS	410.1500	USFS, BLM
166.9000	BLM	169.4000	USFS, BLM, NIFC	172.3750	USFS, BLM	410.2000	USFS
166.9125	BLM	169.5500	BLM	172.3875	USFS	410.2750	USFS
166.9250	BLM	169.5500	USFS	172.4000	USFS	410.4000	USFS
166.9375	BLM	169.5750	USFS	172.4250	USFS	410.6000	BLM
166.9625	BLM	169.6000	USFS	172.5000	USFS, BLM	410.6500	USFS
166.9750	USFS, BLM	169.6250	USFS, BLM	172.5750	BLM	410.6750	BLM
166.9875	BLM	169.6500	BLM	172.6000	BLM	410.7750	USFS, BLM, NIFC
167.0125	BLM	169.6750	USFS	172.6250	BLM	410.8250	BLM
167.0250	BLM	169.7000	BLM	172.7250	BLM	410.8500	BLM
167.0375	BLM	169.7250	USFS	172.7500	BLM	410.8750	BLM
167.0625	BLM	169.7500	BLM, NIFC	172.7750	BLM	410.9500	BLM
167.0750	BLM	169.7750	USFS, BLM	173.0250	USFS	410.9750	BLM
167.0875	BLM	169.8000	USFS, BLM	173.0500	USFS	411.2250	USFS
167.1000	BLM, NIFC	169.8250	BLM	173.3375	USFS	411.2500	USFS
167.1125	BLM	169.8750	USFS	173.7625	USFS, BLM	411.2750	USFS
167.1375	BLM	169.8875	USFS	173.7875	USFS	411.3000	USFS
167.1500	BLM	169.9000	USFS, BLM	173.8125	BLM, NIFC	411.3125	USFS
167.1625	BLM	169.9125	USFS	173.8625	BLM	411.3250	USFS
167.1750	BLM	169.9250	USFS	173.9125	USFS	411.3500	USFS

411.3750	USFS	415.4875	USFS
411.4000	USFS, BLM, NIFC	415.5000	USFS, BLM, NIFC
411.4250	USFS	415.5250	USFS
411.4500	USFS	415.5500	USFS
411.4750	USFS	415.5750	USFS
411.4875	USFS	416.0125	USFS
411.5000	USFS, NIFC	416.1250	BLM
411.5250	USFS, BLM	416.5375	USFS
411.5500	USFS	416.8500	USFS
411.5750	USFS	417.2250	BLM
411.6250	BLM	417.2750	BLM
411.6750	BLM	417.3000	BLM, NIFC
411.7500	BLM, NIFC	417.3500	BLM, NIFC
411.8250	BLM	417.3750	BLM
411.8750	BLM	417.4250	BLM
411.9250	BLM, NIFC	417.4500	BLM
411.9500	USFS	417.5000	BLM, NIFC
412.0250	BLM	417.5250	BLM
412.0500	BLM	417.5750	BLM
412.0750	BLM	417.6250	BLM
412.1000	BLM	417.6500	USFS
412.1250	BLM	417.7250	USFS
412.1500	BLM, NIFC	417.7750	BLM
412.2000	BLM, NIFC	417.8000	BLM, NIFC
412.2250	BLM	417.8250	BLM
412.2500	BLM	417.8500	BLM
412.3000	BLM	417.8750	BLM
412.3750	BLM	417.9000	USFS
412.4000	USFS	417.9250	BLM
412.6000	USFS	417.9750	BLM
412.8000	USFS	418.1500	USFS
413.9000	USFS	418.2250	USFS
414.6500	USFS, BLM, NIFC	418.3250	BLM
414.8250	BLM	418.6000	USFS
414.8750	BLM	418.6500	USFS
414.9250	BLM	418.7000	USFS
414.9750	BLM	419.0000	BLM
415.0250	BLM	419.1250	BLM
415.0750	BLM	419.1500	USFS, BLM
415.1500	BLM	419.2000	USFS
415.2250	USFS, BLM	419.2750	USFS
415.2500	USFS	419.4000	USFS
415.2750	USFS, BLM	419.6000	BLM
415.3000	USFS	419.6500	USFS
415.3125	USFS	419.6750	BLM
415.3250	USFS	419.7750	USFS, BLM
415.3500	USFS	419.8250	BLM
415.3750	USFS, BLM	419.8500	BLM
415.4000	USFS, BLM, NIFC	419.8750	BLM
415.4250	USFS, BLM	419.9500	BLM
415.4500	USFS, BLM	419.9750	BLM
415.4750	USFS		

In addition to these VHF and UHF land mobile frequencies, be sure to search out VHF aircraft frequencies that may be used. Fighting forest fires involves many airborne assets of the federal government and they usually have some operational and tactical VHF AM air band frequencies in use. Don't forget to search in the 136 to 138 MHz extended aircraft band for some air-to-air or air-to-ground communications. Also, the FAA authorizes Temporary Flight Restrictions or TFRs over areas involved in fires. You can find current fire TFRs at this site, **http://airspace.nifc.gov/ mapping/nifc/index.cfm**.

❖ Federal Protective Service

The Federal Protective Service has been a recent topic of discussion on some web sites and Internet mail lists, so here is an update. The Federal Protective Service, formerly part of the General Services Administration, is now part of the Department of Homeland Security under ICE (Immigration and Cus-

toms Enforcement), and you can find out more about them at their web site, **www. ice.gov/graphics/fps/ index.htm**. They provide police protection to federal buildings, property and special events. They are dispatched from several "Mega Centers" located in Denver, Philadelphia, and the Suitland, Maryland area.
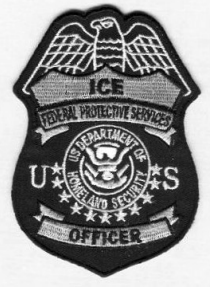
The FPS frequencies in my area of the Pacific Northwest went to P-25 digital a couple of years ago, but many cities still operate with analog radio equipment. The most popular FPS frequencies used to be 415.2000 MHz and 417.2000 MHz, but with the apparent re-farming of the UHF federal band, these frequencies have changed in some areas. Here's a list of possible FPS frequencies (MHz) for you to try:

```
406.4125 407.1750 407.2125 407.3625
408.2000 408.5375 412.7000 413.6500
413.8750 415.1750 415.2000 416.0250
417.2000 417.2500 417.4250 417.6500
419.1500  419.1750  419.6500
419.8750
```

In Atlanta and Denver, the Federal Protective Service has started using wide-area UHF trunking systems for their operations. The Atlanta trunked system was mentioned in the July 2005 *Fed Files* and recently listeners in Atlanta have found that Dobbins Air Reserve Base is also using this system. Here are the frequencies:

System ID 750d
Site 1 – 406.4125, 407.2125, 408.5375, 410.1250
Site 2 – 406.5625, 407.1625, 408.5625, 410.3625, 410.5625
Site 3 – 407.3625, 408.3625, 408.7625, 409.3625, 410.7625
Site 4 – 406.7625, 406.9625, 407.5625, 407.8625, 408.9625

The Denver trunking system is often mistakenly referred to as the "Buckley" system, as many listeners originally thought it was built for the Buckley ANG Base in

Aurora, Colorado. In fact this is a wide area federal trunked system being managed by the FPS for use all along the front-range and Denver area. Buckley ANG Base is a user of this system and can be heard using the Site 1 frequencies. Here are the particulars of the Denver FPS system:

System ID 8D34
Site 1 – 406.5000, 406.9750, 408.7500, 409.4000, 410.5500
Site 2 – 406.7750, 407.1250, 407.8125, 408.4250, 408.7750
Site 3 – 406.9875, 408.2750, 409.0250, 409.9250, 410.4250
Site 4 – 407.0000, 408.4500, 410.6500

❖ TSA Follow Up

In the March *Fed Files* I mentioned that there are some new frequencies being used by the Transportation Security Administration. I was recently in the Dallas, Texas, area and was able to personally confirm one of these frequencies. 169.1625 MHz is a new repeater being used by the TSA at the DFW airport; the input to this repeater is 165.0750 MHz. The Radio Reference web site is also listing 169.1875 MHz as a TSA frequency at DFW airport, but I was unable to confirm that.

If you've run across any other new or unusual frequencies at your local airport (or anywhere else for that matter), be sure and let us know at the *Fed Files*! See you in July!

Tracking Domestic Airliners

How can a domestic airliner in flight be tracked by listening to its radio traffic? Can information from the Internet help? Yes, and yes, and you can do it with practice, patience, and careful listening – and for free. This aspect of the hobby can present some interesting and entertaining challenges. Let's get started!

❖ Instrument Flight Rules (IFR)

Airliners must file a flight plan and fly IFR. Pilots flying IFR must be able to fly by instruments alone, if the need arises, without looking out the window. Airliners must also be in contact with Air Traffic Controllers from before they start to taxi until they pull up to the gate at the destination airport. This allows you, the listener, to follow along with them from controller to controller and from airspace sector to airspace sector, as long as they are within your listening range. Your area terrain and, to a large extent, the height and quality of your antenna system will determine how far you can receive.

❖ Starting with a Commercial Airport

If you are fortunate enough to live where you are able to receive the ground-side communications from a commercial airport, you can select an airliner to follow before it departs. First, find the airport and its frequencies at **www.airnav.com/airports/** and make sure that the Clearance Delivery, Ground Control, Tower, and Departure frequencies are programmed into your scanner and that you are able to receive the aircraft on the ground and the controllers.
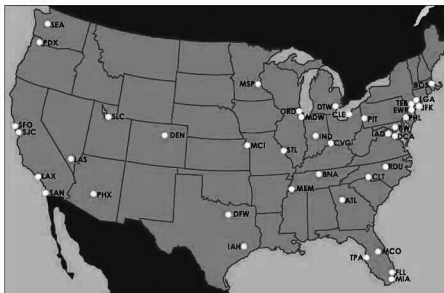
Flight delay information can be useful when tracking and airliner. At **www.fly.faa.gov/fly-faa/usmap.jsp** *the country, or a region, can be selected and with the latter showing more airports. Hover over an airport for basic info. Click on it for full info. Courtesy of FAA - Air Traffic Control System Command Center*

When airliners and cargo aircraft are making preparations to depart, they will come up on the Clearance Delivery or Ground Control frequency to briefly discuss their departure route with the controller. Some airports transmit simultaneously on both these frequencies and some don't, or it varies over the course of the day depending on activity. Some brief listening will help you to determine where the Clearance Delivery function can be found. Keep in mind that the Departure frequency will be called out during this rapid verbal exchange. Sometimes the initial departure direction is different from what you might expect, so go by what the Clearance Delivery / Ground Controller says – which the pilot will read back.

When picking an aircraft to follow, write down the call sign, such as "Alaska 477." During periods of heavy radio traffic, you will have to listen carefully for the call sign of your selected plane. It will be mixed in with many others and it can become confusing.

In our example, "Alaska" is Alaska Airlines and 477 is the flight number. Some are not so obvious and may be totally different from the airline name. To decode such call signs, go to **www.faa.gov/ATPubs/CNT/3-3.htm** *Section 2 by Telephony,* or see FlightAware below for another option.

If the pilot used the Clearance Delivery frequency for that function, rather than the Ground Control frequency, he/she will be told when to contact "Ground." Ground Control, in any case, will eventually issue taxi instructions directing the pilot to near the end of the runway.

Once the taxi instructions have been issued – such as, "Southwest twelve twelve, taxi to runway one six right" – switch to the Tower frequency, since there may or may not be a radio handoff to the Tower.

Not long after the plane leaves the runway, the Tower will say "Contact Departure," at which time you quickly change to the Departure frequency mentioned in the Clearance Delivery phase so that you can be on frequency when the pilot checks in. Each time the plane goes to a new frequency, so do

you. In order to reduce confusion, you need to silence each of the previous frequencies as soon as the plane you are following is no longer using them.

❖ FlightAware.com

There are Internet sites that offer airline departure and arrival schedules. FlightAware **http://flightaware.com/** works well and has excellent features, including route-tracking graphics.

On the left, enter a three or four-letter airport code in the "Airport Code" box and click on "View Airport Activity." You will see lists for "Arrivals," "En Route/Scheduled," "Departures," as well as "Scheduled Departures," all on one page. You can save the links for your favorite airports which lets you bring them up easily later. Click on the map and it will start a larger one that updates and shows multiple tracks for that airport area. Even a small non-commercial airport can be entered and will show area airliner traffic.

From among the flights listed in the "Ident" column, hover your mouse cursor over a flight I.D. for information – and what an outstanding feature this is! "AWE831," for example, shows "America West Airlines – 'Cactus' (Tempe, AZ)." Thus, the radio call sign that you would hear for AWE831 would be "Cactus eight thirty-one." Also, the complete company name is shown
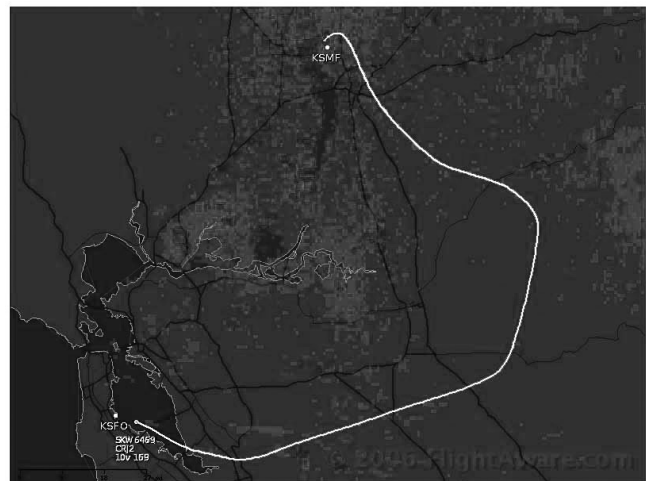
The departure airport is KSMF (Sacramento International). The airliner, SKW6469, is almost to the destination airport KSFO (San Francisco International). The previous flight with the same number shows the completed track and remains static until the new flight starts. This track illustrates that a departing aircraft may not go "as the crow flies" due to factors such as heavy air traffic. Courtesy of FlightAware (flightaware.com)

Each FlightAware.com track has a Data Block by the aircraft which contains info much like this. UAL221 is the Flight I.D. (Airline company code and Flight Number), A319 is the aircraft type – decodable via the site, 360 is altitude 36,000 feet, and 375 is ground speed in knots.

and where it is headquartered.

If you were to click on "AWE831," or any other flight I.D., it will open a map showing the flight track. Click on that map and a larger one will open. Unfortunately aircraft are displayed several minutes behind their real-world positions, for alleged government security reasons – typical of all tracking sites available to the public.

From **http://flightaware.com/live/find-flight_route.rvt** it is easy to display a list of flights from one airport to another by entering the airport codes for the two airports – for example, ZLA in the first box and SLC in the second. The result is a list of flights from anywhere within the Los Angeles Center (ARTCC) to Salt Lake City International Airport. And, there are lots more things to click on and try.

Adding Departure Schedules

Instead of listening to Clearance Delivery or Ground Control to select an airliner to follow, you can view a schedule of departures, as from FlightAware.com, for your airport of interest. From the list, you can pick the flight before the pilot says a thing and be waiting for him/her to appear on the air.

From the Scheduled Departures list, you can pick one that will be going in a direction of interest to you and/or a direction where you know you can receive well at some distance. It is a good idea to start listening to Clearance Delivery / Ground Control (whichever is appropriate for your airport) 25 to 30 minutes before the listed departure / wheels-up time.

Tower to TRACON to ARTCC

As soon as the Tower tells the aircraft to "Contact Departure" and the pilot checks in on the designated Departure frequency, the plane is then being handled by a Terminal Radar Approach Control (TRACON) facility. These facilities handle aircraft that are transitioning from airports on their way to the enroute phase of their flights, where they will be in contact with an Air Route Traffic Control Center (ARTCC), and conversely, when they are transitioning from the enroute phase to an airport. There are some exceptions to this but this is the general rule.

TRACONs, like ARTCCs, have "Sectors," each with its own controller. Sectors are irregularly-shaped, three-dimensional chunks of airspace that all fit together, some designated "Low Altitude" and some "High Altitude." As the flight progresses, each controller hands off the plane to the next controller / sector – each with its own frequency.

Once the plane reaches a certain distance from you, you will no longer hear the ground side. In order to tune quickly to the next frequency, it depends on your being able to hear the handoff read-back to the controller from the pilot. When you hear that, go to that frequency. Eventually, you will not be able to hear and copy the plane.

This next site may assist you in making some best guesses for ARTCC handoff frequencies when you don't quite hear the pilot read-back or are setting up in advance for frequency possibilities. Go to **www.freqofnature.com** and click on "Databases" at the left and then on "FAA Wings and Waves." It starts with a nice U.S. ARTCC map, from which you select the desired ARTCC. It shows the Remote Communications Air/Ground Facility (RCAG) locations and frequencies. Each ARTCC's map may be clicked and dragged to center it, and zoomed as needed.

Pick a Plane Out of Thin Air

If you either do not live within receiving range of an active commercial airport or lack a substantial antenna, there may be airliners going overhead to be heard, identified, and followed, at least to some degree. If you see contrails under certain atmospheric conditions, that is promising, and they could be from civilian or military planes. Many, but not all, enroute airliners may be found in the 132 to 136 MHz range, so tune around to determine what you can hear and grab some call signs.

When you hear an airliner call sign, go to the FlightAware site and, at the left in the box above "Flight Number," enter the airline name or call sign, and then the flight number in the "Flight Number" box. Click on "Track Commercial Flight." This will produce a track map and offer details about the flight.

For a given aircraft, it shows aircraft make and model, origin and destination airports, route information like "FROGO6 FRA REBRG DERBB FIM TANDY3," flight duration, miles flown and miles to go, departure and arrival times, ground speed in knots, and altitude. It can be helpful and interesting, even a lot of fun, to see where an airliner you have heard is along its route and then to learn about it.

❖ Route Information

The FlightAware route information can be decoded as follows. Let's say the route information for a flight from Sacramento International (SMF) to Ontario International (ONT) is given as: "FROGO6 FRA LANDO PMD ZIGGY3."

To the rescue is AirNav **www.airnav.com/** which decodes all the terms. FROGO SIX is a published departure from SMF. To find it, go to **www.airnav.com/** and click on the "Airports" tab, then enter SMF for the airport and then scroll way down to "Departure Procedures" and click on "download" for FROGO SIX. Similarly, enter ONT and scroll way down to "STARs - Standard Terminal Arrivals" and click on the

ZIGGY THREE links. These, as examples, give the details of predefined "published" departures and arrivals.

LANDO is an airway intersection (always five letters) defined by latitude and longitude and shown on IFR aeronautical charts. Go to the AirNav.com site and click on the "Airspaces Fixes" tab and then on "L," and on LANDO.

This leaves "FRA" and "PMD." These are VOR navigational stations, also shown on aeronautical charts. Go to the AirNav.com site and click on the "Navaids" tab and enter FRA and then PMD to learn about them. (Note that FlightAware.com is constantly upgrading the features on their website. As you read this, some or all the info referred to at AirNav.com may also be available at FlightAware.)

If you have the *IFR Enroute* chart(s) that includes the flight path, you can connect the dots. Charts: **www.naco.faa.gov/index. asp?xml=naco/catalog/charts/ifr/ifrchart**

❖ Arriving Transoceanic Airliners

If you happen to live near a coastal airport where international flights routinely land, with some practice and investment in time, you can find and track airliners, for hours sometimes, on HF SSB as they are inbound to the U.S. over the ocean. Each will be handed off from the HF frequency to a specific VHF frequency, which they announce. If your location permits, you can continue to follow one, sometimes, until it is on the ground.

For HF frequencies and more info, see the *Monitoring Times* May 2005 issue – *Monitoring Transoceanic Flights*. For *Monitoring Times Anthologies* on searchable CD-ROMs by year see: **www.grove-ent.com/mtantindividual. html**

Your Logs & Letters

As often occurs in the spring, I've received a welcome surge in correspondence from readers reporting their best DX of the winter season. This month, we'll share some impressive loggings and pass along other news items from radio's basement band.

❖ SAQ (17.2 kHz)

Have you ever wanted to hear a station below 25 kHz—one that is sending something other than encrypted data? Well, you may get your chance on July 2nd, the next scheduled transmission date for SAQ, the historic Alexanderson alternator located at Grimeton, Sweden. This date is being observed as Alexander Day, in honor of the transmitter's inventor, Ernst F.W. Alexanderson (1878-1975). During a test on February 19th, a total of 15 U.S. listeners (mostly along the East Coast) reported hearing this station on its 17.2 kHz frequency (CW mode).

SAQ is a working exhibit commemorating what was considered cutting-edge technology back in the 1920s. It uses an electro-mechanical transmitter, and is the only such station left in operation in the world. For full information, check out the SAQ web site at **www.alexander.n.se/**.

❖ Mystery Solved

In mid-February, I received numerous reports of a new signal that had appeared on 454 kHz near Hagerstown, MD. The station was heard as far away as Georgia, North Carolina and Virginia and was sending data bursts every second, along with continuous data at 1 kbps.

After some detective work by several monitors, it was determined that this is a Differential GPS (DGPS) station used to improve the accuracy of GPS signals in the vicinity of Hagerstown. A similar station is believed to be active in Pennsylvania at 458 kHz. You can download a sound sample of the 458 kHz station at **http://ve3hls. tripod.com/noise/noise-files/unid-458khz. mp3**.

Interestingly, the MD station uses a former Ground Wave Emergency Network (GWEN) site and is connected to its 300-foot "hot" tower. The transmitter power is a hefty 10 kW, so it is capable of considerable range, especially at night. The choice of 454 kHz for this station was probably not given a great deal of thought. This is only 1 kHz away from the fixed 455 kHz Intermediate Frequency (IF) used in most modern radio receivers! This could cause severe interference to a nearby receiver, regardless of the frequency it is tuned to.

My thanks to Perry Crabill (VA), Brock Whaley (GA) and MT's Bob Grove (NC) for assistance in finding the origin of this station. I would appreciate reports from others who hear such signals in their locales.

❖ North to Alaska

Jerry Brookman, KL7CMN wrote with a listing of beacon logs from his monitoring post in Kenai, AK. He writes: "I enjoy your column in *MT*. I've been interested in longwave for quite a while, but never enough to put a LOWFER beacon on the air, or even to put up a decent antenna—although I could probably string up a decent beverage antenna where I live! I've listened for LW beacons for the past 25 years or so—first with a Kenwood R-300, then with a Kenwood R-600 from 1983 until 1990, and since then with a Kenwood R-5000. For the past 15 years or so I've used an Alpha-Delta DX-SWL Sloper antenna. Over the years, the RF noise level in my area has slowly but surely increased. I'm not sure what the cause is—undoubtedly a multitude of causes—including light dimmers, street lights, computers and other modern conveniences. The logs listed below were all made between 1441 and 1459 UTC."

Additional loggings this month are supplied by Ron Perron (MD) who uses an Icom R-75 receiver connected to a 90-foot wire in a horizontally deployed triangle configuration. Although the antenna is installed in an attic, Ron reports good results on the lower frequencies.

Table 1. Selected LW Logs

Freq.	ID	Location	By
153	LWBC	Russia?	J.B. (AK)
216	CLB	Carolina Beach, NC	R.P. (MD)
233	ALJ	Hinchinbrook Island, AK	J.B. (AK)
260	YSQ	Atlin, BC	J.B. (AK)
277	ACE	Homer, AK	J.B. (AK)
283	DUT	Dutch Harbor, AK	J.B. (AK)
279	LWBC	Russia?	J.B. (AK)
325	BVK	Buckland, AK	J.B. (AK)
329	YHN	Hornepayne, ON	R.P. (MD)
335	YLD	Chapleau, ON	R.P. (MD)
341	DB	Cold Bay, AK	J.B. (AK)
350	VTR	Takotna River, McGrath, AK	J.B. (AK)
351	YKQ	Waskaganish, QC	R.P. (MD)
365	ZP	Sandspit, BC	J.B. (AK)
366	YMW	Maniwaki, QC	R.P. (MD)
371	PDN	Port Heiden, AK	J.B. (AK)
371	FND	Ellicott City, MD	R.P. (MD)
378	RJ	Roberval, QC	R.P. (MD)
382	JNR	North River, AK	J.B. (AK)
391	DDP	Dorado, PR	R.P. (MD)
392	ML	Charlevoix, QC	R.P. (MD)
411	ILI	Iliamna, AK	J.B. (AK)
429	DGG	Red Dog, AK	J.B. (AK)
525	ICW	Nenana, AK	J.B. (AK)
530	ADK	Adak, AK	J.B. (AK)

❖ What the Others are Saying

An interesting discussion on Longwave DXing appeared on the e-Ham.net website back in February. As of press time, the material was still available for viewing at: **http://www.eham. net/articles/13150**.

The Longwave Club of America's website reports that Robert Helliwell's classic book, *Whistlers and Related Ionospheric Phenomena*, is back in print in an affordable paperback edition. If you'd like a scientific explanation of what's behind these amazing signals, you may want to add this one to your bookshelf. Full ordering information is online at: **www.lwca.org**.

Mike Leahan (WI) supplied this photo of MS/400 kHz in Monona, Wisconsin

❖ Hamfest Season

It's time for my yearly plug of what I believe is one of the best hamfests in the U.S! The Rochester (NY) Hamfest is celebrating its 72nd year in 2006, and the event has historically been a great place to find LF-related gear and components. This year's fest will be held June 2, 3, 4. Full information is available online at: **www.rochesterhamfest. org/**.

See you next month!

Digital SSTV on Pirate Band

During the winter months of 2006, a small but noticeable fraction of the broadcasts in the North American shortwave pirate bands did not consist of voice and music content. Instead, some pirates are experimenting with slow scan television modes on the pirate bands.

For those who do not have a decoder that will demodulate SSTV broadcasts, a radio receiver demodulates the transmissions as digital noise that means nothing. In fact it sounds like harmful QRM interference on the pirate band. But, for those with decoding software, slow scan TV actually produces a still video image.

Since the broadcasts are on the unlicensed shortwave pirate bands, the content of the slow scan TV images is not always up to the highest standards of good taste. But, they can be interesting and sometimes amusing, as we see here this month. WBNY transmitted the highly doctored image of your editor that we are blessed (?) with in the column.
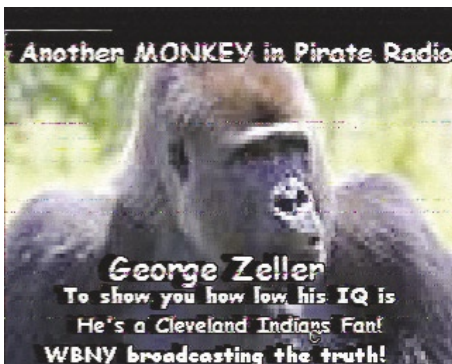
Because most radio hobbyists do not have slow scan TV decoding software, the audience for these experimental shows is extremely small.

If you would like to attempt some decoding of these broadcasts, veteran DXer Dave Zantow points out to us that some necessary software can be downloaded from the internet. From Japan, JE3HHT, Makoto (Mako) Mori has a variety of amateur radio software available for freeware download at a web site in Switzerland. The **http://mmhamsoft.ham-radio.ch/** URL will take you to Mako's freeware site. Among the software that he has available is a SSTV decoding package. You might want to give his free SSTV software a try.

The most frequent recent user of SSTV modes on shortwave has been **WBNY**. They often identify the digital noises with Morse Code at the end of the broadcasts. Nevertheless, these digital broadcasts are unintelligible to most DXers.

❖ Unusual Pirate Bust

Perhaps one of the most unusual pirate busts in history took place on November 10 in San Diego, CA. The FCC charged that Joni K. Craig was operating an FM pirate on 106.9 MHz from her garage. Craig has denied the charges, claiming that she merely rented the garage to tenants. The FCC claims that the tenants installed a remote FM repeater for the pirate broadcasts inside the garage.

Craig claims no knowledge about the radio broadcasts, and she refused to name the tenants to FCC personnel. The FCC issued a Notice of Apparent Liability to Craig anyway in the amount of $10,000 in November. The case was still not fully resolved by the deadline for this month's *MT*. However, this appears to be the first pirate bust in history of a person who claims to know nothing about radio, and who, according to evidence released by the FCC, is apparently not the pirate operator with the transmitter. Instead, she appears to be a landlord where a pirate transmitter was installed. It remains to be seen if a landlord can be held liable for a Notice of Apparent Liability from the FCC.

❖ Oldest Pirate QSL?

As we mentioned last month, we are still taking nominations from our readers as we attempt to find out who has the oldest pirate radio QSL card in their collection. Certainly many of us will have QSLs older than the 1983 date that we mentioned last month. Let us know what your own oldest pirate QSL is, and what station sent the QSL to your mailbox.

❖ What We Are Hearing

Monitoring Times readers heard twenty different North American pirates this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. April Fools Day is considered a major holiday by pirates, and so is Easter.

You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on or near **6925**, plus or minus 30 or 40 kHz.

Captain Morgan- The captain still features a rock oldies format mixed with audio from the old Twilight Zone TV show. (None, says to send loggings to the Free Radio Network web site, and has QSLed lately)

KCBM- Ken and Barry remain the best heard west coast pirates in North America. (Uses *kcbm_2@yahoo.com* e-mail)

K-Fudd- This new one claims to be operated by Elmer Fudd's son Ozzie. It plays the old Bugs Bunny tune "Kill the Wabbit" as a "warning" to Commander Bunny. (None)

KIPM- Alan Maxwell announced his retirement from pirate radio, but his complex drama broadcasts are still being relayed by somebody. (Elkhorn)

Kracker Radio- Their parody and novelty music programming is funny. (Uses Merlin and *crackerradio@pmoll.com* e-mail)

MAC Shortwave- Not operated by Steve Jobs at Apple, this one combines Yogi Bear, the Three Stooges, and rock music. (None)

Melvin Malfuction Radio- This veteran pirate programs both rock music and world news. (Uses *melvinmalfuction@yahoo.com* e-mail)

Mouth of Muhammed Radio- This new one is a parody of Arabic protests over cartoons in Danish magazines. (None; cartoons not included)

Punxatawny Pothead Radio- Groundhog Day came and went in February, but this station saw its shadow and stayed on the air during later months. (Belfast)

Radio Free Whatever- They primarily feature rock music "from the right coast." (Uses *radiofreewhatever@yahoo.com* e-mail)

Radio Free Speech- Bill O. Rights is still on the pirate bands with advocacy for individual liberties. He offers a copy of the USA Constitution with QSLs. (Belfast)

Radio Pigmeat International- Pigmeat Martin's format has always been rock music. (Belfast)

Radio Six- The latest entry into the pirate world with a station name as a number is turning out to be a rock music station. (None)

Sunshine Radio- The female DJ on this pirate spins rock tunes. They have been QSL'ing lately. (Uses *grasscutterradio@yahoo.com* e-mail)

The Border Radio- This new one combines rock and pop music into a replica of the old Mexican medium wave stations that broadcast to the USA across the border. (Uses *theborderradio@yahoo.com* e-mail)

The Crystal Ship- The Poet hosts music

Hamventions, Headsets, and Odds & Ends

❖ If This is May, It Must Mean Dayton

The annual Dayton Ohio Hamvention will be held this year on May 19, 20, and 21. Every year this remains the largest gathering of hams in the United States. The show boasts dozens of forums, opportunities to get your license or upgrade, a large indoor exhibitor's area, and much more. It also sports the largest outdoor flea market for gear of all kinds. The stuff you can find on the tables at Dayton is the stuff of ham radio legend. (Hams worldwide still talk about the Viet Nam era motion detector transmitter modules that were disguised as animal droppings.) Most importantly, Dayton is the traditional place for manufacturers to premier their newest goodies.

Having said that, I must admit that, even though I am about as dedicated a ham as you will find, I have yet to make the pilgrimage to Dayton. It will happen, maybe even this year. But May tends to fill up with family obligations faster than free time for ham trips for me.

I was poking around the Internet and came across a bit of historical information about the Hamvention. I was surprised to discover that the show is as old as I am, being first held in 1953 by the Dayton Amateur Radio Association. It was originally held in the Biltmore Hotel. As it grew in popularity, it moved in 1964 to the Hara Arena, where it continues to this day. If you can make the show, it is well worth the trip. The most up to date information for this celebration of ham radio can be found at the Web site **www.hamvention.org/**

❖ Four Days In May

If you have an interest in low power operation and you are planning to head for Dayton, you will want to check out a gathering of QRPers that is held more or less side by side with the Dayton Hamvention. Sponsored by the QRP Amateur Radio Club International, **FDIM** is held May 18th through 21st at the Fairborn Holiday Inn near Dayton.

The gathering hosts many specialized forums on low power operation and they hold a nice banquet. But the activity that draws the most attention every year is the "Build-a-Thon." QRPers tend to be builders and experimenters. Opportunities to show off your work and try new things are at the center of this fun gathering.

For more information on this adjunct to the Dayton Hamvention check out the QRPARCI Web site at: **www.qrparci.org** You can get

together with some of the top QRP people and still have time to head over to the flea market at the Hamvention.

❖ Ham Radio Headsets

I am one of those folks who likes to do his listening wearing "cans," or at least the modern equivalent of the old radio operator's headset. I think it comes from being such a dedicated CW op, but I know that even phone folks like a headset in contest conditions.

Now, if you are new to the ham radio hobby, you may not know that the headsets you might use to listen to your stereo or portable music player can often be used for ham radio operations. However, they are, more often than not, less than ideal for this purpose.

Audio headsets designed for music have a much broader frequency bandwidth than headsets designed for hearing just the human voice or a CW tone. For example, if I am digging for a 400 Hz CW signal using a 250 Hz filter, that full range bandwidth of a high fidelity headset is either just wasted or, more likely, is bringing some level of audio interference into the picture as well. If you look at any catalog of amateur radio gear, you will see many examples of headsets designed specifically for ham radio use. You will also notice that most of these are a bit large, not all that suitable for lightweight portable operation, such as when backpacking.

I have been looking for suitable substitutes and found most wanting. Most folks going light have compromised and made use of portable stereo music type headsets with the problems noted above. I ran across an interesting solution almost by accident. On my "Real World" job, I have

recently become involved in maintaining and servicing audio transcription equipment. You see this sort of gear used in business meetings and in court room settings. The event is recorded on audio tape (or in more modern settings, recorded digitally), so that a written transcript can be made of the proceedings. The transcribing equipment is optimized for the human voice as opposed to the full audio frequency spectrum associated with music.

Transcription monitoring staff, as well as the transcribers who type up the hard copy, often wear headsets for hours on end. Hence, they opt for lightweight units that are optimized for the human voice. Hmmm, I think we're onto something here. With my boss's permission, I borrowed a couple of examples of these headsets and gave them a try on the air. I found them to be as good as all but the most expensive (and rather heavy) ham radio specific headsets.

A web search on transcription headsets with the brand names Spectra, Lanier, Sony and Dictaphone will turn up dozens of examples ranging in price from around $15 and up. Most of these designs can be purchased in either stereo or mono form factors, so you can pick the type that suits the output of your receiver. Be careful, too, as some sets have specialized plugs designed for specific equipment. But changing out a plug is just an excuse to melt a little solder, so this is not a large hurdle for a tenacious ham.

You may also have to pay some attention to the proper impedance matching for your receiver, but I found all of the headsets I looked at to be 8 ohms nominal, so they should work with most modern ham gear. I am still playing with these designs and I will be taking several examples out into the field for further testing and experimentation as summer approaches. I will report back. But don't wait on me; give this idea a try yourself.

❖ What's So Special About Special Events?

If you have followed this column for any length of time, you know I have a soft spot for Special Event Stations. Nothing says *summertime* in the ham radio world quite like a group of hams putting a bunch of gear out in the field for no better reason than to have some radio fun related to some activity that may not even have any direct ham radio interest. State fairs, historic celebrations, city centennials, light houses, submarines, and ships are just a few of the things you will find commemorated by Special Event ops.

In addition to the opportunity to obtain an often quite attractive commemorative QSL card or certificate, I really enjoy the low key nature of most of these operations. It's just a bunch of hams having fun talking to other hams. Don't expect a quick contest exchange here. Plan to talk a bit about what is going on and even tell a bit about yourself. A nice change from "59 QRZ."

Remember, too, there is nothing to stop you from getting together with some ham radio friends and setting up your own Special Event station. It's nice to have about a three month lead time to get the activity into the ham radio press, but that is not absolutely necessary. I've run across more than a few Special Event operations that were not pre-listed in the magazines. They were even more fun to work than the ones I went hunting for. If you go the unannounced route you will want to set up about 30 kHz up from the bottom of the General Class phone portion of the bands you plan to work with. This is where most Special Event stations can usually be found.

❖ And May Leads into June

By now your plans for ARRL Field Day should be well under way. This year, this demonstration of field operations will be held the weekend of June 24 - 25.

If you are not already involved in Field Day through your local club or group, you can still get involved. While the emphasis is always on the portable stations running emergency power, it is just as much fun and potentially useful to operate from your home station. This would be a Class "D" station under the rules if you are using household electricity to power your station.

But you may find some value in looking into operating Class "E." This would be your home station run using emergency power. We live in "interesting" times. Emergencies come in all shapes and sizes, and knowing you can still put a signal on the air when the going gets tough can be very important – even a life and death situation. Class "E" operation during Field Day will give you a good idea of how your station will fare in difficult times and may point to a few things you can improve.

❖ One More Publication

Whenever I do a publication review column such as the one I shared with you folks last month, it always seems an item or two hits my mailbox a few days after the column deadline. I won't let this lateness deprive folks of some good information. So allow me to share one thing more this month.

The 2005 ARRL Periodicals on CD -ROM
No. 9754 (Compatible with Microsoft Windows and Macintosh PCs)
The American Radio Relay League
225 Main St
Newington, CT 06111
1-888-277-5289; **www.arrl.org/catalog/**

Each year since 1995, the ARRL brings together its three major publications. *QST*, its ham radio journal; *QEX*, its technical publication; and the *National Contest Journal*, whose title is self explanatory. As a well known radio

sage, I read all three religiously, and this results in quite a pile of paper. And of course this pile of paper is not easily searchable nor is it cross-linked in any way.

Enter the *ARRL Publications* CD-ROM. It allows me to dig through all the articles and even the advertisements in search of information that I either need to make my personal radio hobby experience more enjoyable or to bring some ideas forward to you, my loyal readers.

Every year the ARRL has improved on its Periodicals CD. This latest edition takes advantage of some of the new functionality of the Adobe 7.0 Reader platform (**www.adobe. com**) to give the user an even better computer based publication experience. I note this not just to tell you about these improvements, but to point out something important for some users. The newer features in Adobe Reader expect a bit more personal computer horsepower than earlier reader editions. Not to worry. You do not need to run out and buy a new computer. Older versions of Adobe Reader will also work with some limited features. You should still be able to view the files as with previous League periodical compilations.

I ran into a bit of a puzzle during installation due to the fact that I had the latest full version of Adobe Acrobat installed on my system. Adobe Acrobat is the big brother of the more common Adobe Reader, used for publishing documents as well as reading them. I needed to juggle the default settings to get the files to point where I wanted them to go, but I was guided through the process on the installation screens. I like when a program's installation takes such things into consideration.

If you want to recycle your old issues and take up a bit less space, the CD-ROM is a great way to go. And if you are not a subscriber, the CD-Rom is a great way to get to know the publications and, by adding earlier editions, build up a great library of ham radio knowledge.

UNCLE SKIP'S CONTEST CALENDAR

MARAC County Hunter Contest (CW)
May 6 0000 UTC - May 7 2400 UTC

Nevada QSO Party
May 6 0000 UTC - May 7 0600 UTC

10-10 Int. Spring Contest (CW)
May 6 0001 UTC - May 7 2400 UTC

Oregon QSO Party
May 6 1400 UTC - May 7 0200 UTC

Indiana QSO Party
May 6 1600 UTC - May 7 0400 UTC

New England QSO Party
May 6 2000 UTC - May 7 0500 UTC
May 7 1300 - 2400 UTC

FISTS Spring Sprint
May 13 1700 UTC - 2100 UTC

CQ WW WPX Contest (CW)
May 27 0000 UTC - May 28 2359 UTC

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as the "Voice of the Blue States Republic" on 6875 kHz and various unusual frequencies such as 1710, 3320, 6854, 6925, and 9057 kHz. (Belfast and uses *tcsshortwave@yahoo.com* e-mail)

Undercover Radio- Dr. Benway operates "from the middle of nowhere," usually with rock music. (Merlin and uses *undercoverradio@mail.com* e-mail)

Voice of the Islands- They claim to broadcast irregularly from Pelee Island in Lake Erie from Canada, usually around 13888 kHz. QSLs are arriving in DXers' mailboxes. (Merlin)

WBNY- Commander Bunny, the leader of the rodent revolution, mixes Easter music with digital and voice broadcasts on the pirate bands. (None, but has said on the air that it will QSL Free Radio Network postings)

World of Pirate Relay Service- This new one, otherwise known as WOPRRS (pronounced Whoppers) has been relaying programs from other pirates. (None)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations, especially in Europe. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox.

Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE 68022; and PO Box 293, Merlin, Ontario N0P 1W0.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings with a hope that pirates might QSL is now the e-mailed *Free Radio Weekly* newsletter, still free to contributors via *yukon@tm.net*. A few pirates will sometimes QSL reports left on the *Free Radio Network* web site, at **http://www.frn.net** on the internet.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Dave Balint, Wooster, OH; Lee Banner, Fishkill, NY; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Jerry Coatsworth, Merlin, Ontario; Wendel Craighead, Prairie Village, KS; Rich D'Angelo, Wyomissing, PA; Gerry Dexter, Lake Geneva, WI; Harold Frodge, Midland, MI; William T. Hassig, Mt. Prospect, IL; Harry Helms, Smithville, TX; Harald Kuhl, Germany; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Mark Morgan, Cincinnati, OH; John Poet, Belfast, NY; Fred Roberts, Germany; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Lee Silvi, Mentor, OH; Joe Wood, Greenback, TN; and Dave Zantow, Janesville, WI.

Building or Buying Your Antennas:
Part One of Two

Radio monitoring, DXing, scanning, ham radio, or just plain "tinkering" around with radio can all be a lot of fun. For a beginner there are many questions, and one of the most common is probably: "Will my home-built version of the antenna I want perform as well as that shiny, new commercial version about which the maker says such remarkably-good things?" The answer to this question is often "yes."

For simple antenna designs, chances are quite good that your home-brew version will perform just as well as the commercial version. Most basic antenna designs are fairly simple, and also easy to make if you have even a modest amount of ability to use hand tools. And if you can work with your hands reasonably well and follow instructions, then you can probably construct even more complex antenna designs that will perform as well as the commercial ones. An added benefit is that you usually save money by building rather than buying.

Of course there may be good reasons why you prefer to buy rather than build: you may not have the time required, maybe you don't work well with tools, or you may just want to use radios, but not build accessories for them.

❖ If You Decide to Buy:

Next month I'll discuss some sources of commercially-built antennas and some thoughts on how to evaluate their manufacturer's claims for their antenna's performance.

I'll also discuss then a number of antenna books, and in general what they cover. These books should help you decide what antenna designs will fit your needs.

❖ If You Decide to Build:

The manner of constructing wire antennas – such as the many types of half-wavelength dipole designs, the slopers, long-wires, Beverage, V and rhombic antennas – is relatively simple. Just by looking at these antennas it's fairly obvious what is needed to construct them: wire, insulators; poles, towers, trees or such to support them; and guy wires or ropes to strengthen them (fig. 1). These simple antennas are good choices for a beginner, although the long-wire, Beverage, V and rhombic are rather lengthy, and require more effort than the others.

On the other hand, constructing one of the less-simple antenna designs – such as the cubical quad, the Yagi-Uda, log-periodic dipole array, discone, or dish – is a more demanding job. More time, patience, and attention to detail will be required for these. Be prepared to read the construction directions *before* you start making the antenna, and to follow them faithfully as you work. Attention to length and spacing of elements is important, especially at VHF and higher frequencies. But with reasonable care, you can make antennas that perform well, and compare very favorably with commercial models.

❖ What Do You Want Your Antenna to Do?

Before you decide what antenna you will build or buy, ask yourself what you want it to do for you. Basic questions are things such as, "Will it be used for communication with stations in a specific direction, or with stations in many different directions?" Answering this will help you choose between directional and non-directional antennas. "Will you want to work DX, or stations closer in?" And so forth.

Also consider whether there are there sources of electrical noise in your location that will compete with the signals you want to receive. If so, an antenna with a directive pattern or deep nulls in its pattern may be useful to reduce reception in the direction from which the noise arrives at your antenna.

Are you limited in space to erect an antenna? One of the shortened or bent-antenna designs may answer your needs. You'll find that a wide variety of antenna designs are available to you.

Checking over the various designs in some of the available antenna manuals, which I'll discuss next month, will help you decide which of them are likely to fulfill your requirements. Also, my January 2006 *Antenna Topics* column was a discussion of factors to consider in selecting an antenna.

RADIO RIDDLES

Last Month:

I said: "Just as I have done below, I always sign off this column using both the terms 'DX,' and '73.' What do these terms mean, and where did they come from?"

Well, it seems that "DX" is a term that was used by early telephone operators to indicate that the telephone exchange with which they were in contact was a "distant exchange" (Distant eXchange). Over time, the term "DX" became a convenient, short *pro-word* (procedure word) which came to be used by radio operators to indicate communication with a distant station.

Pro-words are quite short, and therefore easier to send in Morse code than the longer phrases for which they stand. Other examples of pro-words are "HI," which means laughter, and "OM" which means "old man" – a term of friendship with a meaning similar to "buddy" or "pal" as used in ordinary conversaton.

There are also numerical codes for radio operators that, like pro-words, allow the use of a short phrase which is easily-sent in Morse code to stand for a longer phrase that would take more time to send. For instance "73"
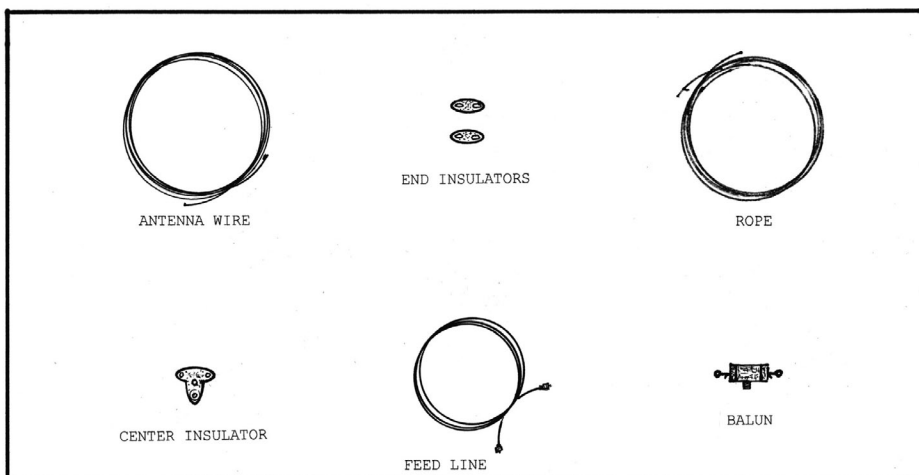
Fig. 1. Supplies often used when building simple antennas

ANTENNA WIRE

END INSULATORS

ROPE

CENTER INSULATOR

FEED LINE

BALUN

originally meant "my compliments to you." However "73" has now evolved to mean "with best regards." But I have to say that, in my experience, 73 also carries a meaning beyond simply "best regards." Signing "73" at the end of a CW (cut wave or "radiotelegraph") conversation, especially for old timers like myself, is also saying something like: "best regards friend, good to talk to you, and I will be pleased to contact you again sometime on down the line."

We can't leave the idea of pro-words and related topics without mentioning ARL messages, and the "Q-code." ARL messages are listed by number in American Radio Relay League operating manuals so that by simply sending the prefix "ARL" followed by a spelled-out number, an entire message is indicated. For example, sending "ARL twenty two" means, "Need accurate information on the extent and type of conditions now existing at your location. Please furnish this information and reply without delay." Obviously, it is quite a savings of time to send "ARL twenty two" rather than the whole text of that message. This can be quite important in emergency situations.

There's also a Q-code in which short letter groups are given the meaning of longer phrases. An example of a Q-code letter group is: "QRN," which means: "There is static interference to your signal." "QRN?" asks the question: "Is there static interference to my signal?" On the lighter side, there are a few unofficial Q-codes such as "QZZ?" which means: "Is that a 60-cycle hum on your signal, or are you snoring?"

This Month:

Just what is the "static" referred to by the letter-group QRN discussed above? Where does static come from, and what causes it? The term "static" means "immobile," or "stationary." What is immobile, or stationary about radio static?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, and, of course, DX and 73.

Restoring a Depression Era Silvertone

Since we just finished discussing depression-era a.c.-d.c. tabletop radios (April issue), I thought it might be fun to make one of them the subject of our next restoration project. In selecting a radio for the project, I wanted to make sure that it was an early and inexpensive example.

We have already restored two a.c.-d.c. sets in this column – both late 1930s 5-tube superheterodynes in plastic cases. But for this restoration I hoped to find an early 30s wood-cabinet table model with a very rudimentary circuit. Something that might be purchased on a slim depression family budget.

Looking through the stash of radios that I've accumulated over the years as possible subjects for magazine articles, I found one that really filled the bill. Housed in a small (6-1/2" h X 8 3/4" w X 5" d) wood cabinet, the diminutive set uses just three tubes plus a rectifier tube. It had lost its nameplate, but a few of the tubes were branded "Silvertone," (Sears' well-known radio brand). A label inside identified the manufacturer as "C.R.C.," which I assumed was the Sears supplier.

❖ Identifying the Radio

Using the Silvertone clue, I found a set that looked almost identical to mine with the help of Volume 2 of Mark Stein's *Radiomania's Guide to Tabletop Radios*. This indispensable series consists of picture after picture of vintage radios arranged by manufacturer and date – each with an estimate of current market value (though I honestly think that the values quoted tend to be a mite too generous).

At any rate, what looked like my set was identified as a Silvertone Model 1703, ca 1934. The only difference was that the dial plates on mine are oblong, while the ones in the catalogue

This is the minimal a.c.-d.c. depression radio we'll be working on next. The unfortunate owner-applied paint job will have to come off.

The circa 1933 Silvertone "Little Fello" closely matches our project set, but there are some differences (see text). A zipper case was offered as an optional accessory.

picture are round.

The picture showed that the central part of the front panel was finished in a heavily grained veneer, while the rest of the cabinet seemed grainless – either painted or finished in a dark opaque stain. The clue to the original finish was helpful because my cabinet had been painted over by a long-ago owner in a snazzy cream-and-burnt-orange scheme.

Mark has also published a compendium of Sears Silvertone radios as they appeared in catalogs from 1930-1942. Being fortunate enough to have that one in my library also, I looked for the set there and found the same radio shown as a 1933 catalogue entry, where it bore not only the 1703 model number, but also the name "Little Fello" (the odd spelling is Sears'). The catalogue description indicated that the color was walnut – another helpful hint in planning the refinishing.

However, elements of the description didn't quite match my radio. The cabinet size was given as an inch or so longer and, though three of the tubes matched mine (types 77, 78 and 43), the fourth was a 1V rectifier as opposed to the 25Z5 rectifier in my set.

I turned to another well-used reference book in my collection, the *Mallory Radio Service Encyclopedia* 6th Edition (1948). This reference lists radios by make and model number and indicates the part numbers of the correct Mallory controls, capacitors and vibrators. While the part numbers are of limited use today, other entries are valuable indeed. They are the tube complements of each radio, the i.f. peak frequency and the Riders manual where complete data can be found.

I have a few other editions of the Mallory *Encyclopedia* in my library, but the 6th is the latest one I have seen. If you happen to spot one of these editions at a radio meet, be sure and pick it up. You won't regret it!

Since the Silvertone model numbers seem to have been assigned in chronological order, I began looking at tube complements of slightly

earlier and later sets to see if I could find one with the same four tubes I had in my set. I quickly located a 1728 and a 1728A. While the 1728 had the same tubes as the 1703, the 1728A tube complement matched the one in my set – containing a 25Z5 instead of the 1V rectifier.

Turning back to the Sears catalogue, I found that the 1728 was a later (1934) version of the "Little Fello." The cabinet was different (updated to an art deco look) and its name was now spelled conventionally as "Little Fellow." And, by the way, it had oblong dial plates that looked like mine.

This is about as close an identification as I can make. I guess I have some kind of a transitional, not widely documented, version of the "Little Fello." However, I'm sure that the schematic of the later "Little Fellow," which I'm running with this article, represents my radio quite well.

❖ Reviewing the Circuit

The first part of the circuit we should discuss is the *antenna*. Note that this is not a loop antenna, as was common in the later a.c.-d.c. sets. Instead it is a hank of wire that the documentation says to "unreel and lay on floor or throw out window." Note that the wire is connected to the antenna coil through a .01 uF capacitor.

Why? Note that one side of the a.c.-d.c. line is connected to chassis ground, as is the bottom end of the antenna coil. If the plug were to be inserted so that the chassis were "hot" to ground, there would be a disaster waiting to happen. Without the presence of the capacitor to break the circuit, the antenna coil would go up in smoke and flame should the bare free end of the antenna wire happen to contact a radiator or water pipe. A person who happened to touch the bare end while also touching a grounded object wouldn't fare too well either.

The signal from the antenna coil is amplified by the type 78 r.f. amplifier and passes through the detector coil to the type 77 detector-first audio amplifier. For station selection, the two coils are tuned by ganged variable capacitors. Finally, the audio is amplified to speaker volume by the type 43 power amplifier.

Unlike a superheterodyne receiver, where the received frequency is converted to a lower fixed frequency before being amplified, the received frequency is amplified without change as it passes through the tuned circuits. This design is known as a TRF (tuned radio frequency) circuit.
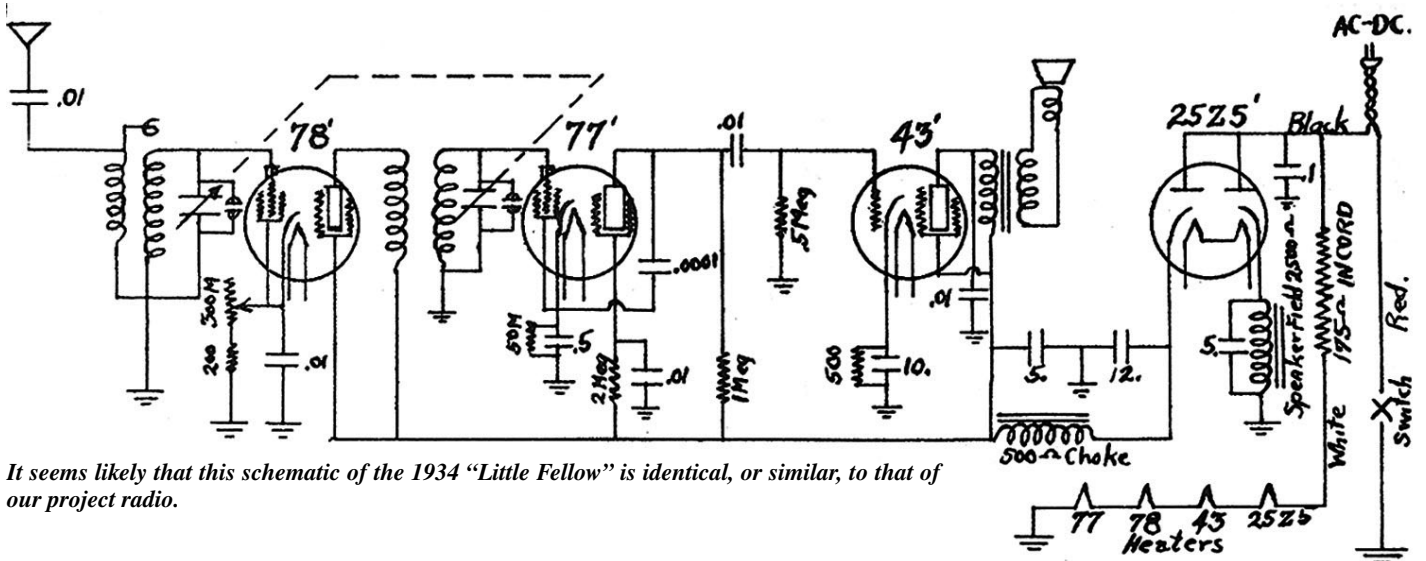
It seems likely that this schematic of the 1934 "Little Fellow" is identical, or similar, to that of our project radio.

It's worth noting that it's the same design used in the battery-powered "three dialers" of the previous decade. But thanks to the development of the new pentode and multi-function tubes, as well as the proliferation of more powerful radio stations, three tubes and an under-the-carpet antenna could now do the same job as the battery set's five tubes and long outside antenna.

Now let's turn our attention to the *power supply* circuitry. The first issue is power to light the tubes. By definition, an a.c.-d.c. set has no power transformer that would otherwise provide the necessary low voltages. In fact, that lack is what makes it possible for the radio to operate on d.c. as well as a.c.

The tubes have to be lit directly from the line, and for that purpose their heaters are placed in series like the bulbs in an old-fashioned Christmas tree set. But the heater voltages of the four tubes in the set add up to only 62. In the early '30s there were not enough tubes with higher voltage heaters to make up the required total of 110-115.

According to the schematic, a 175 ohm power resistor is placed in series with the tubes to make up the difference. At the 300 mA current required to flow through the tube and resistor string, the resistor will have over 52 volts across it, bringing the total voltage required by the string to over 114. This is appropriate for direct connection across the line.

The schematic also notes that the resistor is located in the line cord. Such a resistor takes the form of a special resistance wire bundled in with the normal two wires in the cord. Because it gets very warm, the composite cord is packed with asbestos for insulation.

Line cord resistors are a special problem for the restorer because the heat degrades the resistance wire, the other wires, and the cloth outer covering over a period of time. New resistance line cords are no longer available, and new old stock ones are apt to be defective because the resistance wire becomes brittle with age. We'll deal with methods for substituting for the resistance line cord during the restoration to come.

Direct current for the plates and screens of the tubes is supplied by the 25Z5 rectifier and a filter network consisting of a choke and two electrolytic capacitors. Of course, if the set is plugged into a d.c. source, the 25Z5 has no work to do except to contribute to the voltage drop of the filament string.

In somewhat later sets using *dynamic* speakers, in which the necessary magnetic field is supplied by an electromagnet, the electromagnet coil, called a *field coil*, doubled as the power supply choke. In still later models, the development of stronger permanent magnets made speaker electromagnets unnecessary and the development of inexpensive electrolytic capacitors of higher capacities allowed the substitution of a power resistor for the filter choke.

❖ **Physical Condition**

I have to admit, I probably would never have picked this set for restoration if it hadn't been such a perfect example of the type of radio I want for this project. As you can see from the pictures, this is a very dirty set. It looks as if it had been stored in a shed or garage for many years. Besides being dirty, there is some surface corrosion here and there on the various metal parts. On top of that, the cabinet has been painted over and will have to be refinished – not exactly my favorite radio restoration activity.
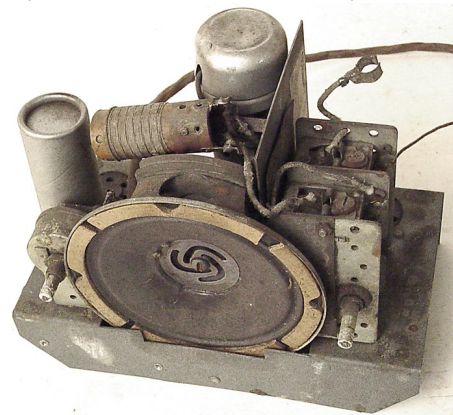
The little Sivertone is about as dirty a radio as I've ever worked on – but at least there isn't much of it to clean!

On the other hand, I see no signs of crude repairs or modifications. That's probably because the radio was too inexpensive to be worth servicing and too minimal to attract the attention of a radio experimenter. Probably its last owner couldn't quite bring him or herself to actually throw the little Silvertone in the trash can, and so it was just shelved out of the way.

Bringing a radio back to life that has been neglected can be an interesting challenge. Don't expect that the set will be museum quality when we are finished. However, I am shooting for restoration of normal operation and an appearance decent enough to enhance a display shelf. See you next month, when we'll begin!

ON THE BENCH
PROJECTS, REVIEWS, TIPS & TECHNIQUES

"Law and Order" on 2 Meters

By Ed Yeary W4TEY, Technical Specialist ARRL Dist. 9 TN

About nine years ago, I bought a house and moved into a subdivision in a small town near the Cumberland Gap National Historical Park. The town of Harrogate, Tennessee, is nestled in the mountains at the gap of the Cumberlands where Daniel Boone led the first settlers westward.

My house is situated high on a hill and I had visions of ham radio nirvana as I eyed my surroundings. I have a great look to the east into Virginia, a very good perspective to the south and southwest into Tennessee and beyond, and a straight shot through Cumberland Gap into Kentucky. The only real obstacle as far as I could see was Cumberland Mountain to the north. At the time, I had been licensed for about a year and was still a Technician. With this great location I was looking forward to upgrading, but it wasn't long before the first of two discouraging obstacles arose: the first in the form of a TV show known as "Murder She Wrote" and later, a second one called
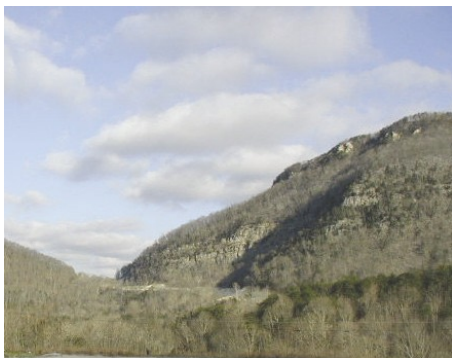
"Law and Order."

The subdivision I live in has houses packed pretty close together. Most had the usual cable TV hookups leading into their homes. It wasn't long before I started receiving calls from neighbors on either side and in front of me. They had spotted my antennas, obviously. One neighbor seemed particularly disgruntled, claiming I was continuously interrupting his viewing pleasure. The other two neighbors were much less irritated, and especially so after I explained I was a ham operator and not a CBer, and that I would do everything I could to avoid causing them problems.

Further investigation proved that, nine times out of ten, whenever any neighbor had problems it was on cable channel 18 while I was transmitting on 2 meters. Cable channel 18 transmits its visual carrier smack in the

heart of the 2 meter band on 145.2625. Generally, I could drive around Harrogate and see a full scale carrier on 145.250 MHz in many places on my mobile radio, and it was also full scale at my house on my base radios. At the time I also had cable TV, and, sure enough, if I keyed my 2 meter base station anywhere in the 2 meter band, even on low power, the video on channel 18 went completely kablooie. Nothing could be seen or heard.

Some of my neighbors assured me it wasn't that big a deal, as they didn't watch channel 18 [the USA network here in Harrogate] that much anyway. Unfortunately, my other neighbor watched it every night to view "Murder She Wrote." (USA has a penchant for showing the same shows every night of the week over and over and over.)

I knew I had a problem. I went over to my USA-viewing neighbor's house and talked with him at length. I also sent him a lot of information taken from the ARRL website about ham radio, as well as articles discussing cable channel 18 and 2 meter interaction and the inherent responsibility of the cable company.

Fortunately, I had known this neighbor on a casual basis before I had moved in. I told him to call me anytime I was interrupting his viewing and I would try to keep my transmissions short. He agreed to do this, and for quite some time this seemed to work for both of us. I was working for the Dept. of Juvenile Justice in Kentucky at the time and sometimes didn't get home until fairly late in the evening. So, most of my 2 meter activity was late at night, was brief, or was conducted while mobile.

I did call the local cable company and ask them if there was anything they could do, and the response was "Our technicians were just out and we don't have any leaks." I knew this to be untrue, but decided it wasn't necessary to pursue it further.

❖ Law and Order Disturbed

Now flash ahead a few years. I retired from Juvenile Justice after 23 years of service due to health issues. This was about five years after I moved into the subdivision. Now I had plenty of time to play radio. I had upgraded to Extra by this time and was also a lot more active on 2 meters. I have many friends all over the region on 2 meters and there are a large number of repeaters I can "bring up" from my location, but sometimes this requires 50 watts.

It wasn't long before the calls began again. Same scenario: different TV program. Now I was – no pun intended – interrupting "Law and Order." This show was apparently on *ad infinitum* on the USA network right in prime time for local 2 meter activity and for nets in the region. This was not going to work.

I decided this time I was going to have to come up with a better answer. I told my neighbor to have patience and to continue to call me, but we needed to find an answer together so we both would be happy. He is a Christian man and nice guy, so he agreed.

❖ Laying the Groundwork

I posted an inquiry to the TN Ham e-mail list hosted by QTH.net and waited anxiously. I won't repeat some of the replies I got. Some short-sightedly advised me I should tell my neighbor that I had every right to transmit on 2 meters since it was shared with cable channel 18 but ham operators were the primary tenant. Some wanted me to suggest to my neighbor he take a long vacation in a very hot place run by Satan. Neither of these seemed the neighborly thing to do! After all, I had to continue living next to my neighbor despite what the advice was or what the FCC rules say.

Jimmy Floyd NQ4U responded to my inquiry and said he had forwarded my information to Andy Masters NU5O the Technical Coordinator for Tennessee. He also advised me to make sure my station and signal were "clean" before bringing in the cable company. I did this by checking all connections, cable, grounds and by also checking SWR on all my equipment. I also looked at my transmitted signal with a small frequency counter. Everything appeared to be OK.

When Andy Masters contacted me, I informed him of my results. Then I proceeded to call the cable company. The company had

changed hands since my first encounter, and I had also switched to satellite service via a small dish, so I had no recent experience with them. I was polite in requesting that they send out a technician to check for leaks in my neighborhood and explained that I was a ham operator and what was going on with my neighbor. They said they would pass the word to a technician. At this point I was very dubious that this would get any real results.

However, a technician did show up within a couple of business days with a small RF detecting device. He made a summary trip around the houses on either side and in front of me, and I was not surprised when he told me he could find no leaks. I inquired about the device and he told me it was tuned to cable channel 14 or 121.2625 [250]. I thought to myself, "These guys are only worried about causing interference to aircraft."

I explained that I was having a problem with channel 18. He said he would come back the next day.

Meanwhile, I e-mailed Andy again and he gave me some questions to ask my neighbor. For example: if he had more than one TV, were they all affected? My neighbor replied, yes.

The technician came back the next day and I took one of my handhelds out in front of all the houses and showed him the carrier I was getting on 145.250. I also used a directional 2 meter handheld Yagi from Arrow Antennas to help pinpoint the leaks. (If you are a builder, you can build one yourself.) This did seem to catch his attention, but he was unsure of the explanation and said he would talk to his supervisor.

In the meantime, I also called his supervisor the next day and reminded him very politely of the situation and casually dropped the fact that I was in contact with an ARRL representative and was forwarding all my e-mails to the FCC. I had heard back from the FCC ham representative and they seemed keenly interested in me keeping them informed of my progress. The next day there were three cable trucks at the house and technicians plus the supervisor running around everywhere! I suppose those three little letters can go a long way.

At fist, the supervisor thought they had found the leak at a neighbor's house across the street, where a child's video game may have been the ingress point. This did not prove to be the solution, however, because when it was unhooked it did nothing to help the problem. Also, this neighbor's house was on a different cable run.

❖ Elusive Success

In the meantime, Andy Masters had sent me some really nice snap-on toroids free of charge to place on my equipment and for my neighbor to place on his television cables. This is accomplished by winding the cable three times through the toroid and making a small coil of six turns on the cable at the TV hookup. We did find that this reduced some of the interference to a couple of TVs in my neighbor's house but not to the primary one. I can't thank Andy enough for his generosity.

Heartened by a little success, I contacted the cable company again and the supervisor told me he was still working on it. One of his coworkers up the corporate chain was a ham and he was in contact with him for advice. (I'm sorry I never got his callsign. It was about this time that the supervisor asked me more about ham radio and how to get a license. A future convert?)

The technician began about a two-week search in the neighborhood for leaks and ingress points, whenever we could coordinate our schedules. I loaned one of my Family Radio Service radios to the primary tech so he could tell me when to transmit. Over those two weeks we got all the leaks sealed. The cable guys placed an analyzer into the system and "listened" for my signal as well as driving around injecting their own signal with a CB radio.

We also were able to eliminate all ingress points right up to my neighbor's main TV. It appeared that the shielding on the TV and the closeness of my transmitter on 2 meters just weren't going to get along. We, of course, had to tell my neighbor that this appeared to now be a TV manufacturer issue. I was pleasantly surprised that he had been listening to me when I had warned him that this might turn out to be the case and I had casually dropped the idea of satellite service to him as well. He immediately purchased and installed a small dish.

My neighbor was satisfied, the cable company was satisfied (even though they lost a customer), and I was satisfied. Since then I have been playing on 2 without phone calls and without worry. "Law and Order," at least for my neighbor, has been restored.

❖ Lessons Learned

In summary, if you have this type of problem, try to remember the three P's: Politeness, Patience and Persistence. I can't stress this enough. There were times when I could sense my neighbors' patience with all the visits from the cable company and the supervisor's patience were getting thin. If I had responded with anger or arrogance we might still be having problems.

Don't get discouraged with the time it takes or the scheduling conflicts. It's important, but it's not life and death. A little work on it as you find time will go a long way and you even find a bit of enjoyment in the problem solving area of it. Be firm but not rude.

❖ Postscript

There may still be interference to some of my neighbors' TVs in the neighborhood, but it seems reasonably sure now that it's not due to cable leaks or to my station operating improperly. In retrospect, I made mistakes by not pursuing this early on and perhaps even in taking all the responsibility on myself. I now think I should have firmly stated to all my neighbors that I would ensure that my station was properly operating while educating them about Ham radio and I would ask them to contact the cable company themselves. Hindsight is 20\20.

If you should encounter this problem, there are people at the ARRL and FCC who can help you. The website at **www.arrl.org** can provide you with the Technical Coordinator in your area even if you're not a member. I am pleased to say Andy offered me a position as Tennessee's District 9 Technical Specialist as a result of my experience.

Also, the e-mail address *fccham.fcc.gov* will put you in contact with a ham representative at the FCC.

I would like to thank Andy Masters N5UO, Tennessee ARRL technical coordinator, and Jimmy Floyd NQ4U, the FCC ham representative, as well as all the Ham and non-Ham employees at Communicom Cable in Tazewell, Tennessee, that helped in this matter. If you have any questions about my experience please feel free to e-mail me *w4tey@bellsouth.net*

WiNRADiO's G313e HF Receiver

By Lee Reynolds, KD1SQ

WiNRADiO (the brand/trading name of Rosetta Labs in Australia) are continuing to expand their well-received range of computer-controlled Software Defined Radio (SDR) offerings for HF reception. Starting with the entry-level internal PCI card G303i back in 2003, WiN-RADiO went on to produce the entry-level external G303e in 2004, and the professional-level internal PCI card G313i later that same year. All are excellent radios aimed at slightly different markets or user needs. WiNRADiO completed the line-up of radios in 2005 with the professional-level external G313e, thereby giving the customer a two tier choice in radios and setups for either in-PC use or external configuration.

The G313e is WiNRADiO's external model of their top of the line G313i PCI card HF receiver. Covering 9 kHz through 30 MHz *(an option is available for it that extends coverage to 180 MHz),* the size of a thick paperback, the durably cased, USB-connected receiver is powered by a 12vdc power supply, which means that this receiver can be used with a desktop or laptop computer system at home, mobile, or in the field.

Cosmetically almost identical to the lower-cost entry-level G303e (only differing in having ventilation slots in the case), the G313e is a product aimed at the commercial, governmental and high-end hobbyist market with its improved specifications, stability and abilities/tools. Out of the box, the G313e will receive all the conventional modes plus less conventional ones (synchronous AM, ISB, DSB) and is DRM-compatible. (Just add the WiNRADiO DRM plug-in, buy the license key, and it's ready to go – no muss, no fuss.)

Additional software packages can add reception of various digital modes, more sophisticated audio processing, frequency database management, and network/internet based client/server control of the radio. Free plug-ins for the radio are also available that add interesting new capabilities to the device, such as 3D spectrum waterfall displays,

Receiver type	DSP-based SDR with DDS-based dual-conversion superheterodyne front end
Frequency range	9 kHz - 30 MHz (optionally 9 kHz - 180 MHz)
Tuning resolution	1 Hz
Mode	AM, AMS, LSB, USB, DSB, ISB, CW, FM
Image Rejection	1.8-7.3 MHz: 80 dB 7.3-30 MHz: 70 dB
IP3	+8 dBm @ 20kHz
Spurious-free dynamic range	95 dB
MDS	-135 dBm
Phase noise	-148 dBc/Hz @ 100 kHz
Internal spurious	Less than equivalent antenna input of -115 dBm
RSSI accuracy	2 dB
RSSI sensitivity	-137 dBm
Bandwidth	50 - 15000 Hz (adjustable in 1 Hz steps)
Scanning speed	400 steps/s (at 1kHz steps)

different radio tuning tools, signal strength logging/display of a frequency over time, and channel occupancy over time.

Specifications are good and, as is to be expected, the additional built-in IF DSP circuitry allows for improvement in performance; sensitivity, image rejection, phase noise and IP3 figures are all improved over those for the G303e.

Readers who have the August 2005 MT with my '303e review in it might want to compare that article's illustrations, receiver specifications and block diagram with the ones in this article. The G313e is definitely more complex than the G303e, and the difference between the control boards is an interesting illustration of how a little additional hardware can make a large difference in an SDR's software capabilities.

❖ What's in the box?

The G313e package contains the following items:
- The G313e itself
- 120v ***Linear*** Power Supply *('Linear' is a nice touch – that means no nasty wall wart RF hash such as is common with 'switched' power supplies!)*
- USB cable
- SMA-BNC adaptor
- A simple 'get started' antenna
- CD containing software
- User's manual

How to install?

Connection of the G313e to the computer is simple, the connectors and cables unambiguous. Connect the antenna to the SMA connector, either directly or via the needed SMA adaptor, attach the USB cable to the receiver, plug the other end into your computer's USB port, plug in the power supply. Done!

Software installation is simple and follows the pattern of any normal USB device. One recommendation – allow the installer to place the graphic user interface (GUI – the radio controls displayed on your screen) application in the default directory it suggests: If you're anything like me you're always messing with things, but I find that the WiN-RADiO software (GUI App., plug-ins, etc.) is happiest in its suggested default location.

❖ How well does it work?

As is to be expected, the G313e performs identically to the G313i. The graphic user interface is the same and the test bed CPU load for the external model stands at approximately 33% for a system with a 2.4 GHz Pentium-class CPU. The software, as usual, is stable. *(Most reports of software problems I've seen on the 'net for this model appear to be caused by external factors, not by any deficiency in the WiNRADiO application code.)*

Using my standard test/comparison setup of an Alpha-Delta DX Ultra antenna feeding a Stridsberg multicoupler feeding the G313e, an ICOM R-75, ICOM R-8500 and a JRC NRD-525, I put the beast through its paces by digging around after various signals and modes of interest across its specified spectrum of coverage.

Performance on LF/MF/HF -

LF coverage was good, yielding excellent audio on weak beacons and utility stations. I did like the quality of reception up in the 120-520 kHz range and found the variable bandwidth filters and realtime spectrum display very useful in winkling out the weaker beacons. It does a creditable job across the rest of the LF band.

On MF I puttered around in the AM band, maritime frequencies and Tropical band, seeking out interesting tidbits and problematic signals. Overload from strong AMers did not appear to be a problem; images were, as far as I could tell, nonexistent. Sensitivity was good; separating signals was easy, especially with the continuously variable bandwidth filters and passband tuning.

HF testing showed similar characteristics. The steep skirts of the DSP-derived filters proved to be useful when copying densely packed digital signals such as BPSK in the amateur 14 MHz band around 14.070 MHz – you often find one or two huge signals in amongst them that'll pump the receiver's AGC, causing weak signals alongside them to disappear unless you have very good filter selectivity. This is also useful in the BC bands when you're trying to pull Nibi-Nibi out from under Deutsche Welle's killer signal.

Frequency stability and accuracy was excellent across the entire tuning range of the radio and excelled that of the G303e. There were no tasks I could set the device that the radio couldn't perform.

Audio –

This is always a very subjective criterion. Give four SW listeners the same radio to test, ask how they liked the audio, and you'll get four different answers. The G313e uses the controlling PC's sound system for audio, so how good it can sound will depend on how good or bad your computer's speakers are. I use good Logitech speaker/subwoofer setups on my test bed PC so I can easily hear if something's not right.

On a good AM/SW signal I could open the filters up to between 7 and 10 kHz bandwidth and get very clean-sounding audio from the rig. DRM is even better, and the limiting factor there appears to be the bandwidth of the encoded audio being transmitted. *(It is a change to have something like that be the determining factor in how good a SW signal sounds… Of course, DRM is **not** a DX mode.)*

❖ Features and Tools

The G313e has a wide range of tools for studying and manipulating signals. It's kind of interesting to consider that for a hobby which is intensely auditory in nature, *visual* tools add such a huge punch to what you can do with a signal. Apart from the realtime spectrum display of an up to 10 kHz wide segment of the band on either side of your tuned frequency, the G313e now sports two wideband spectrum displays: one for use with the conventional receiver GUI, the other a larger one that replaces the receiver GUI entirely. All the spectrum displays now have an improved resolution down to 16 Hz.

Both Bandpass Tuning and IF Shift tuning are now available to the user, and tools exist for establishing the deviation of a received FM signal or depth of modulation of an AM signal. There's the ability to easily record received audio but, more usefully, also the ability to record what amounts to 20 kHz of RF spectrum so that you can grab that weak signal and then play it back, trying out different combinations of receiver settings for best reception… Or you can record 20 kHz of closely packed digital signals and decode each one in turn at your leisure.

S-meter accuracy has been improved (as a result of the additional built-in DSP circuitry mentioned below) and the S-meter still has more ways to be used and to display signal strength information than anything else I've seen. Lots of goodies, and all improved by the fact that they have easily understood *graphical* controls hung on 'em.

❖ Judgment

I give it first place amongst the four receivers. I believe that time and continued use of receivers of this class and type has given me an increased appreciation of such devices and I so vote accordingly. All performed creditably; there was no signal that the G313e
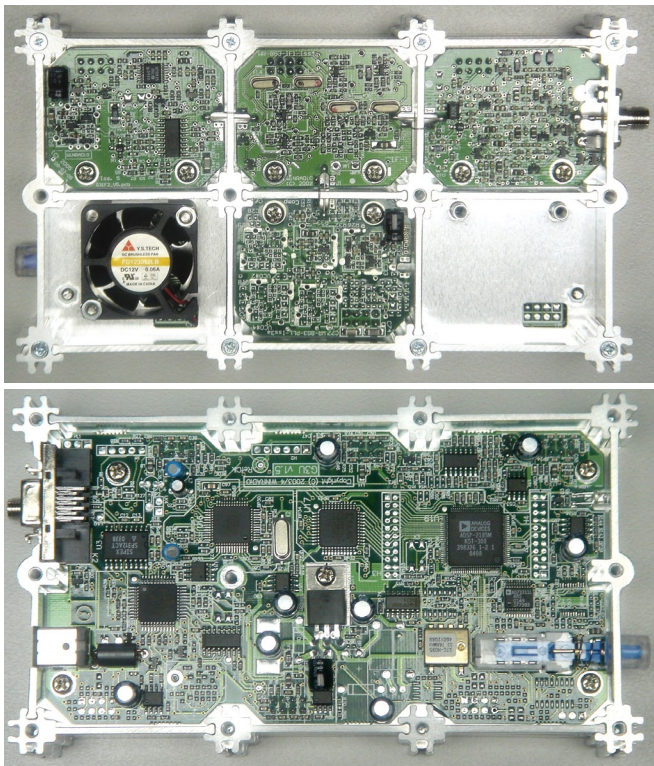
could hear that the NRD-525 couldn't, but the "Swiss Knife toolkit" inherent in the G313e's feature set for improving and/or analyzing those signals made it the winner.

❖ What's inside it?

As usual, I'm curious as to what's inside devices like this, so I try to chase down as much information as I can as to the contents. One thing I've noticed with all the SDRs I've encountered is that "less is more" as regards the apparent complexity of the device. Although the circuitry is vastly more complex than that of old-line receivers, the component count is usually smaller and the layout looks far less intimidating than, say, the guts of a Collins R-390.

In keeping with WiN-RADiO's strategy of trying to design hardware that's future-proof, a look inside the case of the G313e is an illustration of this thinking in action. What you see is a very close relative of the G303e that shares PCB design, much circuitry, and many components, yet is able to offer performance and abilities beyond those possible with the G303e.

Overall case construction is very sturdy, PCB design is clean and layout/component complement is very similar to that of the G303e. A close look does reveal a few obvious differences, the biggest being an internal cooling fan installed on the

RF deck side of the case. Inquiry and a little live testing indicate that it's more for peace of mind rather than a necessity. (It's probably only really needed by the models used in confined spaces in humid, tropical environments in service of mysterious governmental customers.)

The second noticeable difference is on the Control/IF board – You'll see the fairly large DSP chip and associated components that perform similar functions to those provided externally by your sound card for the '303e model. The DSP chip used to replace your PC's sound card is an ADSP2185 manufactured by Analog Devices. This chip helps give the G313e better dynamic range, higher signal sampling rates, and improved spectrum display resolution, among other things, than is possible with an ordinary sound card.

(If you have the G303e review available to you, you'll notice that the PCB is silkscreened for the devices that exist on the G313e. Logically extrapolating, I asked about the remaining empty spots on the G313e PCB but I'm given to understand that if WiNRADiO told me what goes there for some customers, they'd then have to kill me. Apparently it's not for future consumer use!)

The block diagram for the receiver is included here to provide a coarse overview of the design of the device. The ADC and DSP components appearing at the bottom of it are specific to the G313e's diagram and represent the built-in "sound card" functionality of this model.

❖ Summary

Out of all of the HF radios I've owned over the years, if I had to choose only one, I think that I'd have to select the G313 in either its internal or external incarnation. I *am* still a fan of the old style standalone non-SDR radio – like most of you I grew up with radios with knobs and dials and I'm still a little more comfortable with them under many circumstances. A lifetime's tuning habits don't die easily.

(Conversely, today's kids find the concept of analog tuning devices to be 'quaint' at best. Remember when TVs had *rotary* tuning knobs? Not in the lifetime of most 25 to 30 year olds now.)

That said, I still have to rate the G313i/e as the most flexible and fully featured radio I've encountered (or could afford) thus far. …It does too much, too well, and too flexibly to not be given the praise and credit that it deserves.

If you want an all purpose radio that's a good performer and is packed with useful features and tools that don't exist in any other radio of its price class, this is the one to buy.

The WR-G313e is $1,149.95 from Grove Enterprises (call 800-438-8155 or visit www. grove-ent.com)

MT REVIEW
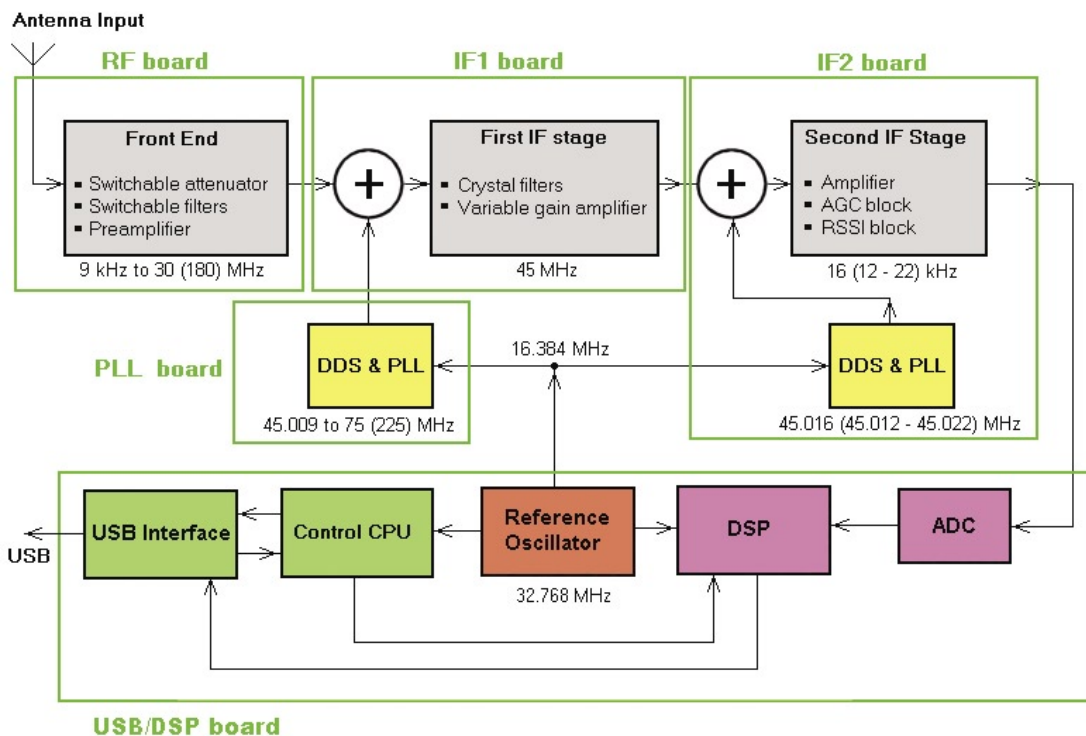
Heil Clear Speech Speaker

By Ken Reitz KS4ZR

As a longtime short wave and medium wave listener, I've tried many ways to get better audio from my radio. Mostly it's my radio's fault: it's got a dinky little 2-inch speaker which fires through the top of the radio and directly into a shelf; it has audio circuitry designed to reproduce a narrow range of the audio spectrum; and it has no capability for modern Digital Signal Processing (DSP).

To help, I've added small speakers which simply redirected the sound but didn't improve it. I've added a powered hi-fi computer speaker, but the sound was too bassy. I've added a speaker and a graphic equalizer but I still couldn't do anything about atmospheric or man-made noise on the bands. So, I just gave up and lived with the fact that I simply expected too much from my radio. Or so I thought.

❖ Heil Sound Comes Through

Bob Heil, K9EID, has made a very successful career out of cleaning up the garbage left by the oversights of radio manufacturers. As with his successful Heil Pro series microphones for hams and his Quiet Phone active noise canceling headphones, he's simply improving the audio where the world's big manufacturers came up short.

Throughout the last 15 years there have been many attempts to fix the HF audio problem, but now, thanks to a combination of audio technology and electronics, the Heil Clear Speech speaker may just be the answer.

The Clear Speech speaker is housed in a sturdy 5" x 5" x 8" black plastic cabinet with a strong metal mesh grill. On the right of the front panel are controls for on/off, volume, tone, a five position DSP switch and headphone jack. The back has jacks for power (12 volts); input from your radio via 1/8" audio cable; and a jack for an external 8 ohm speaker. There is also a removable mobile mounting bracket. Connecting a pair of headphones mutes the speaker.

❖ Clear Speech in Operation

This speaker couldn't be easier to use. After joining the speaker to my radio via the mono audio patch cord (included) and using a 13 volt 300 mA wall transformer (not included), I was set to experiment with shortwave and amateur radio audio.

According to the brief but useful instruction sheet, the volume control should be set to 5 o'clock, the highest position. The tone control should be set between 10 and 5 o'clock, depending on your listening preference. The DSP control in the 0 position by-passes the DSP circuitry and it really shows the difference between the unaltered signal and the various levels of DSP.

I found that the narrower the bandwidth of the transmission, the less DSP I could use without the signature ringing sound that accompanies digital audio processing. For instance, listening to a 75 meter side-band net in the morning, I set the DSP to 1 and virtually eliminated background hiss and light static crashes. Listening to AM signals from the international broadcasters was similarly improved, but I could go up to 4 or 5 on the DSP switch, depending on band conditions and station signal strength. The audio from the Clear Speech speaker was crisp with none of the mushy bass sound heard from powered computer speakers. It was not distorted either, despite being cranked up to a level great enough to fill a large room.

Here are two important notes for hams: It's recommended to use a separate 12 volt d.c. power supply and not the power supply you use to power your transceiver. And, if you run a linear power amplifier and there is stray RF present in your shack, you'll have to use a ground wire (included) which plugs into the external speaker connection and attaches to your station ground system.

Each speaker is tested under harsh stray RF conditions at the factory before being shipped. I found that at 100 watts and lower there was no problem with RF in the audio.

❖ Last Word

Don't look for this or any other speaker to do away with the main problems of analog shortwave listening: fading, weak signals or bad audio from broadcasters. No amount of digital trickery will help. Instead, consider upgrading to a better receiver and/or put up a better antenna.

If you're tired of battling mushy audio from tinny speakers, irritating atmospheric static and want to be able to listen at a volume which won't cause distortion in the little speaker which came with your radio, try the Heil Clear Speech speaker. Cost is $210 plus shipping and handling. It's available from several *MT* advertisers or direct from Heil Sound, LTD 618-357-3000 or visit the web site at **www.heilsound.com**

Heil Clear Speech Speaker on your desk or in your vehicle. This small package delivers a big sound from your shortwave receiver or ham transceiver. (Courtesy: Heil Sound Ltd.)

John Catalano, PhD
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YPlog Radio Control and $20 Memory

Over the past years we have looked at quite a number of radio control and logging programs. This month we'll look at yet another one. The freeware program, YPlog, performs functions you just may need as a radio monitor or ham operator.

Also, how would you like to have a few Megs of portable memory in your pocket for under $20? (But, there is a catch.)

First, let's check out YPlog.

Made for Hams, Useful for Monitors

YPlog was made with ham operators in mind and therefore includes lots of ham related functions such as keeping track of contest parameters. However, radio monitors using Icom, Kenwood and some Yaesu/Ten-Tec radios can also use its logging and radio control functions. YPlog's logging functions can be used even if you don't have a compatible radio.

Required PC

YPlog, version 4.48, works with just about any PC running Windows operation system WIN95, 98, ME, NT or 2000. The YPlog web site (**http://members.shaw.ca/ve6yp/**) does not say anything about the minimum PC requirement. YPLog 4.48 worked great on a Pentium I, 233 MHz, with 256MEG of RAM PC. A screen resolution of 1024x768 is recommended; however, it will work at 800x600.

Two Flavors

The program comes in two forms – a free, but limited function version and the full registered version, which costs $50. It can be downloaded from the above web site. Many of the important functions are available in the free version. Check the YPlog website for the functional differences between the registered and unregistered programs.
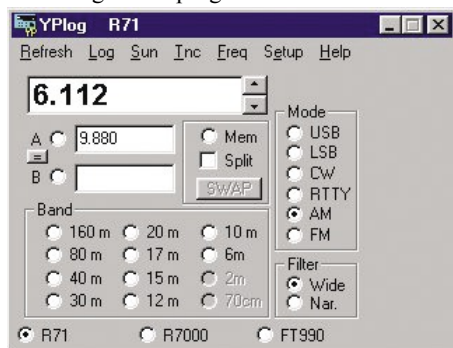
Figure 1 - YPlog's simple to use, yet comprehensive, main radio control screen.
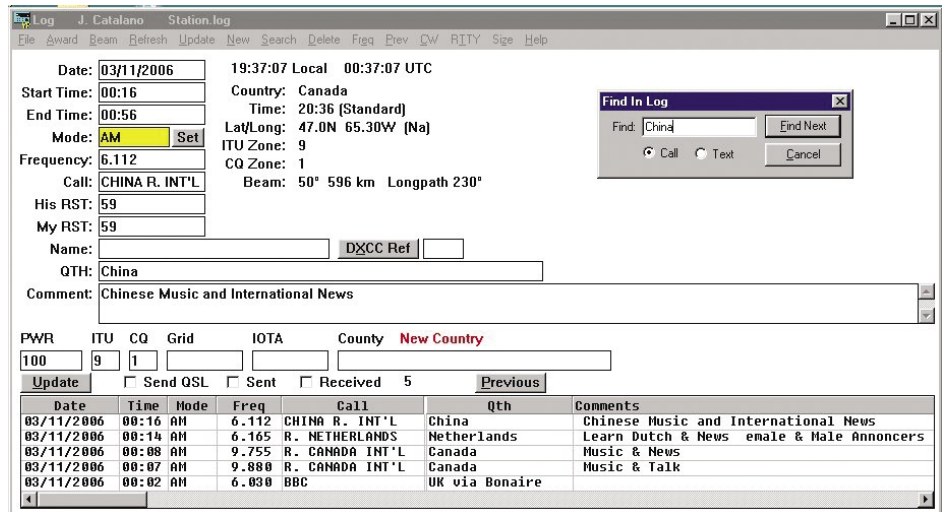
Figure 2 - The logging screen of YPlog. Again, simple, yet comprehensive.

Lots of Radios!

Figure 1 displays YPlog's simple, yet comprehensive, main radio control screen. Using the "Setup" menu in the Command line at the top of the screen, the user can choose three radios, from the many supported radios, to be controlled by the program. The supported radios include transceivers, shortwave receivers, VHF/UHF receivers and even a handheld.

The YPlog controllable radios include: for ICOM R9000, R8500, R7100, R7000, R72, R71, R10, IC271, IC275, IC375, IC471, IC475, IC 575, IC706, IC707, IC718, IC725, IC726, IC728, IC729, IC735, IC736, IC737, IC738, IC746, IC751, IC756, IC761, IC 765, IC775, IC781, IC820, IC821, IC910, IC970, IC1271 & IC1275. It's possible to operate other Icom radios if you know the ICOM address.

The Yaesu lineup includes FT1000MP, FT1000MPV, FT1000, FT1000/D, FT100, FT990, FT847 and FT817. Other Yaesu models, such as the FT890, FT900 and FT900, should work, but have not been tested.

Most Kenwood radios are supported and it can control Ten-Tec's Omni-IV, Paragon-II, Argonaut-II and Delta-II.

Three Radios at Once

YPlog's main radio control screen, Figure 1, is self explanatory and easy to use. First, one of the three loaded radios is selected at the bottom of the screen. Here the dot indicates we are using an ICOM R71; however, two other radios are just a click away.

Radio Tuning

Tuning the radio can be accomplished via a number of methods. The easiest is to enter the frequency in the large box at the top left of Figure 1. In the full version the up/down arrows to the right of the frequency can be used to increment the tuning.

The mouse can be used to tune your radio. The parameters for this tuning method are set in the "mouse tuning rate" screen under the "Setup" menu.

If the radio has two VFOs and/or memory channels, these can also be selected from the main screen. These controls are located below the large frequency entry box.

For ham operators, quickly switching bands is made easy by selecting the band, i.e. 80m. The start and end frequencies for each of these bands and the modes for sections of the band can be modified in the "ham band limits" screen under the "Setup menu." The radio's mode and filter can be selected in their respected "boxes" seen in Figure 1.

Manual Radio Tuning

Even with a computer keyboard at the ready, who among us doesn't occasionally just like to reach out and take hold of the big tuning knob, the good old way? I know I do. Unlike other programs, YPlog's screen will reflect what you manually do to the radio. Change the frequency or mode from the radio, and the computer's display will follow. I really like this function, which is missing on many similar programs.

Logging Stations

Clicking the "Log" command at the top of the Main screen, Figure 1, brings up YPlog's log and all its features as in Figure 2. The boxes at the top left of the screen are where the user enters new log entry details. The frequency that is in use (shown in the large box in Figure 1), as well as date and time, is automatically transferred to the log screen.

Here you can see that we have logged China Radio International on 6.112 MHz. A number of boxes are designed for ham use, such as contest details and "My RST" which is a signal report *from* the station contacted. These we have simply left blank.

Once we have filled in the appropriate boxes and selected "Update," the new station is entered in the log. Logged stations can be perused and selected in the lower section of Figure 2. The log is saved to disk using the "Save" under the "File" menu.

Searching the Log

In Figure 2 you may have noticed a window on the right labeled "Find In Log." This appears when the "Search" command is selected from the top of the log screen. Since we are looking for log entries on Radio China, we have put "China" into this box.

Two types of searches are possible, Call or Text. The first compares your search input to the log's Call field entries for a match. The Text search looks in all the fields in the log, Date, Time, Mode, Freq, Call, QTH and Comments. Although YPlog's search function is basic, it works quite well and relatively fast even on a slow PC.

Tiny Issue for Monitors

Since YPlog was designed for hams, the program attempts to identify the location of the logged station from its call as entered by the user. This then automatically generates logged station's geographical details, such as Country, listed to the right of the entry boxes as well as in the contest info line. For ham calls it does an excellent job.

However, for shortwave broadcast stations, this feature generates incorrect information, if the Call box is used to identify the station by name as we have done. If you don't use the Call box for the station name, you cannot use the Call search. As we said, it's a tiny problem.

Lots of Function!

This program is so feature rich we cannot cover them all. In fact we cannot even mention all of them.

YPlog's logging functions include CW/SSB keyboard messages, PSK31 support, RTTY, log printing, CDROM (Amateur Radio Call Book, Buckmaster & QRZ) call books, beam headings, dup-checking, QSL label printing, and export to database. Award tracking is provided for DXCC, ITU/CQ zone, IOTA. Grid Locator, and Counties. File import and export is possible with ADIF or delimited files. Multiple computers can be networked for SO2R type of operation or to share devices such as packet cluster access or rotator control.

YPlog's ham contest features are very comprehensive, including 70 contests in the contest calendar, complete display of points and multipliers, fully networked multi-multi or multi-2 contesting with automatic sharing of log data and a CW keyboard. And that's not all of YPlog's extensive features and functions!

A "Grey Line" screen, displaying the sun's terminator in real time, is another thoughtful and useful feature.

User Impressions

YPlog installed quickly and simply, did everything it said it would easily without any computer glitches, is intuitive to use, and works on just about any PC. What more can you ask for from a free or full featured $50 radio control and logging program! However, although I have emailed the author a number of times I have not received a reply. So support and timely communication may be an issue if you run into a problem.

If you are into ham contesting you *must* try YPlog. If you are a radio monitor looking for a simple to use, yet powerful radio control and logging program, you really *should* try YPlog. It ranks in the top ten control and logging programs I have used.

❖ Gigabytes in Your Pocket

Got an old laptop? If you are like so many of us, you have an old laptop kicking around the house that you no longer use, so listen up. With the addition of $20 you could already own a multi-gigabyte, portable, memory device! Don't believe it? Read on.

What's Needed?

All it takes are two things. First, an old 2.5 inch IDE (ATA/ATAPI) laptop hard drive with a height of up to 11 mm. (That's the catch.) Then you'll need the USB 2.0 Slim External Enclosure, item number 1630179, from Cyberguys **www.cyberguys.com** for $19.95 plus shipping.

Figure 3 shows the hard drive being installed into the aluminum case. Total size is 2-7/8"L x 5-1/8"W x 1/2"H, almost shirt pocket size. It works with Windows 98SE/Me/2000/XP and MacOS 8.6+ computers with a USN\B port. You can expect data rates up to 480Mbps.

Getting Started

I took apart my old unused laptop and found a 6.1G hard drive. Following the very simple instructions, the hard drive attaches to the enclosure's electronics via the drive's connector. That's it!! Assembly is complete.

If you are using Windows XP all you need do is attach the enclosure to the USB port with the included cable. If you are using Windows 98SE the included driver requires a simple and fast installation.

You now own a hot-swappable, plug and play, very portable memory storage device. I now have 6.1 Gig of portable memory that I take everywhere.

How Does It Work?

Great! Once plugged into your USB port,

Figure 3 - Just add an old laptop hard drive to the $20 compact, self-powered, multi-gigabyte memory device enclosure.

it acts just like a system hard drive and is accessible from the "My Computer" screen. I suggest that you re-format the drive with a right click and then run Disk Scan before you use it for the first time. This will remove all garbage on the drive, insure its data integrity and give you the maximum memory and piece of mind.

OK. So it's not as small as a jump drive. But how much would a 6 Gig jump drive set you back? Certainly not $20! Just make sure that the thickness of your hard drive is not greater than 11 mm.

Constant Companion

This is one of my favorite and most useful pieces of computer gear that I own … and all for $20! This unit from Cyberguys comes with the metal enclosure and electronics, a USB cable, an external power cable (which I didn't need), detailed instructions, driver CD, and even a carrying pouch.

While you are there, check out the Micro USB Hub 4 Port, item number 1040479. This tiny, self-powered device expands the single USB port to four ports and costs just $9.95. Just what was needed to run last month's Radio-Control with its USB dongle and, at the same time, the USB External Drive memory to store this column. Tell Cyberguys you saw it in the "Computers & Radio" column of *Monitoring Times*.

❖ Till Next Time

With globalization, developments in the already-fast paced electronics industry are accelerating! Research in solid state and display devices that I was involved in over the past twenty years are now becoming consumer realities. In the next five years we will witness products that would have been considered science fiction just five years ago. If you think you've seen great technological change in your life so far, just hold on tight for what's coming next.

Elecraft KX1 on 4 Bands

Elecraft kits are known and loved by low-power (QRP) operators for their simplicity and portability. Now, with the introduction of the KXB3080 option, the Elecraft KX1 ultra-portable transceiver can cover up to four bands. The basic KX1 covers the full 40 and 20-meter bands, but with the addition of the dual-band KXB3080 module it will also cover 80 and 30 meters.

KX1 revision 1.02 firmware is included at no charge with the KXB3080 option. The new firmware also adds a scanning feature, useful for monitoring quiet bands. Scanning proceeds in "live" (unmuted) fashion, allowing the operator to hear even very weak stations. In emergency situations, scanning could help the operator find a strong local station they could contact even with weak batteries or an inefficient antenna.

With the KXB3080 installed, the rig's DDS VFO allows reception from 1.0 to 16.5 MHz, which includes many popular shortwave broadcast bands. While signals outside ham bands are attenuated, it is still possible to copy strong stations even in the commercial AM broadcast band. The KX1 transmits only in CW mode, but it can receive SSB and AM signals, thanks to its variable-passband crystal filter.

The 4-band KX1 includes internal automatic antenna tuner, internal batteries, and clip-on keyer paddle. The enclosure measures just 1.2 x 3 x 5.3 inches, and the transceiver weighs just 9 ounces (11 ounces with both the optional ATU and keyer paddle installed).

The KX1 CW transceiver kit by itself is $289. The KXB3080 option kit is priced at $65. (A 30 meter-only option is also available for $29.) Orders can be placed via Elecraft's web page at **www.elecraft.com** or directly by phone at 831-662-8345.

Emergency Power for Radio Communications

As you read this issue of *Monitoring Times* we are a little more than one month away from the 2006 Atlantic Hurricane season. If this new season is half as active as last year's record breaker, amateur radio operators and radio hobby enthusiasts will be busy at the dials.

But what if you are in the path of one of these tropical cyclones? What will you do when the power goes out? When all else fails...how will you communicate?

That is the subject of a new and unique publication from the American Radio Relay League (ARRL), *Emergency Power for Radio Communications* by Michael Bryce, WB8VGE.

With *Emergency Power for Radio Communications*, you will explore the various means of electric power generation – from charging batteries, to keeping the lights on. This book covers the foundation of any communications installation: the power source. Use this book to plan ways to stay on the air when weather or other factors cause a short-term or long-term power outage. Find ways to reach beyond the commercial power grid. Identify methods for alternative power generation that will work best in your particular situation, perhaps taking advantage of possibilities already on hand.

Some of the more interesting topics explored in this well-written, illustrated book include: Keeping The Lights On In The Ham Shack With Emergency Power, Solar Power, Charge Controllers for PV Systems, Generators: Gas, Wind and Water, Holding Your Volts: Battery Systems and Storage, Systems for Emergency Power, Safety, Emergency Practices, and much more. It also includes selected emergency power projects and information from the pages of *QST* magazine.

This softcover first edition (ISBN: 0-87259-953-1), can be ordered from the American Radio Relay League website (**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 ARRL catalog number 9531 – $19.95 plus shipping.

National Radio Club Antenna Pattern Book - 6th Edition

Spend any time tuning the AM broadcast band and you will soon realize that some nearby stations you should hear during daylight hours you won't, and others you hear in the day won't be heard during the nighttime hours. A book from the National Radio Club – the *National Radio Club Antenna Pattern Book* - 6th Edition – holds many secrets to receiving AM radio stations in the United States, Canada, and parts of Mexico.

Let's say, for instance, you want to log XEWA on 540 kHz from Mexico at your location. But try as you might, you can't hear the station. Is propagation your nemesis? Or is it a directional transmit antenna pattern of the station itself? You can check it out on the 540 kHz map graphic from this publication.

The patterns contained in this edition approximate each antenna pattern's shape and bearing, as generated by a computer program written by NRC member Neil Adams.

This edition of the *Pattern Book* is one of the most exhaustive to date, as it includes daytime patterns for the first time. Daytime patterns are depicted by a dashed line as opposed to the nighttime pattern defined by a solid line. Patterns are illustrated showing their intended shape and radiated power, but not necessarily their actual coverage area, which is subject to a number of variables.

Also new to this edition are maps of the six "Graveyard" frequencies: 1230, 1240, 1340, 1400, 1450 and 1490 kHz. Generally, Graveyard stations all operate with a maximum of 1 kW, and their coverage is limited to 30-40 miles during the daytime, while nighttime coverage is limited to 10-15 miles due to skywave propagation interference. Only a few operate with directional antenna systems, which are illustrated.

Only Mexican stations in the states bordering the United States are included – Baja California North (abbreviated BN), Chihuahua (CH), Coahuila (CI), Nuevo Leon (NL), Sonora (SO), and Tamaulipas (TA) – plus stations elsewhere which are easily heard in the U.S. and Canada.

Three hole punched and updated through November 1, 2005, the *NRC Antenna Pattern Book* is designed to be used with the NRC *AM Radio Log*. Mexican stations can be cross referenced with the IRCA *Mexican Log*.

You can order this book and many other publications off the NRC web pages (**www.nrcdxas.org/**) with your credit card using PayPal, or you can order by mail at: National Radio Club, Inc., Publications Center Order Form, P.O. Box 164, Dept MT, Mannsville NY 13661 USA. NY residents add appropriate sales tax; prices are "postage paid" to your location. Checks payable to National Radio Club, Inc. in U.S. Dollars.

The *NRC Antenna Pattern Book* prices: Member US/Canada $16.95, non-member US $22.95; non-member Canada and all overseas $25.95.

Book reviews by Larry Van Horn, N5FPW

Stock Exchange

Attention all those wanting to know what's going on with ham radio in the New Orleans area, check out: **http://groups.yahoo.com/group/GNOAmateurRadio/**

Time to Renew? Your label will tell you how many issues remain in your subscription. When it's time to renew, your MT will arrive with a bright yellow cover sheet with the renewal form. Renew by the second notice to avoid missing an issue!

Re_Inventing Radio through Innovation

E1XM $500*

The E1XM is the world's first radio to combine AM, FM, Shortwave, and XM Satellite Radio Ready technology into one ultra-high-performance unit.

_ AM/FM/Shortwave/XM Satellite Ready Radio
_ 1700 station presets
_ Digitally synthesized PLL tuner with synchronous detector
_ Passband tuning, selectable bandwidth filters and Selectable Single Sideband (SSB) reception
_ Dual conversion superheterodyne circuit design
_ Stereo line-level audio inputs and outputs and external antenna connections
_ Dual Clocks and programmable timers
_ Headphone jack
_ Built-In Antenna: telescopic antenna for AM, FM and Shortwave reception
_ External Antenna Connection for the addition of auxiliary antennas
_ Calibrated LCD signal strength meter
_ Power Source: 4 "D" Batteries (not included); AC Adapter (included)
_ Dimensions: 13"W x 7-1/2"H x 2-1/2"D
_ Weight: 4 lb 3 oz.

E5 $150*

AM/FM/Shortwave Radio

The E5 is the world's leading multi-band and Single Side Band (SSB) enabled radio, uniting performance and mobility into one compact unit, and bringing the power of local and world radio into the palm of your hand.

Features
_ FM-Stereo, AM and full-Shortwave coverage (1711-29999 KHz)
_ PLL dual conversion AM/SW circuitry with SSB
_ 700 programmable memory presets with memory scan and auto tuning storage (ATS)
_ Clock, sleep timer and alarm functions with world zone settings
_ Tunes via auto-scan, manual-scan, direct key-in entry and tuning knob
_ Internally recharges Ni-MH batteries
_ Station name input
_ Dimensions: 6-5/8"W x 4-1/8"H x 1-1/8"D
_ Weight: 12.2 oz.

Features are subject to change

E10 $130*

AM/FM/Shortwave Radio

Intelligence meets performance in the E10. With 550 programmable memories, manual and auto scan, precision tuning and alarm clock features, the E10 provides the sophisticated tools for listening to news, sports, and music from around the world. The E10 even allows internal recharging of its Ni-MH batteries (charger and batteries included). With excellent AM, FM, and Shortwave reception, intermediate frequency shift and shortwave antenna trimmer—the E10 gives you the performance you want with the digital ease you deserve.

Features
_ Shortwave range of 1711 – 29,999 KHz
_ 550 programmable memories with memory page customization
_ Manual and auto scan, direct keypad frequency entry, ATS
_ Clock with alarm, sleep timer, and snooze functions
_ Earphones
_ Supplementary wire antenna
_ Power Source: 4 AA Batteries (included) or AC Adapter/Charger (included)
_ Dimensions: 7-1/2"W x 4-1/2"H x 1-1/2"D
_ Weight: 1 lb. 1oz.

E100 $100*

AM/FM/Shortwave Radio

The E100 fits full-sized features into your palm or pocket. This little marvel is packed with all the latest radio features you want: digital tuning, 200 programmable memories, digital clock and alarm, plus AM/FM and Shortwave reception. And, it is small enough to fit in your coat pocket.

Features
_ Shortwave range of 1711 – 29,999 KHz
_ 200 programmable memories
_ Memory page customization
_ Manual and auto scan, direct keypad frequency entry
_ Earphones
_ Power Source: 2 AA Batteries (included) or AC Adapter (not included)
_ Dimensions: 5"W x 3"H x 1-1/4"D
_ Weight: 7 oz.

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