

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

**Monitoring
Times**
A Publication of Grove Enterprises

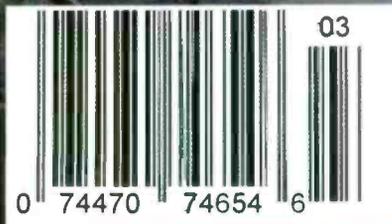
Volume 25, No. 3
March 2006

U.S. \$5.95
Can. \$8.95
Printed in the
United States

Annual Airshow Spectacular!

- > Frequencies
- > Air Show Schedules
- > Equipment

MT Aviation Contest:
Enter and Win the
Kinetic Avionics SBS-1
Virtual Radar (page 69)



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

Discover these Accessories & Add to your Capabilities.



DA3000

Antennas for the Great Outdoors

DA3000: a 16 element receive wideband disccone 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.



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



P25-8600
APCO25 Decoder

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.)

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



TVA-1 External
NTSC TV Converter

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.

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



Authority on Radio
Communications

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Specifications are subject to change without notice or obligation

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

A marine receiver like no other.

At WiNRADiO, the innovation never stops. The new WR-G33EM model represents yet another breakthrough: the world's first PC-based marine receiver.

- Frequency range 9kHz to 30MHz
- AM, LSB, USB, DSB, CW conventional modes
- DSC, HF Fax, NAVTEX, TELEX marine modes
- Very high sensitivity
- Excellent dynamic range
- Real-time spectrum analyzer
- Spot-on tuning in 1Hz steps
- Continuously variable bandwidth 1Hz - 15kHz
- Automatic scheduling, recording and playback
- GPS option



A laptop controlling a WR-G33EM Marine Receiver

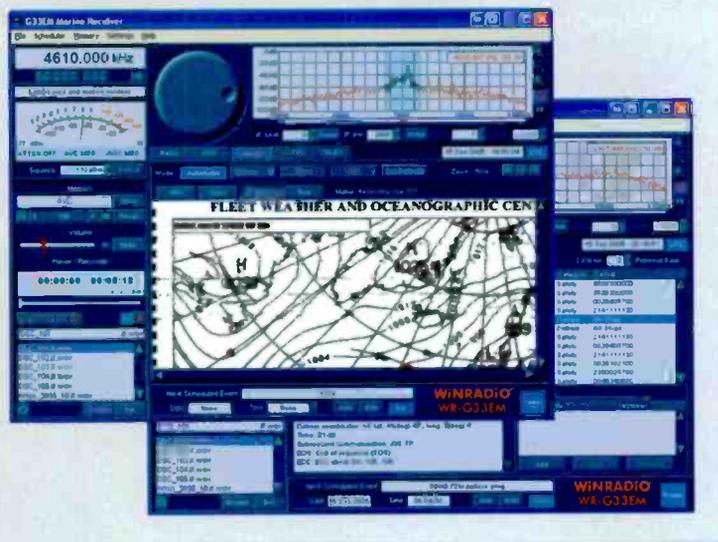
The WR-G33EM receiver easily outperforms a conventional receiver, thanks to advanced signal processing techniques making it possible to implement sharper selectivity filters with more accurate demodulators and decoders.



The USB-interfaced WR-G33EM receiver

The WR-G33EM receiver offers far more features and facilities than a typical conventional receiver. For example, the real-time spectrum analyzer with continuously variable bandwidth, graphical notch filter and IF recording are just some of the many features which were previously unavailable on a conventional marine radio, in particular at such an affordable price level.

All decoding functions are seamlessly integrated with the receiver: Switching from classical AM or SSB modulations to receiving DSC, HF Fax, NAVTEX or TELEX messages is just one mouse click away.



For more information about this remarkable receiver, visit:

www.winradio.com

...the future of radio.™

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 flashlight 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-sterco 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

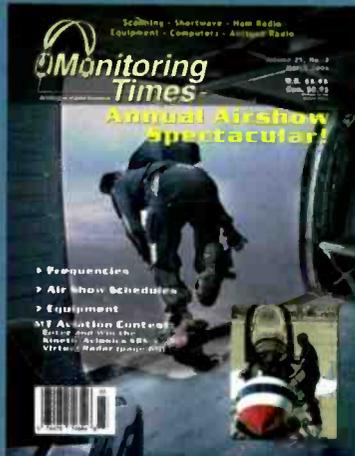
Offering high-tech digital performance and portability, the YB550PE packs performance into a small radio. Palm-sized and only 11oz, the YB550PE can receive AM, FM, and continuous Shortwave across all 14 international bands.

- 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)



*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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Cover Story

MT's Annual Air Show Guide

By Larry Van Horn

Every year, to kick off the start of the air show season in March, we update our annual *Guide to Monitoring Military Flight Demonstration Groups*. Here's the latest in frequencies to monitor, bands to search to find new channels, which equipment to buy, and – of course, the schedule of appearances in 2006.

You'll find the frequency information in our feature article starting on page 10, and the equipment and schedules in the *Milcom* column on page 52.

On our cover: A member of the US Army's Silver Wings parachute team exits a Black Hawk over Harvard Square, Cambridge. Inset: Courtesy Thunderbirds.

C O N T E N T S

WWCR - 15 Years on the Air 14 By Jerry Plummer

Today, it's hard to realize that Christian broadcasting on the shortwave bands was not a common thing back in 1989 when WWCR was finally granted its license and began testing. Fifteen years has seen a lot of ups and downs for this shortwave station which always seems to land on its feet. Will digital broadcasting be part of its winning formula for the future? Tune in the author on **Ask WWCR** and find out the latest.

Propagation Outlook April-September 17 By Tomas Hood

As we head toward the bottom of solar Cycle 23, propagation conditions may not be as good as in years past, but they're not any less interesting or educational. So, what's in store for shortwave and VHF reception over the coming spring and summer? Meanwhile, new methods of analysis are helping scientists make more educated guesses about the next solar cycle, and we may be in for a surprise in Cycle 24.

Reviews:

Be the envy of all around you at the airport's plane spotting site or at the airshow as you watch **real time** air traffic on a virtual radar scope. It's actually the **Kinetic Avionics SBS-1** receiver connected to your laptop computer acting as the display. What's more, **MT** readers have a chance to win this nearly \$800 value instrument for free; just tell us how you would use it! See page 69 to learn more about this innovative product and **MT's Aviation Contest**.

You can buy or build Grove's simple but versatile wideband **FlexTenna**. Here's how the product was developed, how it performed, and how you can build it yourself for both HF and VHF

applications (page 66).

A new vertical HF antenna for both receiving and transmitting arrived from **Comet** – the **CHA-250B** – and Bob Grove put it to the test as well, with mixed results (page 68).

Our software reviewer takes a first look at a well-named package – **Sys-Labs' RadioControl**. "The current list of radios that can be used with **RadioControl** reads like a **Who's Who** of radio manufacturers," says Catalano, and most radio functions can be controlled. This month we install it; next month we put it to the test. We also review **FTP Navigator** – a handy tool for downloading programs and other files (page 72).

Universal Radio — Quality equipment since 1942.

ICOM® R75



Universal Radio is pleased to continue to offer the **ICOM R75** receiver. With full coverage from 30 kHz to 60 MHz; all longwave, medium wave and shortwave frequencies are supported plus extended coverage to include the 6 meter amateur band. Some of innovative features of the R75 include: Synchronous AM Detection, FM Mode Detection (but not the FM broadcast band), Twin Passband Tuning, Two Level Preamp, 99 Alphanumeric Memories, four Scan Modes, Noise Blanker, Selectable AGC (FAST/SLOW/OFF), Clock-Timer, Squelch, Attenuator and backlit LCD display. Tuning may be selected at 1 Hz or 10 Hz steps plus there is a 1 MHz quick tuning step plus tuning Lock. The front-firing speaker provides solid, clear audio. The back panel has a Record Output jack and Tape Recorder Activation jack. The supplied 2.1 kHz SSB filter is suitable for utility, amateur, or broadcast SSB. However, two optional CW/SSB filter positions are available (one per I.F.). The formerly optional **UT-106 DSP board** is now included and factory installed! A truly a great value. **Order #0175 Call for price.**

ICOM® PCR1500



The Icom PCR1500 wideband computer receiver connects externally to your PC via a USB cable. This provides compatibility with many computer models, even laptops. Incredible coverage is yours with reception from 10 kHz to 3300 MHz (less cellular gaps). Modes of reception include AM, FM-Wide, FM-Narrow, SSB and CW. (CW and SSB up to 1300 MHz only). The PCR1500 comes with an AC adapter, whip antenna, USB cable and Windows 98SE/ME/2000/XP™ CD. This device has not been approved by the F.C.C. This device may not be offered for sale or lease or be sold or leased until approval of the F.C.C. has been obtained. The information shown is preliminary and is subject to change.

ICOM® IC-7000



The ICOM 7000 represents the next generation in all-mode HF/VHF/UHF transceivers. DSP at the IF level is the cornerstone of this impressive new multi-bander. In fact, the 7000 employs two DSP chips to work its magic. Imagine having 41 bandwidths available - standard! You can even select sharp or soft filter shape. And variable twin PBT allows you to either narrow the IF passband, or shift the entire passband to eliminate QRM. The IC-7000 has an incredibly versatile and capable **shortwave receiver**. It would be difficult to find a more impressive receiver in such a small package. Yes, there is tremendous power "under the hood", but the radio is also downright gorgeous. The 2.5 inch (diagonal) color TFT presents numbers and indicators in bright, concentrated colors for easy recognition. You can choose from three background colors and two font styles. Not only does this display provide radio status, but it also supports a two-mode band scope. In the Center Mode the scope is centered on the receiving frequency. In the Fixed Mode the scope sweeps a fixed range. The Digital Voice Recorder (DVR) function has a front panel REC control that allows you to record incoming signals for up to 25 minutes. Other features include: a detachable control head (requires optional separation cable), 503 memories, S/PWR/SWR meter, RIT, Preamp, RTTY Demodulator, Attenuator, Bass & Treble, adjustable SSB bandwidth, DTMF memory, VOX, full break-in and adjustable CW pitch. Requires 12 VDC at 22 amps for transmit but only 2 amps for receiving. **Order #0700 \$1499.99**

R3



The **R3** tunes 500 kHz to 2450 MHz (less cellular) in AM, FM-W, FM-N and TV via a 2 inch **TFT color TV screen**. You can receive regular TV (NTSC), and you may be able to see certain video feeds and ham radio Fast Scan TV. A second mono LCD display that can be used to conserve battery life. You get:

450 alpha memories, 4-step attenuator, bandscope, video and audio outputs and auto power-off. Comes with Li-Ion battery, charger, belt clip and BNC antenna. **Call**

R20



The new **R20** covers an incredible 150 kHz to 3304.999 MHz (less cellular) with 1250 alphanumeric memories, bandscope and SSB/CW. It has: two VFOs, dual watch, voice scan control, NB, large two line LCD and CTCSS/DTOS/DTMF. A built-in

IC audio recorder can record 1, 2 or 4 hours of reception! This radio comes with charger, Li-ion battery, belt clip and wrist strap. More info on website. **Call**

R5



The **R5** covers 150 kHz to 1309.995 MHz (less cellular gaps) in: AM, FM Narrow and FM wide. 1200 memories store: frequency, mode, step size, duplex direction and offset, CTCSS tone, tone squelch and skip settings. Other features include: attenuator, LCD lamp AM ferrite bar antenna, auto power off, CTCSS decode, weather function and battery save. A great value at under \$200.00. **Call, or visit website for price.**

www.universal-radio.com

◆ Visit our website or request our free 104 page catalog for other exciting ICOM products.

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Universal Radio is also pleased to carry the complete ICOM amateur radio equipment line. The **IC-7800** shown.

- Visa
- MasterCard
- Discover
- JCB
- Prices and specs. are subject to change.
- Special offers are subject to change.
- Returns subject to a 15% restocking fee.
- Prices shown are after mfg. coupons.

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MONITORING TIMES
(ISSN: 0889-5341;
Publishers Mail Agree-
ment #1253492) is
published monthly
by Grove Enterprises,
Inc., Brasstown, North
Carolina, USA.

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Periodicals postage paid at Brasstown, NC,
and additional mailing offices. Short excerpts
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Subscriptions: order@grove-ent.com

Subscription Rates: \$28.95 in US; \$39.50
Canada; and \$58.50 foreign elsewhere, US
funds. Label indicates number of issues left.
Renewal notice is cover sheet 3 months before
expiration. **See page 75 for subscription
information.**

Postmaster:
Send address changes to *Monitoring Times*,
7540 Highway 64 West, Brasstown, NC
28902-0098.

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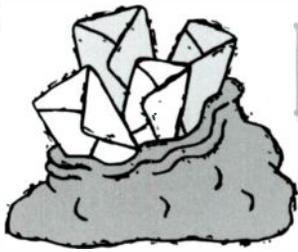
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LETTERS TO THE EDITOR

The Courage to Experiment

Tim Lemmon wrote the following to Richard Finkel who wrote about contacting an amateur station in Antarctica against great odds:

"Your January article in *Monitoring Times* magazine regarding gerryrigging a contact was just great! I've already walked out in the yard wondering how I could put up a similar antenna – and it was raining a little bit at the time.

"I've never been one to just experiment with antennas like you have. I also don't chase DX like you do, but I did listen to the FT5 operations multiple times. Your article really hit home with me. I can imagine the same things happening at my location and wondering what I can do to make comms better. Most of the time, the answer is in the antenna, huh?"

"I'd make a strong bet that many *Monitoring Times* readers are not licensed hams, but Richard's subject hits home with any SWL out there. I sure hope to read more excellent articles like this one in future issues."

– Tim Lemmon WK4U

Tim, I hope you enjoy Bob Grove's article in this month's *On the Bench* column as he tinkers around with designing a new, super simple wideband antenna.

Guidance on the BBC Guide

In January, Will Martin wrote the DX Listeners Digest Yahoo group:

"Got the January '06 *Monitoring Times*; there's a useful article in it that is a guide for North Americans to listen to the BBC around the clock. However, I noticed one major omission – it doesn't mention 15565 kHz in the 1500-1600 UT hour timeframe.

"It does cite 17640 kHz, and I always considered those two frequencies as a pair. I listen every weekday to one or the other of these to catch the science programs at 1505 UT; usually 17640 but sometimes 15565 is coming in better or the transmitter being used on 17640 keeps getting dropouts on a particular day so I stay on 15565. Also, 17640 is wiped out at 1600 (by WYFR, I think) but 15565 is listenable for the 1600 hour and that gives one a chance to hear 'Analysis' at 1645 UT."

John Figliozzi replied, "As the author of the article, perhaps an explanation is in order."

"I spent several weeks in November monitoring various BBC frequencies. During that time, though usually audible, both 15565 and 17640 were consistently weak. The (admittedly subjective) criteria I set for inclusion in the listings was a level of signal strength that would make it likely that the frequency would be heard on portable radios without need for an external antenna. Of course, we all know that shortwave conditions change with the season

and as we have gotten deeper into winter in NA, signal quality on both 15565 and 17640 has significantly improved. Also, my experience in the US northeast undoubtedly differs from that of listeners in other regions. Live and learn!

"These BBCWS listings will be a regular feature of the column, appearing perhaps twice a year. I'd welcome input from listeners in North America, so the next one will better reflect reception conditions throughout the continent. Hopefully, all of you are subscribers to *Monitoring Times* or soon will be. I think it's important for those of us who appreciate radio to support sources like *MT* and *dxld* to the best of our capability."

– John Figliozzi, *Programming Spotlight*

Cold Experiences with Repeaters

"I was reading the article about dead repeaters [May 2005 *Ham Bands* and online], and I would like to share two experiences..."

"Several years ago I had heavy snow collapse my porch roof, trapping me in a 1958 Airstream Overlander in northern Mendocino County. The windows are too small to crawl out of even if I hadn't sealed and screwed them shut tight from the outside. The door is the only way in and out, and with a collapsed porch, I was as trapped as can be. I could only open the door 2 inches...outside help was vital.

"My cell phone, which has variable signal strength in these remote mountains, was useless. I did, however, have a deep cycle 12 volt battery in my Wagoneer, and with a Jones plug in the grill, it was feeding power to my vintage Airstream and to my old Kenwood ten channel 2m handheld, which is connected to a 5/8 skyhook on the roof.

"The 2m Kenwood is permanently mounted in a car holster, and after trying several mountaintop repeaters within range, I was able to get a response from Irene, the duty op of a machine 35 miles to the south of me near Willits, Cal. Irene (whose call sign escapes me right now), marshalled the emergency crews via the CDF (California Dept of Forestry and Fire Protection) – it was spooky hearing your own rescue dispatch go out over the scanner on the county fire net. Good news was that the CHP and local fire dept was able to commandeer the snow plows and divert them up the mountain to my location – 7 miles from the pavement at 3400 feet. But then the Laytonville Fire Dept snow cat broke down, and the Car Star rescue chopper couldn't fly due to the ongoing blizzard and low ceiling.

"Throughout this ordeal Irene kept in close touch with me, and did excellent info relays back to the CDF command center (I used to work for CDF). But I was in a pickle: even though official rescue teams were activated, they couldn't get

to me by land nor air...

"And then I heard a sound outside...people calling my name... Some folks had come to help, and they lifted the collapsed porch up and away, and I could finally get out of my Airstream. As it turns out, a neighbor who was an EMT was monitoring the CDF fire dispatch freqs and heard the rescue dispatch. He called another neighbor, and their local response was the ONLY effective response available, and it all worked out OK!

"Great team work, as demonstrated in the above account, does not figure in my second story..."

"I got my ham ticket while living in another nearby county, and they had a very capable group of hams who, in conjunction with the Red Cross, help conduct classes and exams. These folks were great ... yet as new hams we were blatantly ignored by a few... These bad apples of the local ilk were noted for their lack of manners toward those out of the area..."

"I've been around radio for awhile in college and as a broadcaster in radio and TV, and my uncle was Robert C Harris, N6VY, W6ITU Walt Donahue who was Chief Op at KMI Point Reyes, was a good friend. So I'm used to competent people who don't look down on new folks, but instead embrace their interest..."

"It's no trick to find jerks in society in general, but in the brother and sister hood of Ham Radio, we simply do not have the time and energy to waste on radio grinchers..."

– 73's, John Morehouse KE6VGA

In Your Face from Outer Space



Above is just one photo of three racks of equipment sent by Michael Reynolds W0K1E, "poor-boying" his TVRO set-up. Michael runs the W0K1E Satellite Radio Network, available on C-Band at 1A-6 93 deg. West transponder 1 - 6.2/6.8 or 4DTV T6 973 (6.2) 988 (6.8) 999 (Stereo) You can also listen to this interesting mix of music, news, and political programming online at www.cband.info.

– Rachel Baughn,
editor@monitoringtimes.com



COMMUNICATIONS

BROADCASTING

75 Years of HCJB

WWCR can boast 15 years of broadcasting (see feature article), but the granddaddy of Christian shortwave broadcasters is HCJB World Radio, which is celebrating its 75th anniversary. Throughout 2006, HCJB will hold a variety of activities to commemorate its initial broadcast from Quito, Ecuador, on Christmas Day, 1931.

Check HCJB's 75th anniversary website at www.hcjb.org/75 for event details and a timeline of HCJB's history. "Forever Family" reunions are planned for all former HCJB World Radio staff members and a 75th anniversary book will be released in September.

HCJB World Radio President Dave Johnson says, "We've never been in 'maintenance mode,' whether it's establishing a hydroelectric plant in Ecuador, putting up huge transmitters and antennas, building clinics and hospitals, or setting the 'World by 2000' challenge..."

According to Johnson, their work is more than just airing Christian radio programs. HCJB is helping Christians around the world build and run local radio stations with funding, training and engineering. He says that by now HCJB has planted more than 250 radio stations in every continent of the world except Antarctica.

Airborne Broadcasts to Cuba

This spring, Radio and TV Marti will intensify their broadcasts to Cuba using a new broadcasting airplane which they hope will improve the station's resistance to jamming from Cuba. The aircraft, approved by Congress in December, will replace a Pennsylvania National Guard Commando Solo C-130 that has been transmitting to Cuba for four hours on weekends.

A blimp tethered in the lower Florida Keys was the television station's primary transmitter, but it was knocked out by last year's hurricanes. Congress also approved plans to restore the blimp.

Supporters say the addition of the mobility and broadcasting strength of the new aircraft will give the station the technological punch needed to overcome Cuba's aggressive jamming program. Critics say even a mobile transmitting platform uses frequencies, and as soon as Cuba discovers what they are, they will be jammed.

The aircraft will also only fly in U.S. airspace, to avoid violating international telecommunications treaties.

The International Broadcasting Bureau's intent is to use as many frequencies, transmitter sites, and methods of delivery (satellite, UHF, AM and FM) as possible in hopes of

overloading Cuba's ability to jam the signals – or at least be even more annoying.

Spies Use Shortwave Broadcasts

In January, a Florida couple was accused of operating as covert agents for Cuba's communist government for decades, using short-wave radios, 5-digit numerical-code language and computer-encrypted files to send information about Miami's exile community to top Castro intelligence commanders.

Carlos Alvarez and his wife Elsa, both staff members at Florida International University, were denied bond before trial on a charge of failing to register with the federal government as foreign agents.

The indictment, which included no mention of top-secret U.S. government information being disclosed, came months after the couple confessed to the FBI. Assistant U.S. Attorney Brian Frazier said Carlos Alvarez had spied for Cuba since 1977 and Elsa Alvarez since 1982.

(See page 28 for more on Cuban "numbers" stations.)

Cellphone or Radio?

These days it's hard to know if the cellphone is a telephone, an electronic game, a TV, a PDA, an MP3 player or a radio! Motorola recently announced the Motorola iRadio – a subscription music radio service that seamlessly moves from home, to car stereo, to wireless headphones – powered from the one device you're never without: your mobile phone. The service plans to provide 435 channels and would be sold by wireless service providers to their subscribers for \$7 to \$10 a month – as soon as any wireless carriers sign on to carry iRadio, that is.

Sprint says it plans to provide selected Sirius satellite radio music channels via its cellular service. Clear Channel may also have some deals cooking with cellular providers.

Sure hope they are also working on better batteries for these devices that will be transmitting or broadcasting every waking hour!

Is Nothing Sacred?

We love the irony. After being chased off the public airwaves by his crude humor and language, Howard Stern retreated to Sirius satellite radio. But pirate radio broadcasters in Brooklyn and Queens immediately began rebroadcasting his satellite radio shows on conventional FM radio frequencies.

TV Receiver Calls for Help

A faulty digital television receiver in Portsmouth, England, sparked a helicopter rescue mission after sending out a rogue dis-

stress signal, said Britain's Royal Air Force. The digital converter sent out a signal identical to that for emergency beacons at sea.

The SOS was picked up by a satellite and sent to the RAF's Aeronautical Rescue Co-ordination Centre in Kinloss, northeast Scotland, in the early hours of January 5. Personnel then alerted English coastguards, who sent a helicopter to investigate. The aircraft spent two fruitless hours flying over Portsmouth Harbour looking for stricken sailors until the signal was traced to dry land.

RAF spokesman Michael Mulford said: "This is very very unusual, it's a complete freak and the odds of a digibox sending out a 121.5 signal must be astronomical."

Astronomical, but not impossible. Several years ago *MT* reported on a digital television in Seattle, Washington, doing the same thing. The television set was tracked down by the Civil Air Patrol and the set sent to the manufacturer for analysis. Interference is also more of a problem with 121.5/243 MHz emergency beacons, which is why the international Cospas-Sarsat program is moving to the new frequency of 406 MHz.

SPECTRUM ISSUES

Nextel Swap May Stall

In January, law enforcement officials sent the FCC a letter of concern that the long-awaited swap of airwaves to remove cellphone interference from emergency-service spectrum was in danger of dissolving into turmoil. Nextel had already asked the FCC to extend the deadline an additional seven months.

Nextel blames the Transition Administrator who has made more than 20 changes to forms, directives and policies. The public-safety officials and consultants largely blame cost disputes with Sprint Nextel, which is bankrolling the \$2.8 billion project.

Since most agencies cannot afford to pay the cost of reconfiguring their systems, they need the funding up front, which requires a negotiated agreement. As of early January only two such agreements had been approved, with the likelihood that by January 31st the majority of pending agreements would require Commission resolution, creating further delays. And this is only Wave 1 of a process which is supposed to be completed by mid-2008!

Upsetting the Fruit Basket

The Nextel/public safety channel swap isn't the only spectrum relocation that's imminent. Public safety communications are also getting a chunk of the VHF spectrum being reclaimed from television VHF analog chan-

nels in February 2009. The remainder of that spectrum will be auctioned, but a portion of it will also be occupied by other agencies which are also being relocated.

Federal spectrum users from the 1710-1755 and non-federal users from the 2110-2155 MHz band are being relocated to make way for 3G, or advanced wireless services. 2,200 frequency assignments in the federal band will be auctioned off and the proceeds used to pay the estimated \$936 million cost of the move. The first auction could be as soon as June, although it may take some agencies as long as four years to complete the move.

The 12 federal agencies being moved are: Defense, Justice, Energy, Agriculture, Treasury, Interior, Housing and Urban Development, Homeland Security, the Federal Aviation Administration, NASA, the U.S. Postal Service, and the Tennessee Valley Authority.

Phones Out; 'Net In

The FCC will be auctioning a portion of the 400 MHz general aviation and 800 MHz Air-Ground Radiotelephone spectrum to allow for air-borne broadband services like high-speed internet. The 800 MHz spectrum is to be largely vacated by Verizon's Airfone over a two-year period. The FCC also approved the use of high-altitude balloons to provide air-ground services in the 800 MHz Air-Ground band, but disallowed ancillary terrestrial mobile and fixed services on a secondary basis in the band.

IN MEMORIAM

Joe Adamov



One of the most popular guest speakers to headline the now-defunct Monitoring Times Convention banquet was Joe Adamov of Radio Moscow. His visit in 1995 was thanks to the efforts of hobbyist Katharine Lawson. Joe entertained and charmed the audience with his humor, his personality, and his straightforward answers. We were saddened to hear that Joe died in early December 2005.

The 85-year-old journalist joined Radio

Moscow as an announcer in 1942, but his worldwide fame came as the presenter of *Moscow Mailbag* for more than 40 years, reading and answering letters to the English service and always telling a joke or two. The signature poem of *Moscow Mailbag* was:

*You can't do better
than send us that letter
and in it tell Joe
what you think of his show*

Bjorn Malm



Noted Swedish DXer Bjorn Malm died November 29th in his home in Quito, Ecuador. His reports from Latin America were a great service to the hobby and he will be sorely missed by the radio community. (See page 33, Ecuador, for more.)

BULLETIN BOARD

March 3-4: Kulpsville, PA

19th annual Winter SWL Fest at Best Western's The Inn at Towamencin (1750 Sunnyside Pike). www.swlfest.com for info.

March 18: Marietta, GA

Kenneshooshee Hamfest at Jim Miller Park (2245 Callaway Road). Talk-in 146.880 (-)/PL100. www.W4BTI.org for more info.

"Communications" is compiled by editor Rachel Boughn KE4OPD (editor@monitoringtimes.com) from news and clippings sent by our readers. Thanks to this month's cadre of find reporters: Ed Cummings, Glenn Hauser, Norman Hill, Jason Layton, Sterling Marcher, Stephen Newleyn, Jerry None, Bill Siedsma, Doug Smith, D Strumpf, Larry Van Horn, Dispatch Monthly, HCJB, MRT Bulletin

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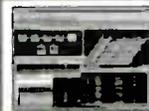
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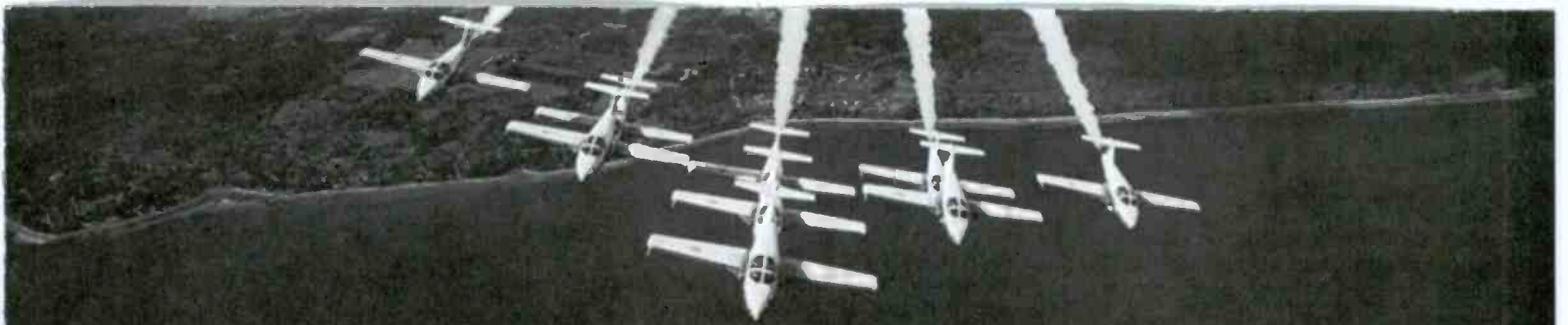
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Monitoring Military Flight Demonstration Groups MT's Annual Air Show Guide

By Larry Van Horn, MT Milcom/Assistant Editor, N5FPW

Air show! Nothing stirs up excitement more for the aircraft enthusiast than those two magical words.

Bottom line: there is nothing quite as thrilling as going out to one of the many public air shows across the country any given weekend and watching one of the military or civilian demonstration teams strut their stuff in front of thousands of airplane fanatics. But, if you add to the visual drama in front of you the element of monitoring the team's radio communications, you will experience a whole new perspective of the show that few attendees can realize or enjoy.

Since the new 2006 air show season starts in the second week of March, we present our seventh annual *Milcom* Air Show column in this issue. You will get the frequencies to monitor, air show radio equipment list, and the military flight demonstration team schedules for the upcoming air show season. (See page 52 for the continuation.)

FREQUENCIES

Where do you hear the action? 2005 did provide air show monitors with a few challenges, especially following the frequency changes of the Navy's Blue Angel team communications. But when changes were made by the teams and our annual list didn't have the new frequencies, seasoned veterans knew the right bands to search to find the new frequencies being used.

So what bands do veteran radio monitors search for new frequencies? You should concentrate on the bands listed below to locate air show activity in your area.

Milair Search Bands (MHz)

118.0-137.0 AM mode (AM) 25 kHz steps
Note: We have reports of a lot of new air show

activity in the new portion of the civilian aero band: 136-137 MHz. Be sure to check out this frequency range out for civilian and military demo aircraft communications

122.7-123.575	AM 25 kHz steps
138.0-144.0	AM/Narrowband FM (NBFM) 12.5 kHz steps
148.0-150.8	AM/NBFM 12.5 kHz steps
225.0-389.0	AM 25 kHz steps
389.0-400.0	AM/NBFM 25 kHz steps
406.1-420.0	NBFM 12.5 kHz steps

U.S. Navy Blue Angels

The U.S. Navy (USN)/Marine Corps (USMC) military team is represented on the air show circuit by the Blue Angels flying their F/A-18 Hornet aircraft. The other major piece of hardware in the squadron is their C-130 Hercules transport aircraft, affectionately known as "Fat Albert." It is the only Marine Corps aircraft permanently assigned to support a Navy squadron and is flown by an all-Marine Corps crew of three pilots and five enlisted personnel. "Fat Albert" flies more than 140,000 miles during the course of a show season.

After a wild 2004 season of searching for new Blue Angel team frequencies, the 2005 season was somewhat quieter in this regard. The primary UHF frequencies monitored during 2005 season included (MHz):

237.800	
251.600	
255.200	
264.550	
265.000	
275.350	
284.250	
289.800	Aerial Refueling
299.650	
302.100	<Fat Albert Secondary>
305.500	<Fat Albert Primary>
346.500	Maintenance

It has been reported that a new ground cart was in use by the team in 2005 and two new ground frequencies made their appearance last year - 139.8125 <Alpha> and 142.6125 <Bravo> MHz. The old 162-174 MHz frequencies are apparently no longer used and we have deleted all but one of them from our list. I encourage those of you with Signal Stalker and Close Call capability to watch the 138-144 MHz closely for new additional 12.5-kHz splinter frequencies being used by the team's ground crews.

Aerial Refueling	289.800
Cross Country Air-Air	143.600 (AM) 237.800
	238.150 284.250
Tower-Comm Cart	173.825 (NBFM) May no longer be used
Tower Observer	143.000 (AM)

Other frequencies reported in past years, but not heard in the last year include:

236.450 238.150 249.625 254.500 256.250
262.850 263.350 264.350 273.300 286.000
302.150 307.700 381.000 MHz

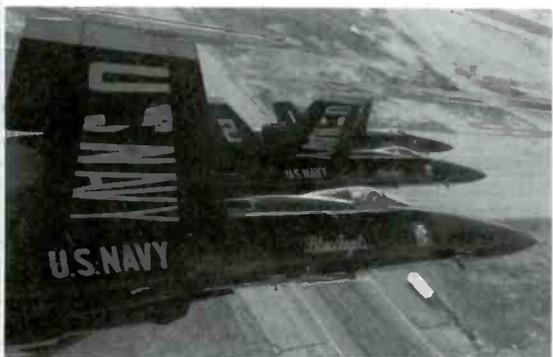
U.S. Air Force Thunderbirds

The premier U.S. Air Force (USAF) flight demonstration team is known as the Thunderbirds. This team uses six F-16C Fighting Falcon aircraft, performing formation flying and solo routines. The four-aircraft diamond formation demonstrates the training and precision of Air Force pilots, while the solos highlight the maximum capabilities of the F-16. The pilots perform approximately 30 maneuvers in a demonstration. The entire show, including ground and air, runs about an hour and 15 minutes.

The frequency list below has been used by the teams over the last seven air show seasons. It should be noted that at some shows the 143.850 and 235.250 MHz roles are reversed from what is published below.

Frequency Usage

140.400	Support/Cross country air-to-air (AM)
141.850	Pre-take/Four ship/Diamond formation linked to PA system (AM)/Cross country air-to-air <Channel 2>
142.575	Program audio/Air-Ground communications (NBFM)
143.850	Diamond formation/Cross country air-to-air (AM) <Channel 1>



Courtesy Blue Angels



Courtesy Thunderbirds

235.200 Thunderbird Control/ComCart
 235.250 Pre-Engine Start and Solo aircraft
 on/off show center <Uniform 1>
 322.950 Engine Starts/Solo aircraft (5-6) Air-Air
 <Uniform 2>

Maintenance/Ground teams (NBFM)

142.175
 143.900
 413.000 Digital
 413.025 Analog/digital <Channel 1>
 413.100 Analog/digital <Channel 2>
 413.250 Analog
 413.275 Analog
 413.350 Digital
 413.375 Digital

Other Military Flight Demo Teams

Both the Navy and the Air Force have other special flight demonstration units in addition to those units mentioned above. All transmissions are in the AM mode. An asterisk * indicates a new frequency used in 2005 and ** denotes a primary frequency.

Heritage Flight (F-15/F-16/F-86/P-51)
 122.475* 123.150* 127.150* 132.950
 136.575* 376.025* 384.550*

USAF A-10 Thunderbolt demonstration teams
 122.475* 123.150 123.475 136.575
 138.050 138.100 138.200 138.250 138.300
 138.475 138.500 139.625 139.725
 139.800 139.975 140.400 142.200 236.850
 269.900 305.400 327.700 341.500*
 343.000 343.000 384.550

USAF B-1B Bomber Flyover
 238.150
USAF B-2 Bomber Flyovers (509BW)
 388.850**

USAF B-52 Bomber Flyovers
 376.025

USAF F-15 Eagle demonstration teams
 122.775 123.150* 225.650 228.450 228.950
 232.150 233.525 234.600 236.150 236.550
 237.400 238.625 238.825 239.400 252.525
 252.575 252.775 254.675 257.075 258.375
 259.550 260.275 262.025 262.050 264.875
 264.975 266.550 268.175 275.675 276.675
 279.650 282.675 282.800 285.150 287.775
 292.725 296.925 298.350 301.525 303.950
 305.650 315.125 315.850 317.800 319.325
 325.325 325.725 325.775 330.125 333.550
 338.750 351.050 355.750 359.225 364.125
 376.025** 376.075 384.500 384.550**
 384.850 385.700 391.200 396.900 397.100
 399.750 399.850

US Air Force F-16 Fighting Falcon demonstration teams
 122.775 123.150 134.175 136.575 138.025
 138.100 138.150 138.200 138.250 138.475
 138.425 138.900 139.750 139.825 139.900
 139.925 139.975 140.375 141.600 227.700
 229.075 261.200 283.700 317.800 336.925
 344.900 376.025** 376.075 384.550**

US Air Force AETC T-6 Texan East Coast Team
 123.150 123.400 127.150* 138.400 283.700
 295.000* (Ground support team uses FRS
 radios)

US Air Force Combat search and rescue (SAR) demonstrations
 127.150* 138.100* 139.700 225.450
 236.000 242.000 251.900 252.800 259.000
 278.800* 280.500 282.800 287.500
 381.000 384.550

US Coast Guard aircraft/SAR demonstrations
 122.900 (SAR) 157.050 (Drug Interdiction
 demo)
 157.075 (Command Post)
 237.900 282.800 326.150 345.000
 379.050

US Navy S-3 Viking aircraft demonstrations
 263.400
US Navy SAR demonstrations
 242.500 282.000 283.100

Military Parachute Demonstration Teams

A new addition to our Military Parachute Demo teams list is the U.S. Special Operations Command Parachute Team based out of MacDill AFB in Florida. They were heard on the following frequencies: 122.450, 123.450, and (no, this is not a misprint) 151.625 MHz, a nationwide business itinerant frequency.

The colorful U.S. Navy Seal Parachute Team, the Leap Frogs, is a frequent visitor around the country at various sporting events and air shows. This team has been regularly reported on 270.000 (AM) and 407.500 MHz (NBFM 131.8-Hz PL tone) nationwide the last several years.

The U.S. Army has quite a few parachute teams that perform on the air show circuit. We have received reports for only two of the teams. We would appreciate reports on frequencies used by the following U.S. Army teams if you catch them performing this air show season.

All American Free Fall Team
 Fort Bragg, North Carolina, 82nd Airborne

Green Beret Parachute Team
 Fort Bragg, North Carolina

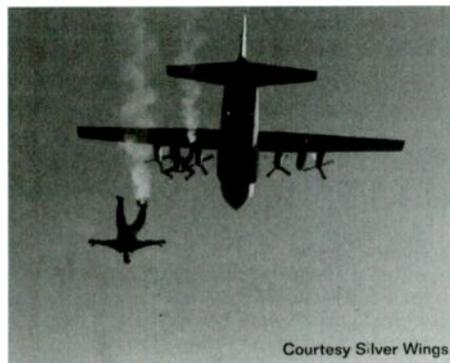
Screaming Eagles
 Fort Campbell, Kentucky, 101st Airborne Division

Black Knights
 US Military Academy, West Point, New York

Another addition to our list this year is the Silver Wings team. This is the Fort Benning, Georgia, Command Exhibition Parachute Team. They were heard last season using 34.650 MHz. In addition to the VHF low frequency, ground and safety teams were using 467.6125 MHz (FRS channel 10) for communications. There was also one report that the team was using an Intra Squad radio frequency of 397.500 MHz. (See our comments below about programming ISR, GMRS and FRS channels for air show monitoring.)

The U.S. Army Special Operations Command parachute team is known as the Black Daggers (see *MT Milcom* May 2004). Frequencies discovered for them during the last two seasons include: 123.450, 136.000, 136.500, 138.650, 237.300 and 238.150 MHz.

The premier U.S. Army Parachute Team is the Golden Knights is based out of Fort Bragg.



North Carolina. The team aircraft used during air shows is either the C-31A Friendship or UV-18A Twin Otter. Look for their communications on frequently reported frequencies of 123.400, 123.475 or 123.500 MHz. You should also keep 32.300, 32.400, 122.575, 124.875, 284.900 and 367.700 MHz plugged in for possible Golden Knight activity.

During 2001 and 2002 seasons I received several reports that the Golden Knights were using GMRS frequencies 462.625, 467.5625, and 467.6125 MHz. In addition to air show demo crews, vendors and other military ground units have also been heard using GMRS frequencies. You should make these frequencies part of your scanner load-out prior to the air show.

A	B	C
462.550	467.550	462.5625
462.575	467.575	462.5875
462.600	467.600	462.6125
462.625	467.625	462.6375
462.650	467.650	462.6625
462.675	467.675	462.6875
462.700	467.700	462.7125
462.725	467.725	

(462.675/467.675 National Emergency Frequency pair)

Legend:

- A. Base station, Mobile relay, Fixed station, or Mobile station
- B. Mobile station, Control station, Fixed station operating in Duplex mode.
- C. Interstitial frequencies, base and portable simplex

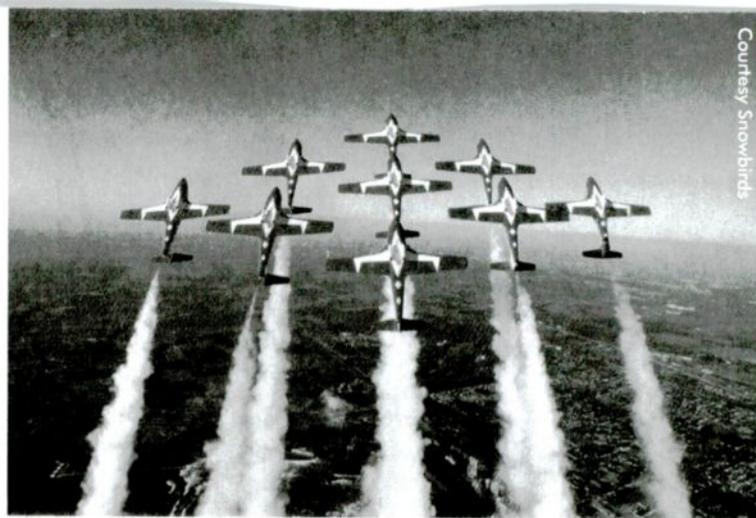
We have received several reports of the ground pyrotechnics personnel from the Tora Tora Tora and Warbirds flight demonstration team using FRS radios for communications during shows. You will also find military monitoring enthusiasts attending an air show using FRS radios to coordinate meeting fellow monitors. Load up FRS frequencies below (NBFM mode) in your scanner or carry a FRS radio to the show, and you might make a new *Milcom* monitoring friend or two.

462.5625	Channel 1
462.5875	Channel 2
462.6125	Channel 3
462.6375	Channel 4
462.6625	Channel 5
462.6875	Channel 6
462.7125	Channel 7
467.5625	Channel 8
467.5875	Channel 9
467.6125	Channel 10
467.6375	Channel 11
467.6625	Channel 12
467.6875	Channel 13
467.7125	Channel 14

The government version of the Family Radio Service is known as the Intra-Squad Radio or ISR. As noted above, I have seen several reports over the last few years that these radios might be in use at air shows by military units, including the Civil Air Patrol (CAP). It might be a good idea to program these frequencies in your scanner as part of your air show load-out.

396.8750	Channel 1
397.1250	Channel 2
397.1750	Channel 3
397.3750	Channel 4
397.4250	Channel 5

397.4750 Channel 6
 397.5500 Channel 7
 397.9500 Channel 8
 398.0500 Channel 9
 399.4250 Channel 10
 399.4750 Channel 11
 399.7250 Channel 12
 399.9250 Channel 13
 399.9750 Channel 14



Courtesy Snowbirds

U.S. Civil Air Patrol Frequencies

Finally, you might want to program U.S. Air Force Civil Air Patrol frequencies in your scanner as well. We received several reports in 2005 of CAP frequencies, repeaters and simplex, being used as ground support at several air shows. Below is a starter list of CAP frequencies to load up for air show use.

There are supposed to be new additional VHF narrowband frequencies for CAP, but this civilian auxiliary organization (that was supposed to have a mission of educating young people in aerospace subjects) is now also performing homeland security missions and anti-narcotics surveillance missions, and has therefore classified all of their frequencies FOUO (For Official Use Only).

An even more disturbing fact about CAP is that Congress in February 2003 amended the Omnibus Crime Control and Safe Streets Act of 1968 to make members of the Civil Air Patrol eligible for Public Safety Officer death benefits in case they lose their lives during a homeland security CAP mission.

143.750 143.900 148.125 148.1375
 148.150 148.5375 148.975 149.5375

Civilian/Foreign Air/Parachute Demonstration Teams

The Canadian Forces Snowbird aircraft demonstration team (431 Air Demonstration Squadron) is another regular on the U.S./Canada air show circuit. The following frequencies have been recently reported for this popular aerial team:

123.325 227.600 242.600 245.500 245.750
 246.500 272.100 (Primary) 284.900 299.500
 333.300 340.100

A new Snowbird VHF frequency has now been noted in use during the last two seasons - 116.000 MHz (AM), but 272.100 is the only UHF frequency reported in 2005.

At most air shows the military flight demonstration units aren't the only performers. Civilian organizations, companies, and individuals sponsor a wide variety of aerobatic teams and parachutists to thrill the crowd. A wide variety of frequencies are used by these teams in the civilian aviation band. If you load your scanner with the following frequencies you shouldn't miss out on communications used by the civilian acts.

122.725 122.750 122.775 122.825 122.850
 122.875 122.925 122.950 122.975 123.025
 123.050 123.075 123.150 123.175 123.300
 123.325 123.350 123.400 123.425 123.450
 123.475 123.500 129.650 129.925 136.575
 136.975

Some specific frequencies reported to us for other foreign military and US civilian flight demonstration teams include:

Civilian Flight Demonstration Teams

Aeroshell Aerobatics Team 123.150
 Air Force Reserve Biplane (Ed Hammil) 123.150
 All American Firebirds Flight Demonstration Team 122.775
 Bud Light Air Force (ex- Coors Microjet) 122.925
 123.350 123.475
 Firecat (Rich Perkins) 123.500
 Flying Colors Hang Glider Aerobatic (Dan Buchanan) 123.300
 French Connection Air Show 122.925 122.975
 129.975
 Geiko Extra 300 - Tim Webber 123.150
 Ian Groom's FedEx Red Bull Aerobatic Team 122.725 122.775 122.825 122.925 123.150
 123.350
 Jim LeRoy Bulldog Team 123.150
 Lima Lima Flight Team 123.150 123.175
 123.425
 Manfred Radius Glider Aerobatics Team 123.150
 North American Jet Air Show Team 122.775
 122.925 129.650 129.925
 Northern Lights Aerobatic Team 123.325
 136.975
 Oreck Vacuum Cleaners Aerobatic Demo (Frank Ryder) 123.450
 Otto the Helicopter 123.150 123.300
 P-51 Mustang Flight Team 122.850 122.875
 (Commemorative Air Force)
 Patty Wagstaff Air Shows Inc 122.750
 123.475
 Pitts Special U.S. Air Force Reserve 123.150
 Rayban Gold Aerobatics Team 122.925
 Red Baron Stearman Squadron 122.725
 122.775 123.150
 Red Eagles Flight Demo Team 123.150 123.425
 123.475
 Sean Tucker Power Aerobatics 122.875 122.950
 123.150 123.475
 SIAI Marchetti SF260 Debbie Gary 123.150
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 Sky Soldiers Demonstration Team (Army Aviation Foundation) 123.025 242.400
 Skytypers Team 122.775
 Swift Magic Aerobatic Team 122.775 122.925
 Team Red 123.350
 Tora Tora Tora Warbirds Team (Commemorative Air Force) 123.150
 123.450 469.500 469.550

Foreign Military Flight Demonstration Teams

Asas de Portugal, Esquadra 103 (Wings of Portugal 103 Squadron) Flight Team 262.150
 Blue Eagles Royal Army Air Corps Flight Team (UK) 136.975
 Blue Tango Helicopters 123.600
 Brazilian Air Force Team (Brazil)

130.550 130.650 132.250
 British Army Red Devils Parachute Team (UK) 462.625
 Canadian Forces Skyhawks Parachute Jump Team (Canada) 123.000 294.700
 Falcons Royal Air Force Parachute Jump Team (UK) 255.100
 465.100
 Frecce Tricolori Military Flight Team (Italy) 307.800 381.000
 Grasshopper Helicopter Team (Netherlands) 281.100
 Halcones Military Flight Team (Chile) 136.175
 La Patrouille Adecoco Air Force Flight Team (France) 121.850
 123.600 138.450 141.825
 143.100 143.850 242.650

La Patrulla Aguila Military Flight Team (Spain) 130.500 252.500

Le Royal Jordanian Teams (Jordan) 123.500
 Les Breitling (Switzerland) 127.350
 Les Iskry (Poland) 123.600
 Marche Verte [Green March] (Morocco) 135.000
 135.925 (Ground) 135.500 (Air-to-Air)
 Military Stars Flight Team (Turkey) 264.400
 279.600
 Patrouille Suisse Military Flight Team (Switzerland) 288.850
 Red Arrows Royal Air Force Flight Team (UK) 242.200 242.050 243.450 253.450

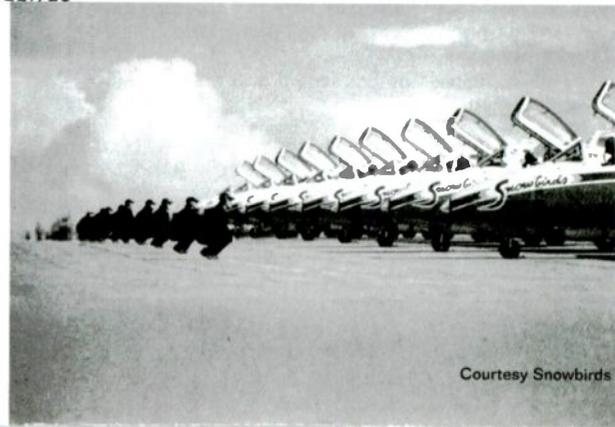
In Closing

It is always difficult to predict what a new season will bring so I strongly encourage readers to watch the *Monitoring Times* website (www.monitoringtimes.com) for new frequency information. We will publish updates on our air show web page as we get new information from field reports during the season.

Finally, I would like to extend a sincere thanks to a record 97 contributors who shared their post show reports with us last year. I want to especially thank several overseas reporters who added new material to our foreign teams section. I deeply appreciate the time and effort each of you took to let us know what you heard at many of the air shows.

If you find this list useful and attend an air show in 2006, please pass along any frequencies that you monitor, whether it is on our list above or not. This will greatly help us keep this annual MT listing up-to-date. You can reach me via e-mail at larryvanhorn@monitoringtimes.com or by our snail mail address *MT Milcom*, 7540 Highway 64 West, Brasstown, NC 28902.

For 2006 air show SCHEDULES and recommended monitoring EQUIPMENT, please turn to *Milcom* on page 52.



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CALL TODAY!

WWCR - World Wide Christian Radio

Fifteen Plus Years on the Air

By Dr Jerry Plummer

On a crisp, cold, December Sunday morning in 2005, I am in the building that houses WWCR's transmitters #1 and #2, assisting in repair on transmitter #2. The Continental 100,000 watt 416E doesn't want to change frequencies. This is a rare occurrence, but the replacement part needed is already on site.

"OK, Doc, change the channel selector to 9 and hit 13.845. Let's bring Dr. Scott up," says Jason Cooper, the transmitter technician on duty at the station who installed the replacement part.

"You got it," I reply as I move the channel selector and hit the 13.845 button. The Continental groans, and a series of movements occur in the huge transmitter. Within twenty seconds, the familiar voice of Dr. Gene Scott crosses the airwaves. I check the output meters and see a solid 98,000 watts booming across the world. "It looks good," I say to Brady Murray, Operations Manager for medium wave WNQM, AM 1300; who is also assisting. "How about your end?"

"Good to go," Brady replies.

"Good to go," says Jason. We all smile. Life is good.

The year 2005 completed fifteen years of successful operation on shortwave by WWCR, World Wide Christian Radio, in Nashville, Tennessee, USA. The anniversary provides a good

excuse to take a look back at the brief history of WWCR from then to now.

Ownership and the Startup

WWCR is owned by F.W. Robbert Broadcasting, based out of New Orleans, Louisiana. In addition to WWCR and its four 100 kW shortwave transmitters, the company also owns medium wave stations in Nashville, Knoxville, and Memphis, Tennessee (WNQM, WITA and WMQM, respectively). It also owns WVOG in New Orleans, which suffered along with the rest of the city from Hurricane Katrina – being "watered down" for ten days prior to resurrection. Of all the stations, WWCR is certainly the jewel of the fleet.

WWCR had to work hard to get its license approved by the Federal Communications Commission (FCC). It was truly a case of "third time's a charm," since the first two attempts to obtain a shortwave broadcast license were virtually ignored by the FCC in the mid 1980s. The third try, however, was successful and the first test transmissions occurred in May 1989.

Longtime hobbyists will remember that WWCR's license was granted only after WRNO, in New Orleans, was granted licensure; and the entire rationale for this dislogic is certainly a

topic for another article. Suffice it to say for now that a citation of Public Law 80-402 played a large role in the FCC's granting shortwave licenses to domestic broadcasters. The FCC has historically frowned on shortwave radio broadcasts intended for a domestic audience, but since the early 1990s has shown little interest in regulating the shortwave bands. Perhaps the WRNO decision helped pave the FCC's way for this approach.

Originally, WWCR had one shortwave transmitter, a Harris SW-100B 100kW unit, that was placed in the same building housing WNQM's 50,000 watt medium wave transmitter. Some earlier histories of the station have indicated that when the FCC approval came for a second transmitter, WMQM in Memphis was sold in 1991 to raise cash for the second Harris. However, in a recent phone interview, WWCR's President, Fred P. Westenberg, noted that the timing was coincidental: WMQM was sold at that time simply because a good return on the investment was possible.

In early 2000, another station in Memphis was purchased, and, since the WMQM call letters were still open, the company petitioned the FCC to allow these call letters to be used for the newly purchased Memphis medium wave station. This explanation is noted only to clarify reports in earlier publications.

The second shortwave transmitter purchased was another Harris SW-100B unit. WWCR then operated on four frequencies; 7.535, 7.520, 12.160 and 15.690. Both transmitters were booked solid, day and night, with paid broadcasting. Of those frequencies, only 12.160 (for transmitter #3) is used today.

A Winning Formula

WWCR had been running a broadcasting mix of Christian programming, an idea initially proposed by George McClintock, Station Manager at Memphis' original WMQM. McClintock argued that there were no Christian shortwave broadcasters in the United States, and that it could be a good business opportunity, as well as reaching a worldwide audience. The New Orleans management group agreed with the idea, and sent George to Nashville to open up the shortwave station and manage WNQM, AM 1300 already operating in Nashville.

At the time, no one else was broadcasting a Christian mix on shortwave, and it was felt that



Transmitter four's control panel, with the door open for frequency changes

this could be a good niche into which the firm could expand. The plan was a success: the two transmitters were filled with paid broadcasting and demand was so strong that a third transmitter, another Harris SW-100B, was purchased to accommodate this burgeoning demand.

The third transmitter came on line in 1992 and was almost immediately booked solid. Then, one broadcaster wanted a transmitter 24 hours a day, seven days a week, for his broadcasts only, so WWCR purchased a fourth transmitter; this time a Continental Electronics model, in early 1993.

Tragedy and a Phoenix from the Ashes

A tragic fire in April 1993 destroyed the three Harris transmitters and the fourth unit – which had just arrived and was still in its packing crate at the station. The entire site was burned to the ground. From a financial standpoint, the tragedy was exacerbated by the fact that the fourth (new) transmitter was uninsured; insurance on it was to have begun the following day.

Although disheartened, management elected to rebuild from the ground up, take the financial hit associated with the dollar loss of the uninsured fourth transmitter, and start anew. Their belief that Christian broadcasting via shortwave addressed a strong, unmet demand was the focal point in making this reinvestment decision. History has proven the decision to have been the correct one.

Two Continental transmitters were initially ordered and the remnants of the station were razed for construction of the new building. Very few records or photographs of the original building are in existence today, and detailing the history of the station during this time period has required a large degree of investigation and study—with some blanks still unfilled.

A completely new, from the ground up, concrete-based building was constructed. Within 38 days of the disaster, WWCR was back on the air with the first new Model 416-E transmitter, again from Continental Electronics of Dallas. The second Continental was online directly after the first transmitter was tested and proven to be operational.

Soon afterward, the third Continental was ordered, to accommodate the previously noted broadcaster who wanted one transmitter entirely to himself. This third unit had to be housed in another building, since the original station rebuild was for the two shortwave transmitters, along with WNQM, the medium wave station



noted above.

By the way, WNQM selected a Continental 316 for its transmitter, which is still operational today, as a backup to WNQM's Harris DX50 model. Good planning on management's part allowed the second building (a matching concrete-based construct) to be large enough to allow for installation of a proposed fourth transmitter in the near future, based again on the expectation that paid broadcasting would be there for the fourth unit's purchase.

Sure enough, in early 1994 the fourth Continental was purchased. It was placed in the "second building" adjacent to the main building. This building houses transmitters #1 and #2 today, with transmitters #3 and #4 in the main building, along with WNQM's medium wave Harris unit and the Continental backup. These four 100kW Continental transmitters are comprised of the three 416E's and a singular 416F.

To broadcast the signal from these four transmitters, WWCR's rhombic antennas are strung from a small forest of creosote poles behind the station. The antenna farm design was developed to include additional transmitters and to allow for frequency changes that would aim at specific world markets. The additional capacities, from a tuning/aiming standpoint, allows for modifications to accommodate potential and existing market areas.

The antenna farm also includes WNQM's five 210-ft towers as well. The center tower (for WNQM) is utilized for 50 kW daytime coverage, and all five are used for night-time directional coverage of Metro Nashville.

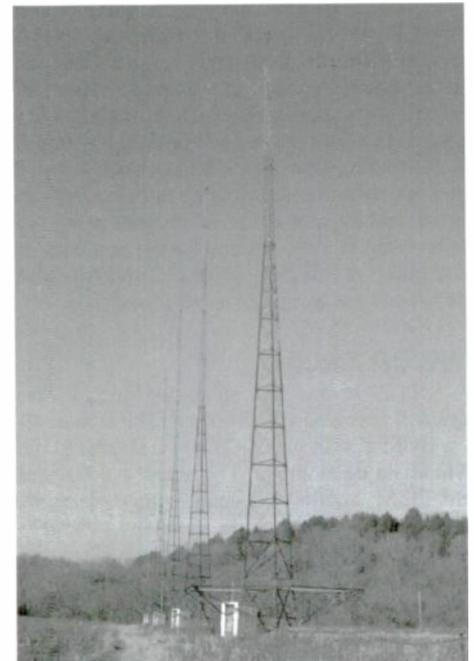
The Programming Mix

From day one, WWCR developed a broadcasting lineup that is often referred to as "eclectic." There is a variety of program formats and preaching styles. Foreign language programming is included, particularly Chinese, Spanish and Russian.

WWCR's formula became a success and several other religious and commercial shortwave stations in the United States have followed

WWCR's lead. Of the handful of "domestic" United States-based shortwave broadcasters, the majority of these stations book programming cut from the same bolt of cloth as WWCR's. WWCR's extremely high uptime percentage, as well as a very strong signal, help to keep it at the forefront of these U.S. shortwave broadcast firms.

Even though the station's call letters imply purely Christian broadcasting, from its inception many programs became involved in political approaches, often mixed with a Gospel and conservative flavor. Tom Valentine's "Radio Free America" rode the WWCR airwaves from the early 1990s, as well as Dr. Gene Scott (who is still airing today), and "The Hour of the Time" hosted by William Cooper. Chuck Harder's "For the People" was one of the earliest broadcasters at WWCR, focusing on consumer and legal



The "doghouses" along the medium wave towers. The creosote phone pole lines connect the shortwave's rhombic array.



A rare shot of WWCR/WNQM before the fire

issues. The Y2K phenomenon yielded a short-run rise in paid broadcasting which called for all sorts of things to occur when the year 2000 hit.

Today, WWCR broadcasters present a mix of political conservatism and Christian preaching, such as Texe Marrs' "Power of Prophecy"; Pastor Pete Peter's "Scriptures for America", and Alex Jones' "Info Wars."

At the same time, WWCR has always had many non-political Christian broadcasters, such as "A Word From The Word," with Dan Hayden; "Through The Bible," with Les Feldick, Millard Byrd's "World Outreach Ministries," Greater Grace World Outreach with "Grace Hour" (on WWCR for roughly 15 years), and Bishop Shelton Rapha's "Church Of The Lord Jesus Christ Of The Apostolic Faith," to name just a few.

The station has always liked to mix these primary components with an interesting group of specialty programming, like "The Golden Age Of Radio Theater," "The Presidential Radio Address and Democratic Response," "Cowboy Church," "Unshackled," Rich Adcock's (the Viceroy of Vinyl) "Rock The Universe," Glenn Hauser's "World of Radio," a DX Block of shortwave related programs, and "Ask WWCR," which is one of the few in-house productions at WWCR. The complete listing of the specialty programming can be found at www.wwcr.com/wwcr_program/wwcr_specialty_pgm_text.html.

Broadcast content is delivered to WWCR in a variety of ways; from postal mail cassette and CDs, to satellite feeds, FTP and Internet file transfer, live broadcasting, or Marti unit reception. Zach Harper, Operations Manager says, "We'll work with our broadcasters in whatever way they need to get their programs delivered to us for airing." Zach notes, "These days, we're seeing a dramatic increase in FTP and Internet broadcast delivery, just as all radio stations are."

Understandably, the programming mix at WWCR attracts an equally wide and diverse group of listeners the world over, with reaction to the varied programs ranging from extreme satisfaction to sheer disbelief. That the station has proven to be a lightning rod for various groups is indisputable; but WWCR has also developed and maintained a strong cadre of listeners from all around the globe. The continuous stream of letters and emails, voicing varied opinions, is indicative of this fact. QSLs are routinely sent all around the world, on a daily basis.

WWCR Today

In 2006, the four shortwave transmitters are still here and still working. The station recently filed with the FCC for two Digital Radio Mondiale transmitters. The actual purchase of the DRM units is still being contemplated by Senior Management. First, it remains to be seen whether DRM receivers will be mass produced in sufficient quantities to be readily available and affordable for the consumer. If market conditions look encouraging, yet a third building will have to be erected on the property to house the two new transmitters.

In the meantime, for backup purposes, WWCR maintains a solid supply of backup parts



Studio #1, with Board Operator Dave Mooney at the helm.

for the Continentals to ensure uptime. This is apparently somewhat unusual in the shortwave broadcasting industry. According to WWCR's website, "the entire complex is designed with redundancy systems in place so if a part goes out, back-up systems can in most cases instantly be brought on-line to insure continued broadcasting."

The theory works. In the author's almost three years' employment at WWCR, downtime has been less than one tenth of one percent overall – certainly one of the best, if not *the* best, of any commercial broadcaster worldwide. One of the best ways to retain paid programming is to offer almost 100% uptime, coupled with a booming signal.

The current management at WWCR is committed to bringing programming to the air in an efficient and effective manner, just as in years past. Although some broadcast/air time is usually available, WWCR's four transmitters are, for the most part, broadcasting paid programming the vast majority of the time. However, as with all for-profit operations, WWCR is constantly searching for new broadcasters, and will "build to suit" if additional transmitters are required.

WWCR management and staff, along with Senior Management in New Orleans, see a bright future for shortwave broadcasting and have plans to continue broadcasting around the globe for years to come. Pictures of the transmitters, antenna farm, building, and employees are available for review at www.wwcr.com including brand new photos from December 2005. WWCR can be contacted at 615-255-1300 or via the web site.

About the Author

Dr. Jerry Plummer, MBA, is a tenured Professor of Economics and IT in Tennessee. He is a hard core shortwave enthusiast with eleven shortwave radios at his home and office. He has worked at WWCR since 2003 as a part time Board Operator, Announcer, and recently

the host of *Ask WWCR*, a biweekly program about happenings at the station and shortwave in general.

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WWCR Winter (B-05) Schedule

www.wwcr.org

Transmitter #1 - 100 KW

FREQ	TIME (UTC)
9.985	1000-1100
15.825	1100-2100
7.465	2100-2300
3.215	2300-1000

Transmitter #2 - 100 KW

FREQ	TIME (UTC)
13.845	1400-0000
5.935	0000-1400

Transmitter #3 - 100 KW

FREQ	TIME (UTC)
9.985	1300-1600
12.160	1600-2200
5.070	2200-1300

Transmitter #4 - 100 KW

FREQ	TIME (UTC)
7.465	1400-1600
9.985	1600-1900
9.975	1900-2200
9.985	2200-0000
7.465	0000-0200
5.765	0200-1400

Propagation Outlook for April-September - Summer SW Broadcast Season -

By Tomas Hood NW7US

Every year when the Sun makes its way northward, the hours of daylight increase in the Northern Hemisphere. The longer hours of daylight during the spring and summer seasons trigger a change in radio signal propagation on much of the radio wave spectrum between the medium frequency (MF) segment and the upper limits of the high frequency (HF) segment. During the years of solar cycle maximum when sunspots pepper the Sun, even the very high frequency (VHF) bands can be affected. During the summer, when the days are longer, higher shortwave frequencies can be used for longer periods of time, while lower frequencies may become noisy and prone to signal absorption loss.

Because the days are longer, lower shortwave frequencies and medium wave frequencies become unusable for most of the day. This is caused by signal absorption in the lowest of the ionospheric layers, the *D-region*. The greatest absorption occurs at the lowest of MF and HF frequencies, and the amount of absorption is

directly tied to the amount of sunlight energizing the layer. At night, when the *D* region is in darkness, it quickly loses energy and no longer absorbs the signals it did during daylight hours. However, since the period of darkness is short in the summer season, the nighttime window for hearing medium wave (MW) broadcast stations and tropical shortwave stations is very short. At the same time, the radio noise level caused by weather is higher, masking those weak signals that might make it through the *D* region.

Not all radio DXing opportunities are lost during the spring and summer, however! At the end of March, international shortwave broadcasters typically change their transmission schedules and the frequencies they use, so they can better reach their audience. They typically use hefty amounts of power (millions of watts) to overcome the signal loss the radio signals experience between the transmitter and your receiver. This opens up a different window of DX opportunity for the shortwave radio listener.

The VHF/UHF hobbyist also benefits from the changes in season. The summer season holds lots of unique opportunities for exotic radio activity. DXing distant FM radio stations and TV broadcasts via tropospheric ducting becomes an exciting summertime activity. Trans-equatorial propagation between stations on either hemisphere is common during the spring and early summer. Some hobbyists enjoy catching pings of FM stations off of meteors blazing through the ionosphere that leave behind a thin but dense ion cloud that reflects VHF and sometimes UHF signals. Don't forget the interesting pursuit of exotic VHF propagation via the Aurora, too, though this mode is less likely to occur often this year due to the ending of Solar Cycle 23.

A Unique Solar Maximum?

The latest solar science research suggests that the Sun may be less active during the next solar cycle than it has been during the last 100 years. This research was performed by Doctors Leif Svalgaard, Yohsuke Kamide at the Solar-Terrestrial Environment Laboratory, Nagoya University in Japan, and Edward W. Cliver at the Space Vehicles Directorate, Air Force Research Laboratory, Hanscom Air Force Base in Massachusetts. While based on only the first of three years of data during the current decline of solar cycle 23, enough information is now available to make a reasonable prediction. They

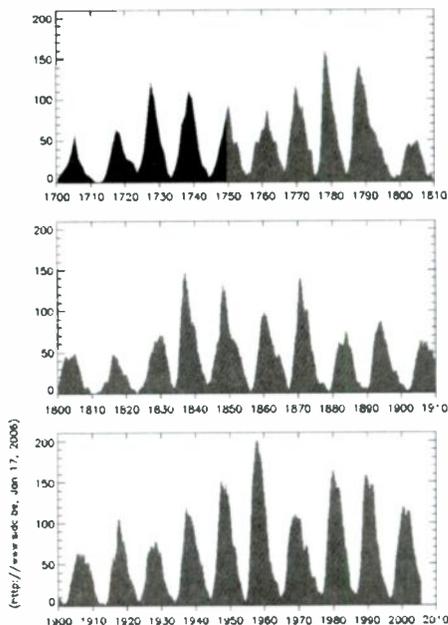
predict that the next solar cycle will peak with an average sunspot number of only 75, give or take 8 points. If they are right, the next solar cycle (cycle 24) will peak around the year 2011 with a sunspot number that is lower than any previous solar cycle since cycle 14. Cycle 14 peaked with a sunspot count of only 64 in 1906.

These results are based upon one of the most successful solar cycle prediction methods in existence, called the "Precursor Method." By investigating the strength of the magnetic fields that assemble in the polar regions of the Sun a few years before the solar minimum of each previous solar cycle, then correlating the strength of those fields to the observed sunspot numbers during the current cycle just past solar maximum, the magnitude of the next solar maximum can be predicted. This is because the polar magnetic fields provide the "seed" magnetic flux necessary to drive the sunspot activity during the next solar cycle.

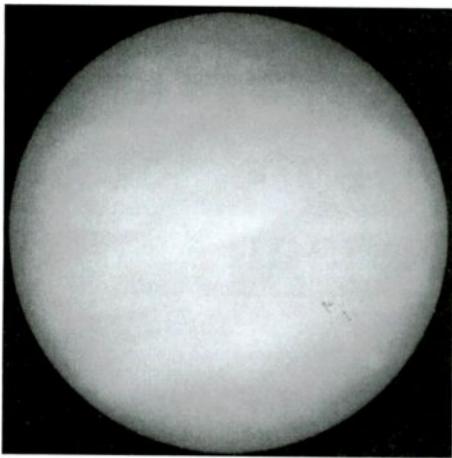
If this prediction holds true, what can we expect for the up-coming solar cycle? As explained previously in this column, the more active the Sun, the more impact solar weather has on radio propagation. With higher sunspot counts comes stronger ionization of the *F* regions of the ionosphere, making it possible for propagating higher radio frequencies over great distances. At the same time, because sunspots are a source of explosive solar flares, a greater number of geomagnetic storms occur, causing aurora and providing VHF excitement.

If this next cycle is weaker than we've seen in many decades, we're going to have poor propagation on the highest shortwave bands, and rare *F*-layer VHF propagation. However, we might have an increase in aurora activity, because the record shows that solar outbursts tend to be extreme during weaker cycles. For example, two of the eight most intense geomagnetic storms during the last 150 years occurred during solar cycle 14. Three of the five strongest energetic proton events since 1859 occurred during solar cycle 13 when the peak sunspot number only reached 88. The scientists note that the next solar cycle could prove to be an excellent test-bed for a number of models and theories concerning the solar cycle and solar activity.

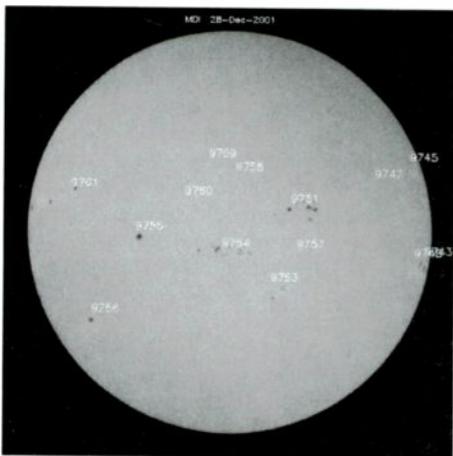
Continue to watch this column in future issues for updates on the prediction for Solar Cycle 24. I will also review the current cycle 23 in an up-coming installment.



The yearly (dark black in top frame, up to 1750) and monthly (red, from 1750 up to now) sunspot numbers. If the current prediction (see text) holds true, the next cycle, Cycle 24, will be the weakest in the last 100 years. (Source: Royal Observatory of Belgium)



A white light image of the Sun taken in January 2006. Solar Cycle 23 is nearly over, with its expected end sometime between December 2006 and February 2007. Note the absence of sunspot activity. Without significant daily solar activity, the ionosphere is not energized to a level sufficient for supporting propagation of the higher shortwave frequencies. (Source: Solar Influences Data analysis Center (SIDC))



A white light image of the Sun taken in December 2001 (during the peak year of Solar Cycle 23). Note the abundance of sunspot activity. With such significant daily solar activity, the ionosphere was energized to a level sufficient for supporting propagation of the higher shortwave frequencies. (Source: Solar Influences Data analysis Center (SIDC))

Summertime Shortwave Propagation

While the lower HF and MF bands become less usable as we move through the spring and into summer in the Northern Hemisphere, the characteristics of higher shortwave propagation changes. Paths between many areas of the Earth begin opening up on higher shortwave frequencies. Openings between the northern and southern hemispheres become more reliable. Because the Sun is mostly overhead over the equator during the last part of March and early part of April, we have mostly an equal day and night period in both hemispheres. The Vernal Equinox on March 20, 2006, marks the day when the hours of daylight and darkness are about equal around the world. This causes

an equalization of the ionosphere, resulting in optimal DX conditions over more of the Earth than during other times of the year. The same thing happens during the autumn equinoctial period.

As high summer arrives, conditions on shortwave frequencies become quite different from those of winter. Radio paths running east and west are not as strong as the signal paths that run between points north and south. On June 21, 2006, the period of sunlight is the longest of the year in the Northern Hemisphere, making the D region the strongest block of signals in the medium and high frequency bands.

At the end of the summer season, we move again through the equinoctial period, and those east/west paths open back up, and we enter the prime DX season.

From April to June, fair to good propagation occurs on both daytime and nighttime paths on the middle shortwave bands. The strongest propagation occurs on paths that span areas of both day and night. During April, peaking in May, and still during June, the frequencies between 9 and 16 MHz may offer occasional 24-hour DX to all parts of the world. Thirty-one meters will be the most stable as a nighttime band, with propagation following grayline and nighttime paths.

During the early part of the summer season (April through May) propagation is still hot on lower SW frequencies, like 41 meters, with Europe in the evening, and Asia in the mornings. Occasional DX openings will occur on the tropical bands around sunrise. However, these bands are quickly being degraded by the seasonal increase in noise.

June marks the changeover from equinoctial to summertime propagation conditions on the shortwave bands. Solar absorption is expected to be at seasonally high levels, resulting in generally weaker signals during the hours of daylight when compared to reception during the winter and spring months.

As we move into July, solar absorption is expected to increase. This causes generally weaker signals on the lower to middle shortwave frequencies during the hours of daylight when compared to reception during the winter and spring months. This higher absorption will continue to play a role in weaker signals on shortwave until the autumn.

Solar activity is nearly at the very lowest in the current Solar Cycle 23. Cycle 23 is expected to reach its lowest point of activity, the end of this cycle, sometime between December 2006 and February 2007. This results in lower maximum usable frequencies than most of the last eleven years. At the highest end of the HF spectrum, propagation from DX locations east and west is a rare event. North and south paths may still open up for short periods on some of the higher bands, especially around sunrise and sunset. During this summer, 19 and 16 meters will be the most reliable daytime DX band though signals will be weaker and more unstable. Sporadic-E propagation will make reception of signals possible for less distant stations, though.

Twenty-five through 31 meters will be fairly good in the evenings and mornings. At night, those paths that remain open may be

marginal. During periods of low geomagnetic activity that I expect this summer (we get less solar storm activity during the years closer to cycle minimum), this band may offer long distance DX all through the night. The most reliable band for both daytime and nighttime should be a toss-up between these two bands.

Forty-one and 49 meters offer domestic propagation during daylight hours and somewhat during the night. The tropical bands (60, 75, 90, and 120 meters) are not noticeably affected by the solar flux, but are degraded during geomagnetic storminess. Through the summer, expect these bands to be more challenging, though less this year than last year, due to the somewhat lower geomagnetic activity levels expected. Look for Europe and Africa as early as sunset. After midnight, start looking south and west for Pacific, South America, and Asia. Short-skip should be possible out to about 750 miles during the daytime.

Expect some openings on 75 and 90, similar to how 40 Meters will be acting. Fairly frequent short-skip openings up to 1000 miles are possible during darkness, but expect very few daytime openings with all the static and absorption. MW and 120 meter propagation is rough in the summer due to the high static and higher overall absorption caused by the short nights and higher D-Layer ionization.

Overall, daytime bands will open just before sunlight, and last a few hours after dark. Look higher in frequency during the day, as these frequencies will be less affected by any solar storms occurring, and more broadcasters have transmissions in these upper bands.

VHF Propagation

On VHF we are expecting Sporadic-E (Es) propagation as we move into June that may produce some great long-range VHF and even possible UHF DX. Statistical studies show that a sharp increase in sporadic-E propagation takes place at mid-latitudes during the late spring and summer months. During July and August short-skip propagation over distances as great as 1400 miles should be possible for about ten percent of the time on 6 Meters. Higher VHF (2m) openings may also be possible during periods of intense sporadic-E ionization.

At the same time, there is a seasonal decline in Trans-equatorial Propagation (TE) during the summer months, but some VHF openings may still be possible during June. The best time to catch a TE opening across the geomagnetic equator is between 8 and 11 p.m. local daylight time. These TE openings will be north-south paths that cross the geomagnetic equator at an approximate right angle.

Tropospheric ducting begins to form over wide areas of North America, and over the Atlantic and Pacific Oceans, during the middle to late summer. Watch for stalled high-pressure weather cells between your location and the distant (DX) station. Stalled high-pressure weather cells, with pressures reaching above 1025 millibars, are known to cause the ducting of VHF radio signals. Ducting allows VHF radio signals to bounce through these natural waveguides far beyond the normal line of sight distances.

Tropospheric ducting forms each year

between Hawaii and the U.S. West Coast, and from San Francisco to Los Angeles, Denver to Dallas, Texas to Florida, the Great Lakes to the eastern seaboard, from the Great Lakes to Texas, Nova Scotia to Miami, and from the Midwest to the Southeast.

Advanced visual and infrared weather maps can be a real aid in detecting the undisturbed low clouds between the West Coast and Hawaii or farther during periods of intense subsidence-inversion band openings. This condition occurs also over the Atlantic. There is a great resource on the Internet that provides a look into current conditions. Bill Hepburn has created forecast maps for North America and presents them at http://home.cogeco.ca/~dxinfo/tropo_nat.html, which also includes links to his maps for the Pacific, Atlantic, and other regions.

Widespread auroral displays can occur during April, bringing with them unusual ionospheric short-skip openings on the VHF bands. Best times for these to occur are during periods of radio storminess on the SW bands. Look for days with high planetary K (Kp) and A (Ap) figures (typically, the Kp should be over 5).

Will that occur often, this year? Probably not, because of the low solar activity we expect now that we are in the final year of the current solar cycle, Cycle 23, the twenty-third cycle since scientists began daily records of sunspot observations. Each solar cycle lasts about eleven years, as measured from a starting point of lowest measured sunspot activity. A solar cycle begins with a sharp increase in sun spot activity, peaking about three to five years later, and then slowly moves toward its lowest point at the end

of nine to eleven years. We are in the final year of Cycle 23. There may be occasional moments of minor geomagnetic storminess caused by fast solar winds and the passage of plasma released from the Sun's corona, but these probably will not be strong enough to cause the level of auroral activity needed to propagate VHF signals.

There are a number of meteor showers during this period between April and September that might provide opportunity for observing VHF/UHF Meteor Scatter propagation DX. Most meteor showers are at their best after midnight. After midnight, you're on the leading edge of the Earth and you're meeting the meteors head-on. Before midnight, you're on the trailing edge of the Earth and the meteors have to catch up to you. As a result not only are more meteors seen in the pre-dawn hours, but their impact speeds encountering the Earth's atmosphere are much higher and the meteors are generally faster and brighter. This causes greater ionization, which is what you use to refract a radio signal. Look for TV and FM broadcast "pings" (short bursts of reception) during these events. If you are an amateur radio operator, look for six and two meter openings off of the ionized meteor trails.

Lyrids, a major meteor shower, should take place from mid to late April. The unpredictability of the shower in any given year always makes the Lyrids worth watching, since we cannot say when the next unusual return may occur. If this year's event is average or better (30 to 60 good-sized meteors entering the atmosphere every hour), meteor-scatter openings could occur on the VHF bands.

Another major meteor shower, the Eta

Aquarids, will occur in May. This shower has a peak rate of up to 20 to 50 per hour.

Minor showers include the Alpha Aurigids (continuing from August), the Beta Cassiopeids (peaking September), the Epsilon Perseids (peaking September), the Delta Aurigids (peaking September) and the Piscids.

Write Me

Do you have questions about space weather and radio propagation? Do you have observations about Aurora, Sporadic-E, or Meteor Shower propagation that you would like to share? Please write me an e-mail message or a letter.

I also invite you to check out my propagation resource center (including discussion forums) on the Internet at <http://prop.hfradio.org>. If you have a cellphone or other handheld device capable of reading WML, I have a WAP version of this resource center at <http://wap.hfradio.org>. You can even sign up for my propagation eAlert service for free. These propagation eAlerts keep you informed of the various index numbers, in real-time.

I wish you a happy radio-monitoring season!

NW7US, Tomas Hood (AAA0WA)
tomashood@monitoringtimes.com or
prop-man@hfradio.org
 P.O. Box 213, Brinnon, WA 98320-0213

(Ed Note: This article will remain available on line for your future reference at www.monitoringtimes.com)

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Getting Started in Slow Scan TV (SSTV)

Slow Scan Television (SSTV) has been around since 1957 when it was an electromechanical contraption strictly for those in the hi-tech vanguard. It was a time of tube-fired gear when most operators were still using AM mode for voice. But since the computer revolution of the 1980s, things have changed. With the rapid progress of personal computers and the availability of sophisticated software driven interfaces, SSTV has become just one of many digital modes available at the click of a virtual SSTV control panel button. Now, anyone with a decent computer, a low cost interface, and widely available free software can enjoy SSTV.

❖ What You'll Need

Until a few years ago, the computer requirements for reliable SSTV would still have been out of the reach of many hams, especially beginners. That's because SSTV operation requires most of the computer's attention. Most computer operating systems will work, even a PC as slow as 100 MHz, but the faster the processor the better your results. You'll need at least 32 MB RAM. SSTV images eat up memory, and if you really get into this end of the hobby you may be saving hundreds of images on file.



Tigertronics SignalLink Model SL-1+ Comes with enough basic digital software to get you well started in this part of the radio hobby. Prices range from \$69.95 to \$74.95 with connecting cable. Power supply extra. (Courtesy: Tigertronics)

Even the less expensive portable radios today are capable of copying SSTV. But, you will need upper and lower sideband capability or a tunable BFO (beat frequency oscillator) to fine tune the signal. The most important part of your receiving system will be a good outdoor antenna. With a telescoping whip you'll be able to copy stronger nearby stations, but DX (distant signals) will be very hard to copy. I use an all-band wire dipole at 30 feet which does a great job in most



MFJ-1279 Sound card interface allows operation of PSK-31, packet, APRS, AMTOR, RTTY, SSTV, CW and can be used as a voice keyer and CW contest memory keyer. Price is \$99.95 and includes software, cables, and AC power supply. (Courtesy: MFJ Enterprises)

cases, but I've found that a multi-element high frequency (HF) beam is needed to work the real DX.

You'll need a digital multi-mode interface to go between your radio and your computer. If you have some skill with a soldering iron you can home-brew your own. However, there are many inexpensive interfaces on the market from which to choose. For some advice on any particular model, check out <http://www.eham.com> and look in the reviews section for the unit in which you're interested. I have been using a Tigertronics SignalLink model SL-1+ with excellent results.

And, finally, you'll need the software to make it all happen. Again, there are a number of software options and you may need to try a few of them before making your final choice. Many are free and even the commercial ones have a 30 day trial period. You'll know long before the trial is up whether or not you like the program. Most have built-in logging programs which helps cut down on the paper work. I've been using HamScope v1.54 as the basic software and using MMSSTV v1.11, both of which are free via the Web and have worked flawlessly for me over the past year. Despite being a complete beginner when I started this year, I'm now using these programs like an old timer. You will, too.

❖ What's the Frequency?

The FCC requires that SSTV transmission take up no more space than an SSB transmission – about 2 kHz. Now, when you consider that your average TV station uses bandwidth 6 MHz wide, it's easy to see that we're going to lose a little something in resolution and action. Add to that the fact that off-air TV signals are sent at 60 frames per second and that one still picture takes about 2 minutes to send via SSTV, and you can see why HF amateur TV is limited

to still images. You don't expect to get VHF or UHF TV images from 10,000 miles away, but that's what's possible with SSTV and that's what makes it interesting.

Unfortunately for SSTV operators, there's little space available to practice their art. SSTV is limited to certain frequencies on certain bands. To top it off, most hams are completely unaware of the SSTV calling frequencies and often set up on or near these frequencies and become irate when SSTV signals come in from around the world.

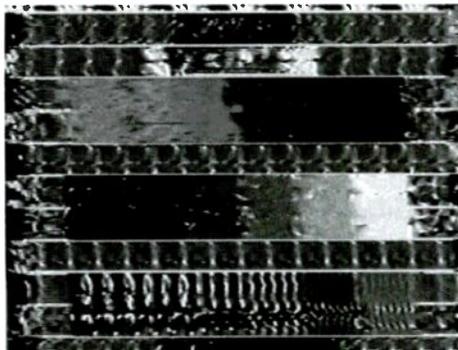


RIGblaster by West Mountain Radio provides all digital modes send and receive in this rugged black sound card radio interface. Includes cables and software for virtually all digital modes. Price is \$129.95 from Universal Radio. (Courtesy: Universal Radio)

Regardless of band, most SSTV exchanges are found on the "calling frequencies" – see chart below. During the day and on weekends when there are more hams on the bands, expect to hear signals either side of the calling frequency. Because of band conditions in this part of the solar cycle there's less activity on 15 and 10 meters. But, when those bands are open, extraordinary DX catches can be had.

❖ Operating Tips

While the MMSSTV program has a good help button, I found that it was easier to print out the entire manual for easier reference while setting up the program. It's a substantial 23 page document but well worth the ink. The program was written by Makoto Mori, JE3HHT and ably translated into English by Nobuyuki Oba, JA7UDE. Additional help in the form of an SSTV Primer by Michael Tondoc, W4HIJ, is found at <http://www.mmhamsoft.ham-radio.ch/mmsstv/priver.htm> The more I use this program the more amazed I am at what it can do. The version 1.11 was written in July of 2004.



Transmission tests on 20 meters of HDSSTV (later renamed Redundant Digital File Transfer, RDFT-SSTV) between VK3LM (Australia) and W9NTP (U.S.). The first figure shows an analog Robot36 SSTV 30.5 second transmission. The second figure shows a 30.5 second RDFT-SSTV transmission. (Courtesy: Barry Sanderson, KB9VAK's web site: <http://www.svs.net/wyman/examples/hdsstv>)

so it's not only new but others have worked out the bugs.

Reception is virtually pain free. After hooking up the hardware and loading the program, simply tune to any of the SSTV calling frequencies and stand by. I found most of the action was on 14.230 MHz. If you've hooked everything up properly, the program will come to life and an image will begin to appear on the screen when you hear the distinctive SSTV tones. If the image is slanted, simply adjust the slant by clicking on the "sync" button and watch the screen straighten up. The receive buffer will save up to 32 images.



Image from 3B9FR, Rodriguez Island in the Mauritius Island group in the Indian Ocean, a distance of about 10,000 miles from the U.S. East coast, using 50 watts on 20 meters. (Courtesy: Author)

Additional image storing is done in a separate "history" folder. Leave your system in the receive mode for a couple of hours after which you can go back and check your catches.

It's much more difficult to transmit a good SSTV image than to receive one. Because sound cards have slightly different record and play frequencies it will cause a slant in the transmitted image. There are a number of ways to correct this slight offset. The only way you'll know if your image has slant in transmit is if the receiving station tells you so. If the slant is not great, the receiving station's autocorrect will take care of it. But, if it's severe, then you'll have to go through the correction procedures in the manual.

While MMSSTV supports 24 SSTV modes, in practice, four modes are used more than others: Scottie 1 or 2 in North America and Martin 1 or 2 in Europe. HF SSTV frequencies are in the voice portion of the bands which allows operators to chat about their images before or after they're sent. In practice, most U.S. hams do chat but most DX operators don't.

Remember that transmitting in SSTV is a full "key down" mode for almost two minutes. For this reason you should set the output of your transmitter for no more than 50 watts. Turn off any processing or other output enhancements.



Image from VE1HBV, Nova Scotia, a distance of about 1,300 miles from the receiver, shows improved image quality of a nearby station. (Courtesy: Author)

❖ On the Horizon

There are other aspects to amateur television (ATV) which are worth noting: Many hams around the country use their 2 meter FM transceivers on repeaters to share high resolution images or they get a net together on a simplex frequency to avoid the congestion of HF. In addition, real time ATV imaging is possible on the UHF ham band (see chart for frequencies) where greater amount of bandwidth is possible. Unfortunately, that also means reception is restricted to line of sight just as it is in commercial TV. However, future amateur radio satellites are being designed to include ATV capability, equipping the satellite with its own camera and including on-board SSTV repeater capability.

Another aspect has to do with improved software and the concept of digital SSTV. Experimental software now allows what amounts to high definition SSTV pictures on the HF bands or via amateur satellites (see images above). There are at least two VHF and HF nets explor-

ing this territory. And, finally, Suitsat (145.990 MHz) is an experiment which will allow an ATV camera to be placed on an astronaut's helmet, allowing earth receivers to actually see what the astronaut sees.

❖ Final Thoughts

As with any type of communications intended to educate or otherwise elevate the hobby, there are those who don't quite get the spirit of the thing. Anyone who's tuned around the 20 meter band in the last decade or so knows that the on-air behavior of a few operators is not the example to which we want our kids to aspire. SSTV is no exception. In fact, the idea that it's a visual medium seems irresistible to some, making it regrettable for the rest.

Those operators aside, SSTV makes it possible for the technically oriented to explore the artistic side of the hobby. Layout, composition, and content aren't characteristics usually mentioned in amateur radio, but here's an opportunity, especially for hams who are also amateur photographers, to add a new dimension to their hobby.

SSTV FREQUENCIES

BAND (Meters)	FREQUENCY (MHz)
160	1.840-1.850 1.916
80	3.845 3.857
40	7.171
20	14.230
15	21.340
10	28.680
.70	420.00-426.00

(Repeater or simplex with 421.25 MHz video carrier, control links and experimental)

Four standard US ATV frequencies:
426.25, 447.25, 234.00, 439.25 (MHz)

Other Frequencies of note:

40 Meter Digital SSTV net
7.173 MHz, Noon weekdays
David Jones KB4YZ net control

Great Lakes SSTV Net
144.175 MHz USB most evenings
Sat. 9pm: Analog night
Wed. 10pm: Digital night
Look for digital pioneer Ralph Taggart
WB8DQT

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Kevin Carey
P.O. Box 56, W. Bloomfield, NY 14585

Q. I frequently receive interference on my Drake R8B shortwave receiver from my new 36" TV set. It is that typical sort of a humming, grinding noise that occurs about every 15 to 16 kHz. My antenna feed is good quality coax, the very low loss highly shielded Belden type, very well grounded at the point where it enters the house and also at the Alpha Delta coax switch near the receiver as well as the receiver chassis itself. The outdoor TV antenna is about 20 feet away from one shortwave antenna and about 50 feet away from the other shortwave antenna. The interference is picked up on both antennas. Any suggestions? (Ed Stroh, Thornton, IL)

A. The noise you are hearing is "sweep noise" produced by the horizontal sweep oscillator that paints the picture, line by line, at 15.75 kHz. Since it's a square wave, it's rich in harmonics which you are hearing. The larger the screen, the more powerful the oscillator, and the worse the incidental radiation from the set!

In most cases, it is radiated into free space through the non-metal, unshielded cabinet, but it can also be radiated from the TV antenna. In that case, a high-pass filter (passes frequencies above 54 MHz, but suppresses them below) inserted on the back of the TV antenna line is a good fix.

You can try putting ferrite beads on all leads coming from the TV to see if that helps. The maximum possible separation of the SW antenna from the TV set is also important. And, of course, fully-shielded coax on all leads is mandatory.

Q. I'm experiencing severe electrical interference from my house wiring on my shortwave receiver. Can I simply use a capacitor across the AC line to reduce it? (Alvin Dattner, email)

A. First, try to determine what is causing the buzzing in the AC line: it could be a loose connection sparking in the wiring, and that's more than an interference hazard!

If you don't know which outlet is most affected, use a battery-operated AM radio as a probe. Set it near the wiring to pick up the noise

and switch the breakers in your panel on and off one at a time to isolate the circuit.

After you know which circuit is affected, unplug anything in those outlets until the sound goes out. You have found the culprit – either the accessory or the wall socket.

If you have found the offending accessory (motor, dimmer, touch lamp, etc.), yes, you can usually reduce the interference by connecting a 0.05 uF @ 600 V capacitor across the AC connection in the device. The connection should be from the hot line to the ground. In a three-wire cable, it's often better to use two capacitors, one from the hot lead, one from the neutral, and both to the ground wire.

(This follow-up email was later received from Alvin Dattner): I think I may have found the cause of a "buzz saw" interference on some shortwave frequencies. I unplugged all indoor sources – computer, printer, TV, and even my cable box, and carried a portable radio around the house as a signal tracer. Nothing made a difference.

I then held the radio next to the outside junction box for the cable TV which is close to all my co-ax lead-ins; the sound was loud and clear. My next step is to ask the cable company to block the signal and see if this will do it. Does this make sense? (Alvin Dattner, email)

A. It sure does. Listen to the buzz and see if its characteristics change every few seconds; if they do, the cable TV signals are the cause. You're hearing the picture video which is scanned; as the picture changes, so will the sound of the scan.

Q. Is there any signal loss if I patch two shortwave receivers together on the same antenna? Would it be better to run the feedline to a splitter? (Tom Claude, email)

A. Generally speaking, the only problems resulting from attaching one antenna directly to two receivers are:

- (1) A loss of 3 dB signal strength in each receiver (this also happens with a splitter), and
- (2) The likelihood of the oscillator from each receiver sending interference to the other receiver (which is reduced with a splitter).

Since most receivers have an RF stage that acts as a buffer, isolating the antenna from the oscillator circuitry, the interference is usually minimal.

The answer, however, is somewhat different for scanners. Since the oscillator is rapidly switching frequency many times per second, the mutual interference can be severe, and the splitter is usually mandatory. Sometimes even a second antenna is required.

Q. Since the PAR End Fedz 1-55 MHz receiving antenna has an impedance-matching transformer to make it closer to 50 ohms, can it also be used for transmitting with a simple antenna tuner (transmatch)? (Kevin Gunning)

A. According to the manufacturer, because of the small gauge of the wire and size of the transformer core, power would be limited to, perhaps, 10 watts. For typical 100 watt transmitting as well as receiving, we would recommend the amateur version designed for 10-55 MHz.

Q. What is a "Zepp" antenna? What is a composite antenna? (Sterling Marcher, La Mirada, CA)

A. "Zepp" is an abbreviation for Zeppelin, the old German lighter-than-air craft. They used trailing antennas fed at the close end for communications; thus, a "Zepp" is a general reference to any end-fed wire antenna.

A composite antenna is simply a combination of two or more individual antennas operating together to produce either gain (focus in one or more directions) or wider bandwidth (frequency range).

Q. Will Internet, satellite and cable alternatives to conventional broadcasting kill standard AM/FM services? (Cary Luse, La Mesa, CA)

A. That's a good question. I think the answer is no, not in the foreseeable future. Here's why.

Basic AM/FM broadcasting is solidly in place, receiving equipment is cheap, listening fees aren't charged, advertising is affordable for small, local businesses, and improved technologies for AM/FM stations are being developed. And despite dire predictions, even the emergence of TV didn't kill off AM/FM radio.

Of course, predictions are only as good as the qualification of the guesser, and unforeseen variables could alter the outcome. But from what it's already withstood over the years, I doubt that we will witness the demise of conventional AM/FM anytime soon.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)

Setting the Record Straight

When scanner enthusiasts have to deal with the new technologies we now encounter in our daily monitoring, some of it can be downright confusing. Last month we talked about the new North Carolina VIPER trunk radio system. Peter Viscarola clarifies the term APCO-25 for us.

"In your column you note "The VIPER system is a Motorola SmartZone 4.1...Mixed-mode (3600 baud analog/digital) trunk system and it is 100% APCO Project 25 compliant.

"The way I understand APCO Project 25, this is not correct. A mixed-mode 3600 baud system is an APCO Project 16 system. While it uses IMBE encoded digital voice, which is also used in APCO 25, this does not make this an APCO 25 system. A required element of an APCO 25 system is implementation of the Common Air Interface (CAI) which is a 9600 baud interface. Thus, by definition, a system with a 3600 baud control channel can *never* be 100% APCO 25 compliant.

"There is so much confusion about this topic in the scanner community – and even in the professional radio community – it would really help if we use the correct terminology. We see this problem all the time when scanner users attempt to program their BCD-396T scanners: When attempting to monitor a 3600 baud Motorola system, and forced to choose between system settings of "APCO 25" or "Motorola Type II" they choose "APCO 25" – which is not correct and results in them hearing nothing. I can't tell you how many times I've seen this problem on the public mailing list."

Don Wingo also commented on the APCO digital mode confusion, "3600 baud and P25 do not go together. P25 per TIA 102 must be 9600 baud and cannot vary from the baud rate for either voice / data packets or control channels. The lower baud rates are the realm of Motorola's Astro system, which is based on SmartZone / SmartNet technology. If one reviews the many listings for trunking systems, they will find many systems listed as P25 but [which] will have analog talk groups. These are not P25 systems since there is not an analog trunking component within P25. You will also find some systems that claim P25 compliance, but when the bit error rate becomes unacceptable at 9600 baud, the control channel will roll back to 3600 baud. This too is not a TIA 102 compliant system."

Rich Newbould also noted that 3600 baud systems should be called P16 and not P25. Thanks, guys. But the bottom line is, the VIPER system is and will be monitorable on any of the current digital capable scanners being sold in the scanner hobby marketplace. Now we move on to this month's questions.

MT's Publisher Bob Grove asks an interesting series of questions regarding the Uniden BR-330T and BCD-396T scanners.

Q. *I notice that these units do not have a squelch control knob. What gives?*

A. Actually it does have a squelch control, it just isn't a knob on the case... The top button on the left side of the scanner is the function switch (bottom button is the menu button). On the top of the unit is the scroll knob, which can activate various functions when depressed. To change the squelch function, hold the function button down and briefly depress the scroll knob control once, which will display the current scroll setting at the bottom of the screen.

When "SQUELCH LEVEL" appears on the screen, rotate the scroll control to set the squelch to the level you want. (Note: If you do not press any key or turn the scroll control within about 10 seconds, "SQUELCH LEVEL" disappears.)

By the way, you also just depress the scroll knob once (no other key presses) in order to change the volume.

Q. *What's the quickest, easiest way to direct-enter a frequency?*

A. If scanning, press Hold button, then enter the frequency and press Hold again. At this point you are in the VFO mode. You can scroll through frequencies. Step is based on what you have entered in menu options for Search/Local (Close Call) menu option selection.

Q. *Is there a way to reload factory resets by an internal restore procedure?*

A. You can erase all the memories and restore factory settings (except for the pre-entered trunk system frequencies) by the standard Uniden protocol of "turning the power on, while holding the 2-9-Man(ual) keys."

Q. *When the radio is operating in the alpha display mode, and you want to review the frequency, what's the procedure?*

A. While holding on a channel with an alphanumeric tag, press and hold Function key plus the digit 5 key. It will toggle to the frequency programmed in that memory location. Depressing Function plus digit 5 key again will toggle the channel back to the alphanumeric tag for that channel.

Q. *I was just reading your article from last year about listening to the Blues or the T-Birds. I obviously don't want to spend a ton*

of money on a hand-held scanner. I was curious if you know of any hand-held in the \$150 range that would work. I was looking at a Radio Shack scanner (Pro 97) and it looks like the frequencies you mention are on that. Joe via email.

A. The Pro-97 is the only handheld scanner from Radio Shack that will monitor the UHF military aircraft (225-400 MHz) spectrum and meets all the requirements to be usable at any air show (see the air show equipment list in this month's MT on page 52). The only other Radio Shack model that can monitor military air communications is the Pro-2055 base/mobile.

Q. *I work at the Hickory NC Police in 911, and they use EDACS. How do I enter and what should I enter for the LCN (Logic Channel Number) required for EDACS frequency entries into the new Uniden T4 trunk trackers? Hickory has two "systems," one has frequencies of 856 through 858.4375 MHz and the other has 856 through 860.9375 MHz. On previous trunk trackers, frequencies were all I entered into two separate banks. Now I am stumped. Entering one of the above frequencies works OK until I enter it and next step is the required LCN. Any ideas?*

(Staley Keener, Hickory, NC)

A. You will need to create two systems in your TT4 for the Hickory system. One will be for the primary system and one for the southwest site. Here are the particulars for each site:

Primary [1] 856.9375 [2] 857.9375 [3] 858.9375 [4] 859.9375 [5] 860.9375

Southwest [1] 856.4375 [2] 857.4375 [3] 858.4375

The number in brackets next to each frequency is that frequency's EDACS LCN or Logic Channel Number. So when you start entering information and it asks for the LCN for a frequency, use the list above.

Make sure you create a separate system for the primary and southwest system sites above.

Till next time, 73 and good hunting.

Equipment, Websites, and Frequencies

With all of the new scanners coming out and plenty of older scanners still on the market, it can be a challenge to select the right one for your needs. This month we take a look at two handhelds from Uniden and examine some Internet resources for new radio systems coming on-line.

Hi Dan,

I just wonder do you have any info as to the following two Uniden trunked scanners:

- 1 - BR330T
- 2 - BC246T

I am looking for a good trunking handheld, and these two fall into my monetary budget. Do you surmise that these units provide a good bang for the buck?

I really appreciate any help you can give me. I never really got into scanning but I do like to listen to one of my handhelds. I also think I should get a trunked unit, as sooner or later trunking is probably going be the way things are.

Also, are agencies like DEA, FBI, etc. using trunking?

- Bill in Freehold, New Jersey

Both scanners you mention are capable of following analog trunked conversations from the "big three" types of systems: Motorola, EDACS (Enhanced Digital Access Communication System) and LTR (Logic Trunked Radio). Neither scanner will be able to monitor transmissions or follow conversations on digital systems, which are becoming more common in many parts of the country.

Both radios also provide Uniden's Close-Call technology, which automatically captures and tunes to nearby signals. Each also has SAME (Specific Area Message Encoding) Weather alerting, to inform you of hazardous weather or emergency conditions in your local area. Programming and control from your personal computer are available for either scanner.

The BC246T is about a year older than the BR330T and was reviewed in the December 2004 issue of *Monitoring Times*. It covers 25 to 54 MHz, 108 to 174 MHz, 216 to 255 MHz, 400 to 512 MHz, 806 to 956 MHz (except for cellular), and 1240 to 1300 MHz.

The BR330T is a relatively new scanner, having been available since September of last year. It's been marketed as a scanner for NASCAR racing fans, although it has some additional features that make it useful away from

the racetrack. First, it has continuous coverage from 100 kHz on up to 1300 MHz (except for the cellular bands). This means you can listen to shortwave stations in the kilohertz bands all the way on up to satellite signals and other microwave radio activity in the gigahertz range. The radio also provides fire tone-out and two-tone sequential paging if you want to follow specific fire department alerts. It was reviewed in the December 2005 issue of *Monitoring Times*.

Before making your choice, I would recommend reading the *MT* reviews (which you can find on the magazine's website) and consider how much use you might make of the additional coverage range and tone-out features of the BC330T. You may also want to consider a digital-capable scanner if you intend on traveling to other parts of the country.

❖ Freehold, New Jersey

Freehold is a town of about 11,000 located in Monmouth County, about 40 miles southwest of New York City. The county has a population of more than 600,000 and is home to two major military installations.

Around Monmouth County there are a number of conventional analog frequencies that either scanner will monitor without trouble:

37.94	County Road Department
39.46	County Sheriff
151.310	County Parks Department
153.755	County Sheriff Administration
153.905	County Mass Transit
153.830	County Fire
154.160	Fireground (Tinton Falls)
154.175	County Fire
154.205	County Fire
154.265	County Fire
154.280	County Fire
154.430	County Fire (Dispatch)
154.680	County Police Intersystem/Hotline
154.875	County Police Dispatch
154.980	Fireground (Brielle)
155.175	County EMS Dispatch
155.280	County EMS Mutual Aid
155.340	County EMS
165.1625	Fireground (Fort Monmouth)
471.7125	County Sheriff DWI Team
472.7125	County Sheriff
477.0625	County Police

Freehold has several separate frequencies for fire and police services. You might notice that

the police frequencies lie within a band that is usually allocated to television channel 19. The Federal Communications Commission (FCC) approved the use of these frequencies because there were no available frequencies in the usual public safety bands in the greater New York metropolitan area.

154.055	Fire
154.175	Fire
154.280	Fire
154.430	Fire (Dispatch)
155.175	EMS (Dispatch)
155.835	Fire
500.5625	Police
500.3875	Police
501.1125	Police

Fort Monmouth has been slated to close in the recent Base Realignment and Closure (BRAC) decision process. Until the personnel and programs are transferred to other facilities, you should be able to continue to monitor fire and law enforcement activity on these VHF frequencies:

154.430	Fire (Dispatch)
165.1625	Fire
165.1875	Fire
165.0875	Police

The state operates a Motorola Type II system that includes coverage in Monmouth County. Frequencies for that area are 856.7125, 857.2125, 857.7125, 858.2125, 858.7125, 859.2125, 859.7125, 860.2125, 860.7125, 866.6125, 867.2125, 867.6625, 868.1375 and 868.5125 MHz.

After you have the frequencies programmed in, here are some talkgroups to get you started:

DEC	HEX	Description
26928	693	Garden State Parkway
26960	695	Garden State Parkway
26992	697	Turnpike
27024	699	Turnpike
27056	69B	Turnpike
27088	69D	Garden State Parkway
27304	6AA	State-wide Alerts
27344	6AD	State Emergency Management
27376	6AF	State Emergency Management
27632	6BF	Bomb Squad
27792	6C9	Organized Crime Bureau
27856	6CD	New Jersey National Guard
27888	6CF	New Jersey National Guard
27920	6D1	New Jersey National Guard
28144	6DF	State Interagency
28176	6E1	State Interagency

- 28688 701 New Jersey National Guard
- 28720 703 New Jersey National Guard
- 36496 8E9 Division Call
- 36528 8EB Troop C Headquarters
- 36560 8ED Dispatch (South)
- 36592 8EF Dispatch (West)
- 36624 8F1 Dispatch (East)
- 36656 8F3 Maritime Police
- 36688 8F5 Car-to-Car
- 53264 D01 Turnpike
- 53296 D03 Garden State Parkway
- 57616 E11 Police Interagency
- 57648 E13 Fire Interagency



❖ Cheboygan County, Michigan

Dan,

I was just doing a Google search on northern Michigan scanner frequencies and found your reply to someone's question on trunking. I am looking for the frequencies for Cheboygan County. Can you help? Thanks!

– Tom in Michigan

Cheboygan County of

- 154.785 County Sheriff - Dispatch
- 151.040 Cheboygan County Road Commission
- 151.745 Cheboygan Garbage Trucks
- 154.220 Mackinaw City Fire (Tactical)
- 154.295 Cheboygan City Fireground
- 154.295 Mackinaw City Fire (Fireground)
- 154.310 Cheboygan County Fire/EMS Dispatch
- 154.310 Mackinaw City Fire (Dispatch)
- 154.46375 Cheboygan City Water Department
- 154.785 Cheboygan County Dispatch
- 155.115 Mackinaw City Road Department
- 155.325 Cheboygan Ambulance
- 155.760 Cheboygan City Public Works
- 159.195 Cheboygan County Road Commission

There also appear to be several frequencies assigned to the Michigan Department of Natural Resources (DNR). Low band frequencies of 44.64, 44.72, 44.80, 44.84 and 44.88 MHz, along with 151.160, 151.220, 159.360, 159.420 and 159.450 MHz, are licensed to broadcast from a number of sites around the Straits. One is on US-23, about three miles east of Cheboygan, and another is nine miles south of town, just off M-33. Two sites are in Petosky, and one each in Boyne City, Indian River, and Mackinaw City. Two additional sites are further south, one on M-93, about seven miles northeast of Grayling and one at Sleepy Hollow State Park near Laingsburg, just outside the state capital of Lansing. Two other



repeaters around Cheboygan are also licensed for operation on 151.235, 451.050 and 456.050 MHz.

Michigan Emergency Public Safety (MEPS) can be found on 155.865 MHz, operated from Post #72 of the Michigan State Police, located on Main Street in Cheboygan.

So far all of the frequencies listed here operate conventionally (that is, they are not trunked) and carry voice in analog format. This means that nearly any scanner will work just fine to monitor these frequencies. However, if you have a more recent APCO Project 25 digital scanner, such as the Uniden BC396T or the Radio Shack PRO-96, you will also be able to monitor the Michigan Public Safety Communications System (MPSCS). This statewide system is a trunked system and voice information is carried in digital form.

The Michigan State Police have three towers in Cheboygan County. One is in the town of Cheboygan near the corner of M-33 and Merchant Road and is licensed to transmit on 866.0125, 867.1875, 867.4500, 867.9500 and 868.4500 MHz. The second is near the town of Wolverine, transmitting on 866.0125, 866.8625, 867.8625, 868.3625 and 868.8625 MHz. The third is located between Cheboygan and High Banks, on the shore of Lake Huron, licensed for 866.0125, 866.9375, 867.9375, 868.4375 and 868.9375 MHz.

❖ Genesee County, Michigan

Hi Dan,

I read your column about Detroit's new APCO-25 system and thought I'd pass on information that I have read on the Radio Reference website "Michigan Forums" postings. Owners of both the Uniden and Radio Shack digital scanners are reporting aggravating problems monitoring this new system, as well as the new systems of Monroe and Genesee Counties. The general consensus is that there is something about these new systems that the scanners don't like, and since I live in Genesee County I can confirm my problems here, using my two PRO-96s.

If you care to read some of the postings, I have provided a link to the RADIO REFERENCE Michigan Forums page where you can scroll through the pages that contain observations and comments on this.



Genesee County Michigan

www.radioreference.com/forums/forumdisplay.php?f=46

Reportedly, Radio Shack is checking into the problem. Thankfully up here in and around Genesee County we are able to monitor quite clearly one or more of four State of Michigan APCO-25 towers in four bordering counties that simulcast the Genesee system. I receive excellent signals from both the Holly tower in Oakland County and the Columbiaville tower in Lapeer County using 800 MHz duckie antennas.

I might add that I have found www.radioreference.com to be a most valuable resource in learning programming tips, frequencies, ID lists, programming software, and other user's experiences with APCO-25 systems.

I read your column monthly, keep up the good work.

– Les in Davison Township

Last year the FCC granted a license for the creation of a six-site Genesee County subsystem on the Michigan Public Safety Communications System (MPSCS). The license covers six repeater sites, all inside the county, specifically in the towns of Flint, Flushing, Goodrich, Montrose, Rogersville and Swartz Creek. Frequencies assigned to these repeaters are 866.0375, 866.0750, 866.3125, 866.3875, 866.7500, 867.0375, 867.3500, 867.6625, 867.7250, 868.2750, 868.3750, 868.3875, and 868.8875 MHz. As usual, each site will also have the capability of using the conventional Mutual Aid frequencies of 866.0125 and 866.5125 MHz.

Testing of the new system was expected to begin in February, with a cutover from the old VHF system to the new digital network scheduled for May 2, 2006. When officials are satisfied that the new equipment is working correctly, the old gear will be taken out of service. It's not clear yet how long the fire department tone-outs will remain on VHF.

Some County frequencies:

- 153.785 Administrative
- 153.830 Fire
- 154.190 Central Fire Dispatch (South)
- 154.145 Central Fire Dispatch (North)
- 154.280 Fire
- 154.295 Fire
- 155.445 Central Dispatch (South)
- 155.580 Sheriff
- 155.610 Central Dispatch (North)
- 155.865 Michigan Emergency Police Service (MEPS)
- 156.180 Road Commission
- 158.865 Sheriff

Two frequencies carry local agency dispatch and operational activity, 155.565 and 155.880 MHz. In the city of Flint, the Police Department uses the following VHF frequencies:

- 155.250 Car-to-Car
- 155.070 Dispatch
- 155.685 Detectives
- 156.150 Special Operations

The Flint Fire Department has two frequencies:

- 153.890 Dispatch (Primary)
- 154.235 Tactical and Administrative

And Les, I agree that www.radioreference.com is an excellent resource for scanner enthusiasts – in fact, *MT* granted it our first Internet Excellence Award. I would recommend it as a first stop for someone trying to learn more about their local systems.

❖ **Carbon County, Pennsylvania**

In a very refreshing counterpoint to many of the secretive municipalities scanner listeners have encountered, Carbon County in Pennsylvania has published their public safety frequencies on an Internet web page. Despite the typographic error in the word “frecuencies,” this link www.carboncounty.com/communications/frecuencies.htm

will bring up a rather lengthy list of state and local frequencies including police, fire, emergency medical service, government, utility, railroad and aviation services.

Carbon County is located between Philadelphia and Scranton in northeastern Pennsylvania. The Carbon County Communications Center provides centralized dispatch services for many local agencies, including more than a dozen police departments and nearly two dozen fire departments.

For those readers who can't get to the Internet to check it out, here is a sample of some of the police and fire frequencies listed on the site:

- 154.755 State Police - Unit-to-unit
- 155.475 State Police - Nationwide Police Channel
- 155.505 State Police - F-4 (Black)
- 155.580 State Police - F-4 (Black)
- 155.670 State Police - F-3 (Red)
- 155.910 State Police - F-3 (Red)
- 42.60 State Police
- 460.200 State Police
- 154.800 County Sheriff/Police - F-1
- 154.965 County Sheriff/Police - F-2
- 155.730 County Sheriff/Police - F-3
- 460.175 Countywide Fire Communications - F-1 (Dispatch) (PL 127.3)
- 458.025 Countywide Fire Communications - F-2 (Statewide E.M.A.) (PL 136.5)
- 453.4875 Countywide Fire Communications - F-3 (PL 127.3)
- 452.775 (PL 118.8) - Countywide Fire Communications - F-4 (County Transit) (PL 118.8) - Countywide Fire Communications
- 458.5875 F-5 (Fireground - North) (PL 127.3)
- 453.5875 Countywide Fire Communications - F-6 (Fireground - Central) (PL 127.3)
- 458.100 Countywide Fire Communications - F-7 (Fireground - South) (PL 127.3)
- 453.8875 Countywide Fire Communications - F-8 (Splinter 1) (PL 127.3)
- 458.8875 Countywide Fire Communications - F-9 (Splinter 2) (PL 127.3)
- 453.6875 Countywide Fire Communications - F-10 (Splinter 3) (PL 127.3)
- 453.5875 Countywide Fire Communications - F-11 (District 4) (PL 127.3)
- 453.100 Countywide Fire Communications

46.50 - Paging
Countywide Fire Communications

❖ **Baltimore-Washington Airport**

Motorola has won a \$6.9 million contract to install a “pure” APCO Project 25 system at the Baltimore-Washington International (BWI) airport. The Maryland Aviation Administration (MAA) hopes to improve interoperability with nearby counties and local agencies, many of which are already using some P-25 standards. The counties of Anne Arundel, Baltimore, and Howard, and the city of Baltimore all provide mutual aid to the airport.

The Association of Public-Safety Communications Officials (APCO) Project 25 is actually a set of standards spelled out in excruciating detail across more than 30 documents. The most important standard describes the Common Air Interface (CAI), laying out the method and meaning of each digital message sent and received by a P-25 radio. Each radio manufacturer building P-25 radios follows the CAI standard, thus ensuring that the digital voice format is the same from all radios. This provides several benefits, including competition among manufacturers and interoperability among agencies.

Another Project 25 standard specifies how a trunked system should work, including the requirement that the rate at which data is transmitted on the control channel occurs at 9600-baud. A system that uses the CAI and the P-25 trunking standard is considered “pure” since all critical functions follow a Project 25 standard. The system to be installed at BWI is heralded as the first true P-25 system in Maryland.

Many digital systems use the CAI but don't use the P-25 trunking standard – they use the older, much more common Motorola trunking protocol. This is usually referred to by the data rate of the control channel, 3600-baud, and allows older analog equipment to coexist with newer digital-capable radios.

MAA expects more than 700 users to eventually use the system, including the airport security and fire fighting personnel, Maryland Transportation Authority Police, as well as maintenance and operations crews.

In the meantime, here are some frequencies for BWI (Thurgood Marshall) Airport:

- 154.100 Fire Dispatch
- 154.280 Statewide Mutual Aid
- 154.980 Maintenance
- 156.195 Snow Plows
- 453.1375 Maintenance
- 453.2375 Maintenance
- 453.5375 Buses
- 453.8000 Administration
- 453.9000 Maryland Transportation Authority Police
- 129.075 AirTran
- 129.225 American
- 129.300 FedEx
- 129.675 Air Canada
- 129.800 US Airways
- 130.300 Northwest

- 130.475 Southwest
- 130.525 Continental
- 130.575 US Airways
- 130.850 America West
- 131.325 Southwest
- 131.850 Delta
- 460.6500 Northwest
- 460.7500 Continental
- 460.7750 American
- 460.8500 Delta
- 461.0500 Southwest
- 461.2750 Southwest
- 461.5750 Southwest
- 461.7125 AirTran
- 463.2750 Southwest
- 463.8000 Southwest
- 464.6000 America West

❖ **Cumberland County, Pennsylvania**

Municipal police departments in Cumberland County, in south central Pennsylvania, switched over to a new 800 MHz trunked radio system last December. The \$10 million system replaces a low-band radio network that is older than many of the personnel it serves. Also, by getting all sixteen police departments and more than 30 fire departments on the same system, communication between agencies should be much easier. Local fire departments and ambulance companies are scheduled to switch over in June.

Planning for the system began almost ten years ago. The county finally settled on a “piggyback” agreement with the state to use OpenSky equipment from M/A-COM Wireless Systems, a hardware supplier based in Virginia. Pennsylvania is currently implementing a statewide OpenSky system of nearly 200 repeater sites but is struggling with cost, coverage and schedule issues.

Cutover of the Cumberland County system was delayed for two years while coverage problems were addressed, although the Transportation Department had been testing the system during that period. The county eventually put up seven additional towers to provide adequate signal strength in problem areas. The last site, at Waggoners Gap in North Middleton Township, was the subject of much controversy but was finally settled about two years ago.

The OpenSky network will provide additional capabilities for county users, including data transmission, one-button “emergency” alerts, and continuous GPS (Global Positioning System) location for each vehicle.

Scanner listeners will continue to hear fire departments and ambulance dispatches until their scheduled cutover on June 1. No scanner is currently able to monitor the proprietary OpenSky digital transmissions.

More information and links related to scanning and radio equipment are available on my website at www.signalharbor.com, and I welcome your electronic mail to danveeneman@monitoringtimes.com. As always, I'd love to hear about the systems you're listening to, whether analog or digital. Until next month, happy monitoring!

Big Savings on Radio Scanners

Uniden®

SCANNERS



Bearcat® 796DGV Trunk Tracker IV with free scanner headset

Manufacturers suggested list price \$799.95
CEI Special Price \$519.95
 1,000 Channels • 10 banks • CTCSS/DCS • S Meter
 Size: 6^{15/16}" Wide x 6^{9/16}" Deep x 2^{3/8}" High

Frequency Coverage: 25 000-512 000 MHz., 806 000-956 000 MHz (excluding the cellular & UHF TV band) 1,240 000-1 300 000 MHz

When you buy your Bearcat 796DGV TrunkTracker package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC796DGV scanner purchase, you also get a free deluxe scanner headphone designed for home or race track use. Headset features independent volume controls and 3.5 mm gold right angle plug. The 1,000 channel Bearcat 796DGV is packed with features to track Motorola Type III/III Hybrid, EDACS, LTR Analog Trunk Systems and Motorola APCO 25 Phase I digital scanner including 9,600 Baud C4FM and CQPSK. Also features control channel only mode to allow you to automatically trunk many systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control and programming with RS232C 9 pin port (cable not supplied), Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for \$29.95. For complete details, download the owners manual from the www.usascan.com web site. For fastest delivery, order on-line at www.usascan.com

Bearcat® BCT8 Trunk Tracker III

Manufacturer suggested list price \$299.95
CEI Special Price \$169.95
 250 Channels • 5 banks • PC Programmable
 Size: 7.06" Wide x 6.10" Deep x 2.44" High

Frequency Coverage: 25 0000-54 0000 MHz., 108 0000-174 0000 MHz., 400 0000-512 000 MHz., 806 0000-823 9875 MHz., 849 0125-868 9950 MHz., 894 0125-956 0000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker ESP20 with mounting bracket & 10 feet of cable with plug attached \$19.95. Magnetic Mount mobile antenna ANTMMBNC for \$29.95



Bearcat® BCD396T Trunk Tracker IV

Suggested list price \$799.95/CEI price \$519.95
 APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging.
 Size: 2.40" Wide x 1.22" Deep x 5.35" High

Frequency Coverage:

25 0000-512 0000 MHz., 764 0000-775 9875 MHz., 794 0000-823 9875 MHz., 849 0125-868 8765 MHz., 894 0125-956 000 MHz., 1240 0000 MHz - 1300 0000 MHz

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as Fire Tone Out Decoder. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning. Close Call Radio Frequency Capture - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid SMARTNET, PRIVACY PLUS, LTR and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Dynamically Allocated Channel Memory - The BCD396T scanner's memory is

organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but over 6,000 channels are possible depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. Preprogrammed Systems - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems: 3 AA NiMH or Alkaline battery operation and Charger - 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAh Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted berries. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. Manual Channel Access - Go directly to any channel LCD Back Light - A blue LCD light remains on when the back light key is pressed. Autolight - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.

More Radio Products

Save even more on radio scanners when purchased directly from CEI. Price includes delivery in the continental USA excluding Alaska.

Bearcat 898T 500 channel TrunkTracker III base/mobile	\$209.95
Bearcat 796DGV 1,000 channel TrunkTracker III base/mobile	\$519.95
Bearcat BCD396T APCO 25 Digital scanner with Fire Tone Out	\$519.95
Bearcat 246T up to 2,500 ch. TrunkTracker III handheld scanner	\$214.95
Bearcat Sportcat 230 alpha display handheld sports scanner	\$184.95
Bearcat 278CLT 100 channel AM/FM/SAME WX alert scanner	\$129.95
Bearcat 248CLT 50 channel base AM/FM/weather alert scanner	\$104.95
Bearcat 92XLT 200 channel handheld scanner	\$109.95
Bearcat 72XLT 100 channel handheld scanner	\$99.95
Bearcat BR330T up to 2,500 ch. TrunkTracker III with Tone out	\$274.95
Bearcat BCT8 250 channel information mobile scanner	\$169.95
Bearcat 350C 50 channel desktop/mobile scanner	\$104.95
AOR AR16BQ Wide Band scanner with quick charger	\$199.95
AOR AR3000AB Wide Band base/mobile receiver	\$1 079.95
AOR AR5000A+3B Wide Band 10 KHz to 3 GHz receiver	\$2 599.95
AOR AR8200 Mark IIIB Wide Band handheld scanner	\$594.95
AOR AR8600 Mark II Wide Band receiver	\$899.95
AOR AR-ONE Government/Export sales only 10 KHz-3 GHz	\$4 489.95
Scancat Gold For Windows Software	\$99.95
Scancat Gold For Windows Surveillance Edition	\$159.95

Bearcat® BC246T Trunk Tracker III

Suggested list price \$399.95/CEI price \$214.95
 Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging.
 Size: 2.72" Wide x 1.26" Deep x 4.6" High

Frequency Coverage:

25 0000-54 0000 MHz., 108 0000-174 0000 MHz., 216 0000-224 9800 MHz., 400 0000-512 0000 MHz., 806 0000-823 9875 MHz., 849 0125-868 9875 MHz., 894 0125-956 000 MHz., 1240 0000 MHz - 1300 0000 MHz

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include: Close Call Radio Frequency Capture - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Dynamically Allocated Channel Memory - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but over 2,500 channels are possible depending on the scanner features used. You can also easily determine how much memory is used. Preprogrammed Service Search (10) - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. Quick Keys - allow you to select systems and groups by pressing a single key. Text Tagging - Name each system, group, channel, talk group

ID, custom search range, and S.A.M.E. group using 16 characters per name. Memory Backup up - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. Unique Data Skip - Allows the BC246T to skip over unwanted data transmissions and berries. Attenuator - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. Duplicate Frequency Alert - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. 22 Bands with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAh nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part #HF24RS for \$29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.

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Cuban "Numbers": A Pattern Emerges

Collection and analysis of several months' loggings confirms that, just as others have observed, the Cuban voice "numbers" station does indeed have what may be its first daily broadcast schedule ever.

This station is also known as "V2," "Atencion" (from its callup), the "5-Figure Spanish Lady," and the "SS/YL/5F" (same thing in "shortwavese"). It's the latest version of the famous Cuban spy transmissions which have mystified listeners in much of the world, while inspiring some good pop music, for several decades now.

And indeed, these broadcasts are compelling in their sheer strangeness. Mumbling voices, strange noises, Radio Havana, and even the occasional parrot, can turn up on the open tuning carriers run before the messages. Technical flubs, mostly of the "oops, wrong button" variety, are many and legendary. If everything works (always a big "if" with this bunch), that ominous machine-spliced female finally barks the distinctive "Atencion" ("Attention").

While the name "V2" sounds appropriately like some kind of a World War II German rocket bomb, it is simply the sequential designator given this particular broadcast on the list maintained by ENIGMA 2000. They're the online incarnation of the European Numbers Intelligence Gathering and Monitoring Association. Over the years, this generic V2 has had a number of lettered variants. These differ in message structure or detailed formatting.

After the callup, our V2a variant sends a message designator with three 5-number groups. These are the first groups in the three following messages, which are of equal length. Each message is always 150 5-number groups, beginning (as we've noted) with the one in the designator. The whole transmission usually ends with the Spanish "final" ("end"), around 45 minutes after the hour.

While the Cubans have traditionally preferred monthly and weekly schedules, the new local-daytime V2a is a daily one. It's a long schedule by "numbers" standards. It's more like something you'd hear from an international broadcaster, changing frequency more or less hourly while

maintaining a long program. This is pretty ambitious for an operation which is so audibly straining to keep its aging, hurricane-damaged equipment going.

This daily sked starts at 1600 Coordinated Universal Time (UTC), and goes until the 2100 broadcast ends, nearly six hours later. The times in UTC and frequencies in kilohertz (kHz, AM mode) are:

1600 on 7975.0
 1700 on 8010.0
 1800 on 8097.0
 1900 on 8097.0
 2000 on 7887.0
 2100 on 6855.0

That's it. By the standards of "numbers" stations, which often confront listeners with a bewildering number of times and frequencies, this is pretty simple stuff.

But there is way more: All of the other V2 schedules are still on the air. These are the more traditional ones, using what may or may not be a weekly frequency rotation. Parallel transmissions frequently occur, on two or three frequencies.

At press time, the rest of V2a was on from as early as 0200 UTC until as late as 1500. In other words, there's a Cuban voice "spy numbers" station going somewhere at nearly any hour of the day. This doesn't even count the hours of Morse code broadcasts in a similar format. For whatever it's worth, which may not be much, this represents an awesome volume of traffic.

V2a Message Continuity

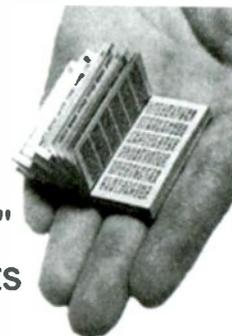
These transmissions have another most interesting feature. If one logs all of the initial three-group message designators, it becomes quickly evident that they are anything but random. In fact, they often increment their last figures by one with each day's broadcast.

The best way to explain this is by example. On December 11, 2005, one of several sets of message designators was 38641 45851 51761. On the 12th, this one changed to 38642 45852 51762, but the messages stayed the same. On the 13th, it became 38643 45853 51763. This continued until the last digits reached 6 on the 16th.

At the same time, another sequence started out as 55911 12911 31311 (they always seem to start out ending in 1). This one did the same behavior, until reaching 5 on the 15th. Currently, in early January, we have 51871 10971 04481, incrementing daily.

It's been theorized that this last digit refers to the number of times a message has been

Typical code pad used with "numbers" broadcasts



broadcast. In any event, it's a real good idea to keep track of these numbers when logging the Cuban stations.

A special word of thanks is due Camilo Castillo, a dedicated ham and numbers listener in Panama, for making most of the loggings used in the data. A few others appeared on the usual Internet mailing lists, and they showed the same patterns we describe.

❖ More CBV

At last month's deadline, we had still not determined whether Playa Ancha Radio, near Valparaiso, Chile, was still sending its standard time signals marking the official time in Chile. Subsequent lucky catches on 8677 kHz upper side band (USB) have shown that it is.

As time signals go, these are rather strange. They only last five minutes, four times a day. The transmission only broadcasts beeps on some of the seconds, and then its top-of-hour beep occurs twice. These are too far apart to be the difference between Coordinated Universal Time (UTC) and any of the other Universal Time Scales. Perhaps the second is one of the scales with a greater offset, such as International Atomic Time or Global Positioning System time.

Spanish voice announcements of the local time and several other unknown items occur periodically through the five minutes. My hits were in the Southern Hemisphere summer, and so the local time was the same as in Argentina. Chile has a summer "daylight saving" time, but Argentina does not. At no point, however, was the transmitter itself identified.

Most of the listings on the Internet for this service are outdated, from when a different system and mode were in use. The International Telecommunications Union list entry is more recent, and seems to be the correct one. Frequencies are 4228 (unheard here) and the aforementioned 8677 kHz, both USB. Times are 0055-0100, 1155-1200, 1555-1600, and 1955-2000 UTC.

ABBREVIATIONS USED IN THIS COLUMN

5N1 / 5N2	..... 5 data bits, No parity bit, 1 or 2 stop bits
AFB	..... Air Force Base
ALE	..... Automatic Link Establishment
AM	..... Amplitude Modulation
ARQ	..... Automatic Repeat Request teleprinting system
AWACS	..... Airborne Warning and Control System
CAMSLANT	..... Communication Area Master Station, Atlantic
CAMPAC	..... Communication Area Master Station, Pacific
CBP	..... US Customs and Border Protection
CW	..... Morse code telegraphy ("Continuous Wave")
DEA	..... US Drug Enforcement Administration
EAM	..... Emergency Action Message
FAX	..... Radiofacsimile
FEC	..... Forward Error Correction teleprinting system
HFDL	..... High-Frequency Data Link
HF-GCS	..... High-Frequency Global Communications System
ITA2	..... International Telegraph Alphabet #2
JSTARS	..... Joint Surveillance Target Attack Radar System
M8a	..... Cuban CW "numbers" cut to ANDUWRIGMT
MARS	..... US Military Affiliate Radio System
Meteo	..... Meteorological
MFA	..... Ministry of Foreign Affairs
PACTOR	..... Packet Teleprinting Over Radio
PR	..... Puerto Rico
RTTY	..... Radio Teletype
SCOPE	..... System Capable Of Planned Expansion
SHARES	..... SHARED RESOURCES
SITOR-A	..... Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	..... Simplex Teleprinting Over Radio, FEC mode
STANAG	..... Standardization Agreement
UK	..... United Kingdom
Unid	..... Unidentified
US	..... United States
USCG	..... US Coast Guard
V2	..... Cuban Spanish "female," 3-message variant

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 ().

2813.9	MTI-UK Royal Navy, Plymouth, RTTY channel availability at 0918. (Day Watson-UK)	4724.0	Death Blow-US military, with a 28-character EAM simulcast on 8992, 11175, and 15016, at 1803. (Jeff Haverlah-TX)
3167.0	"4-E-C"-US Navy Link-11 coordination with "Q-5-X" and "6-A-E," at 2146. (Mark Cleary-SC)	5320.0	Mobile 1-USCG, radio check with Sector Hampton Roads at 1358. (Cleary-SC)
3349.0	NNN0BNJ-US Navy/Marine Corps MARS SC state net control, taking traffic at 0102. NNN0SDL, GA MARS net, at 0232. (Cleary-SC)	5423.5	India Whiskey-Unknown US military, air defense exercise with Papa, Charlie, and Civil Air Patrol stations Micmi and Boston, at 2206. (Cleary-SC)
4028.0	Cuban "Atencion" station (V2a), 5-figure AM "numbers" in progress, with separate (not parallel) broadcasts going on 8010 and 9323, all at 1530. (Tom Sevart-KS)	5696.0	CAMPAC Point Reyes-USCG, CA, working Coast Guard 6030 at 0242. (Sevart-KS) CAMSLANT Chesapeake-USCG, VA, working Coast Guard 1503 on a search for stolen lobster pots, at 1655. (Cleary-SC)
4079.6	Unid-Southwestern US pirate CW temperature beacon, repeating TMP47 (outside air temperature in degrees Fahrenheit), at 0707. (Sevart-KS)	5708.0	Reach 505-US Air Force Air Mobility Command C-5A, ALE initiated patch to call to Tanker Airlift Control Center, at 0140. (Cleary-SC) ADW-Andrews AFB, MD, calling PNR400, Panther400, Bahamas, at 2013. (Baker-OH)
4096.0	"I"-Pirate CW cluster beacon, probably Southwestern US, at 0707. (Sevart-KS)	5711.0	DRJ-Unknown US Government, ALE sounding, also heard on 6800 and 9106 (both SHARES frequencies), at 0226. (Baker-OH) [Sounds at the same time every hour. -Hugh] Cape Radio-US Air Force, Cape Canaveral Air Force Station, FL, secondary frequency radio check with Trackstar, at 1656. (Cleary-SC)
4096.6	"T"-Pirate CW cluster beacon, sending dashes at 0707. (Sevart-KS)	5732.0	J15-USCG, contacting OPB in ALE, then voice as 15 Charlie with position for Panther (DEA Operations, Bahamas and Tortugas, also uses PNR), at 0005. Foxtrot 04-USCG HU-25, setting guard with CAMSLANT enroute to New Orleans, at 0012. (Cleary-SC) CAMSLANT Chesapeake-USCG, taking ops-normal and position from F04, at 0142. (Sevart-KS)
4225.2	IDR-Italian Navy, Rome, STANAG 4285 channel availability marker and idler (600 baud/long interleave, 5N1 and ITA2), at 1733. (Watson-UK)	5847.0	TXXX2-Spanish Guardia Civil headquarters, ALE sounding at 0201 and 0704. (Watson-UK)
4295.0	FUE-French Navy, Brest, with RTTY markers at 1728, (Watson-UK)	5850.0	R23473-US Army National Guard, AL, calling TF131, 1/131st Aviation, ALE at 2221. (Baker-OH)
4318.0	NMG-USCG, New Orleans, LA, with FAX Caribbean weather chart at 0708. (Sevart-KS)	6243.0	XSS-Unknown station sounding in ALE, at 1455. Also sounding on 6425, 8108.5, 8126.4, 10360, 10458, and 20965. (Watson-UK) [This mysterious station has also been snagged on 2217.3, 2199, 3161, 3227.4, 3280, 4226.5, 12057.5, 12333, and 14510. -Hugh]
4346.0	NMC-USCG CAMPAC, Point Reyes, CA, weather chart FAX at 0409. (Sevart-KS)	6316.2	IDR-Italian Navy, Rome, channel availability marker in STANAG 4285 (300/long 5N1 ITA2), at 1439. (Watson-UK)
4479.0	Cuban "Atencion" station (V2a), 5-figure AM "numbers" in progress at 0407. (Sevart-KS)	6348.0	FUE-French Navy, Brest, marker in STANAG 4285 (600/L 5N2 ITA2), at 1450. (Watson-UK)
		6358.5	PBB-Dutch Navy, Goeree Island, RTTY channel availability at 1018. (Watson-UK)
		6368.5	HEB26-Bern Radio, CW identifier every 3 minutes in PACTOR-II/III markers, at 1943. (Watson-UK)
		6379.0	4XZ-Israeli Navy, Haifa, still running CW markers, at 1955. (Watson-UK)
		6454.0	Unid-CW station repeating "L4DB," then a coded message, at 1445. CW "O9UY," no message, at 1509. (Watson-UK)
		6694.0	Halifax Military-Canadian Forces, Halifax, NS, taking fishing vessel track reports from an unheard station, at 2104. (Cleary-SC)
		6706.0	Trenton Military-Canadian Forces, calling King 31, probably a US Air Force rescue C-130, no joy at 2303. (Cleary-SC)
		6712.0	68-Danish Army, calling 50 in ALE, at 0756. (Watson-UK)
		6721.0	160026-US Air Force C-5, ALE sound at 0021. MPA-US Air Force, Falkland Islands, sounding at 0455, 0559, and 0656. (Watson-UK)
		6761.0	Indy 85-US Air Force Reserve KC-135R tanker, radio check with Tazz 84, another tanker, at 0015. (Cleary-SC)
		6767.5	USAIS1012-US Army, VA, working USAMD1010, VA, ALE at 1523. (Baker-OH)
		6800.0	Cometa-Mexican military ("Comet"), calling Estrella ("Star"), ALE at 0247. (Baker-OH)
		6834.0	GYA-UK Royal Navy, Northwood, Gulf service FAX at 1947. (Watson-UK)
		6854.0	Cuban CW "numbers" (M8a), two different 5-letter group transmissions going simultaneously, at 2200. (Camilo Castillo-Panama)
		6855.0	Cuban "Atencion" station (V2a), 5-figure AM "numbers," 11

- 6880.0 days at 2100. (Castillo-Panama)
CS003-Albanian Net, calling RS0014, RS0012, RS0016, and RS0017, in ALE starting at 0743. (Watson-UK)
- 6910.0 02HAWK-US Army, calling T1Z131, 1/131st Aviation, ALE at 1910. (Baker-OH)
- 6985.0 T12-US Army 12th Aviation, calling helicopter R23732 in ALE, also using 7361.5, at 1707. (Baker-OH)
- 7527.0 LNT-USCG CAMSLANT, ALE contact with J17, who came up as Juliet 17 with voice ops-normal, at 1919. (Baker-OH)
- 7668.0 CER42-French MFA, Paris, calling AMMAN, Jordan, ALE at 1239 and 1300. (Watson-UK)
- 7793.0 RS903A-Unknown Algerian station, ALE calls to ORAN2A, Oran, at 0800, and ALGE1A (Algiers?), at 1902. (Watson-UK)
- 7887.0 Cuban "Atencion" station (V2a), 5-figure AM "numbers," 11 days at 2000. (Castillo-Panama) Cuban "Atencion" station (V2a), in progress at 2033. (Sevart-KS)
- 7975.0 Cuban "Atencion" station (V2a), 5-figure AM "numbers," 3 days at 1600. (Castillo-Panama)
- 8009.0 Cuban CW "numbers" (M8a), 5-letter groups at 2001. (Castillo-Panama)
- 8010.0 Cuban "Atencion" station (V2a), 5-figure AM "numbers," 5 days at 1700. (Castillo-Panama) MDN-Algerian Ministry of Defense, calling JB14 in ALE at 0644. JB12-PossibleAlgerian Military, calling UM12, ALE at 1756. (Watson-UK)
- 8097.0 Cuban "Atencion" station (V2a), 5-figure AM "numbers" in progress at 1906. (Sevart-KS)
- 8097.0 Cuban "Atencion" station (V2a), 5-figure AM "numbers," 7 days at 1800 and 6 at 1900. (Castillo-Panama)
- 8171.5 988-US Army or National Guard, ALE-initiated voice with "Home Base" at 2257. (Sevart-KS)
- 8301.6 USCG Sector San Juan, PR, working Rescue 2113, a HU-25, on rescue of a Moroccan warship at 2302. (Cleary-SC)
- 8421.0 WLO-Mobile Radio, AL, sending Voice of America headline news stories to an unknown vessel in SITOR-A, at 0635 and 0716. (Hugh Stegman-CA)
- 8503.0 NMG-USCG, New Orleans, LA, FAX weather charts at 1225. (Sevart-KS)
- 8912.0 Rescue 1712-USCG, ops-normal for CAMSLANT at 1604. (Cleary-SC) JOE-Old callsign for Rockwell-Collins Service Center, Cedar Rapids, IA, calling 712, USCG, ALE at 2348. (Baker-OH)
- 8965.0 PNR400-DEA Panther 400, Bahamas, working X93, US Army, ALE at 2212. (Baker-OH)
- 8971.0 Bat 22-US military fighter tracking a target of interest, giving ops-normal to Blue Star (US Navy Tactical Support Center, Comalapa, El Salvador), at 2240. (Cleary-SC)
- 8983.0 CAMSLANT-USCG, passing a message regarding a live-fire zone from Coast Guard Air Station Cape Cod, MA, to Coast Guard 2141, a HU-25, at 1822. (Cleary-SC)
- 8992.0 Space Ace-US military, with a 28-character EAM simulcast on 4724, at 0633. Overdraft-US military, patch to a commercial number via McClellan HF-GCS, at 1436. (Haverlah-TX)
- 9001.6 USCG Cutter Gallatin (WHEC 721), radio check with GAL 2, at 1929. (Cleary-SC)
- 9007.0 Canforce 4471-Canadian Forces aircraft, getting weather from Trenton Military, then a patch to Trenton Wing Ops, at 2232. (Cleary-SC)
- 9025.0 Coast Guard 1503-USCG, ALE-initiated autopatch to District 1 Command Center, at 1754. (Cleary-SC) KWK96-Unknown US Diplomatic, working KWK91, also on 11226 and 23337, in ALE at 2204. [All Air Force SCOPE Command freqs. Very interesting. -Hugh] NW1-Nightwatch 1-Probable US Airborne Command Post, calling OFF, Offutt AFB, NE, ALE at 2325. (Baker-OH)
- 9052.0 CLC-Venezuelan Army headquarters, calling CRC2M, in ALE at 0305. (Watson-UK)
- 9060.0 NA6-Mexican military, calling ORO7 ("Gold-7"), in ALE at 2300. (Baker-OH)
- 9081.5 R05426-US Army, calling T1Z82, 1/82nd Aviation, NC, ALE at 2212. (Baker-OH)
- 9198.0 TAC-Chilean Navy, calling FGT in ALE, at 0019. 4P0 calling CA2, at 0306. (Baker-OH)
- 9497.0 RDSGC-Brazilian Air Force Flight Safety Net, Itabuna, ALE sounding at 0032. (Baker-OH)
- 10444.0 CICLON-Mexican military ("Cyclone") calling CYRLON (unid), in ALE at 2235. (Baker-OH)
- 10740.0 OPS171-US Army 1/171 Aviation, GA, calling helicopter R26610, in ALE at 1959. (Baker-OH)
- 11175.0 Omni 04-Michigan Air National Guard, patch via Offutt HF-GCS to Smasher, US Joint Task Force, Key West, FL, given working frequencies of 15025 and 11205, at 1453. Offutt, telling an unknown station to contact San Francisco on 11342, 13348, or 17925, at 1703. A.I.R.-Unknown US Air Force control point, making radio checks with Puerto Rico and McClellan HF-GCS at 2125, then a very similar sounding transmitter and operator working a Reach flight as Offutt HF-GCS, at 2130. (Haverlah-TX) [Very interesting...this would tend to argue against AIR being the US Air Force MARS station with this callsign. -Hugh]
- 11220.0 Andrews-US Air Force, MD, troubleshooting data comm with Andrews 01 and Tapestry, at 2256. (Cleary-SC)
- 11232.0 Chalice Golf-US Air Force E-3 AWACS, patch to Best Deal via Trenton Military, at 1948. King 31-US HC-130, patch to Angel Ops via Trenton at 2349. (Cleary-SC)
- 11271.0 Dagnet Victor-US Air Force E-3 AWACS, patch via Trenton to Radar Maintenance for troubleshooting, at 1427. (Cleary-SC)
- 11494.0 Omaha 57B-CBP, position and ops-normal for Hammer, March Air Reserve Base, CA, at 2325. (Cleary-SC)
- 11494.0 X93-US Army, calling OPB (DEA, Bahamas), ALE at 2208. (Baker-OH)
- 12390.0 GYA-UK Royal Navy, Northwood, Persian Gulf weather FAX, also on 18261, at 1046. (Watson-UK)
- 12799.5 UFZ-Vladivostok Radio, Russia, working an unknown vessel in SITOR-A, mentioned "Wladivostok" and "Sibersk," at 0114. (Stegman-CA)
- 13200.0 "Z-8-L"-US military, patch to Station 1 via Puerto Rico HF-GCS, with Exercise Highly Esteem Alpha traffic, at 1421. (Cleary-SC)
- 13215.0 G23487-US Army National Guard, calling AASF2SLN, Army Aviation Support Facility, KS, at 2200. (Baker-OH)
- 13907.0 Omaha 54X-CBP, telling Hammer that they are over the target vessel of interest, at 2137. (Cleary-SC)
- 13927.1 Peach 12-US Air Force E-8 JSTARS, morale patch via US Air Force MARS AFA4DD, at 2140. (Cleary-SC)
- 13960.0 Ironwood-US military, working an unheard station at 1916. (Haverlah-TX)
- 15016.0 Life Long-US military, with a 107-character EAM simulcast on 11175 and 8992, then Offutt with same EAM on all HF-GCS frequencies, at 1530. Parasite, with two 28-character EAMs simulcast on 11175 and 8992, at 1703. (Haverlah-TX)
- 15025.0 Omni 04-Michigan Air National Guard, came from 11175 for Smasher, FL, no joy, then Smasher calling Omni 04, also no joy, at 1459. (Haverlah-TX)
- 15043.0 E31604-US Air Force E-3B AWACS, calling OFF, Offutt AFB, NE, ALE at 1839. (Baker-OH)
- 15867.0 700-USCG HC-130H, ALE contact with TSC, CBP Service Center, FL, then voice 1700 working Service Center, at 1700. (Baker-OH) CAMSLANT-USCG, VA, passing position of a cruise ship to Juliet 15, at 2112. (Cleary-SC)
- 16607.0 ERMSAL-Brazilian Navy, Bahia, calling NDDCEA, Landing Ship Dock Ceara, ALE at 8491. (Baker-OH)
- 17458.5 M010AN-US National Guard, MA, calling R01, ALE at 1328. (Baker-OH)
- 18003.0 523517-US Air Force KC-135A tanker, calling 572598, a KC-135E, ALE at 1641. (Baker-OH)
- 18594.0 CAMSPAC-USCG, taking ops-normal from Coast Guard 1713, gave 11202 as secondary frequency and 15088 as tertiary, then did a radio check on 11202, at 2326. (Sevart-KS)
- 19814.0 0011ARCAP-Arkansas Civil Air Patrol, sounding in ALE, also on 7602, at 1711. (Baker-OH)
- 20215.0 ACB-Unknown station sounding in ALE, at 0957, 1329, and 1500. (Watson-UK)
- 20890.0 J37-USCG, calling UCG, possibly an old callsign for CAMSPAC, ALE at 1955. (Baker-OH)
- 23214.0 D47-CBP P-3, ALE and secure voice with EST, CBP Eastern Comm Center, at 2200. (Baker-OH)
- 24145.0 ACA-Unknown station sounding in ALE at 1422. (Watson-UK)

Yacht Email and Aeronautical Selcals

Judging by the number of organizations providing "HF email at sea," there must be a lot of yacht owners who need to keep in touch with their email and the web while out on the water. This month we profile a new service that's currently testing.

And, how do pilots on those long transoceanic flights keep in contact when they leave VHF radio range? There's some interesting digital listening to be done in answering that question.

❖ XNet Yachting Association

I'll tell the whole story on this one, mainly because I didn't do something as early as I should have – I didn't check the FCC database. I first came across a PacTOR-like 100bd/200Hz shift FSK signal on 12190.1 kHz on Thanksgiving Day while waiting for the turkey to cook. The station was running a typical channel-free signal like that used by many of the "HF email at sea" providers like Globe Wireless, but this one was much more akin to that used by a smaller competitor called SeaWave (see Resources), which had renamed itself after doing business as PinOak Digital for some time. I was further intrigued by the periodic CW identification of "XNET".

I ran with the SeaWave theory and checked the company's website. Interestingly, a very recent press release made mention of the acquisition of Rydex, a Canadian maritime communications company based in Nova Scotia. Aha, I thought, if it's not fictitious, the XN-series of callsigns is allocated to Canada, so I have my ID.

A few hours later, as evening approached, I came across another XNET marker, this time much stronger, on 9045.1 kHz. Obviously the same organization. I tuned through the usual places on the assumption expecting to find a few more signals, but these were the only two

at the time.

In discussing the station with Day Watson, he suggested checking the Canadian Register (much like the United States' Federal Communications Commission callsign database – see Resources) for the station. Alas, no searches either by callsign, frequency range or company name turned up anything to confirm the theory.

A few weeks later, I heard a third frequency carrying the distinctive CW identification and channel free signal: 5730.1 kHz. I had been listening to another US station close by, so I checked the FCC database for hits between 5720 and 5740 kHz. There, to my surprise, alongside my station is a listing for WQDT278 allocated to XNet Yachting Association. Finally, I had my culprit.

So, XNet offers email at sea using PacTOR-III modems for \$220/year and provides a special gateway "XGate" to accelerate email transfers (see screenshot). The current station is licensed for the following (carrier) frequencies (kHz):

5730*, 5745, 5755, 8035, 8040, 8045, 8080, 9045*, 9050, 9115, 9120, 10385, 10390, 10560, 10565, 12160, 12165, 12190*, 13950, 13955, 13977, 18290, 18370

Transmitters are in Lakeland, Florida, and Maryville, Tennessee, but only those frequencies marked with * are currently active. XNet also boasts partner SAP in Sweden, which is operated by Marinecom on the following frequencies (upper sideband, USB):

4268, 6469*, 8583*, 13006, 17231 and 22637

and partner ZMH302 operated by Xaxero in Auckland, New Zealand, on the following channels (USB):

6380.3, 8485.8, 12706.3 and 16952.3

I also took the opportunity of analyzing Xnet's channel free signal in case of any frequency dependent information. By ear, the channel free signal is sent like this: AxN BB. That is, N (equal to the MHz band) repeats identical-sounding "A" bursts with identical interval, followed by two more "B" bursts closer together. On inspection, using the 12190.1 and 9045.1 channels, the A and B patterns are the same:
01000000000101001001
010010000110011101010
100110101001110111110
011011000100000110010
011101

I have yet to hear any traffic on any frequency.

XNet joins a highly competitive field along with SailMail, Seven Seas Cruising, SeaWave and MarineNet among others.

❖ Aeronautical Selcals

When out of range of standard VHF, most transoceanic flights keep in touch with ground stations via HF radio. There is also a well-established protocol used by the major ground stations for handling and calling long, over-water flights involving a selcal (selective calling) system called ANNEX10.

On contacting an oceanic air traffic control center (for example, Shanwick or Gander on the transatlantic routes), and obtaining or confirming their particular track, the aircraft and control center will often test the aircraft's selcal. Since the planes are often silent for long periods during flight, the ground stations can "wake up" the aircraft they wish to talk to by sending the selcal on a prearranged frequency. On receiving the correct selcal, a buzzer or light in the cockpit is triggered to alert the crew.

Named after the ICAO (International Civil Aviation Organization) document that specifies the protocol, ANNEX10 is a simple selcal system that consists of sending two groups of two tones for one second each, corresponding to the aircraft's 4-letter identifier. Here are the tones (Hz):

A 312.6	J 716.1
B 346.7	K 794.3
C 384.6	L 881.0
D 426.6	M 977.2
E 473.2	P 1083.9
F 524.8	Q 1202.3
G 582.1	R 1333.5
H 645.7	S 1479.1

There are plenty of digital decoders that will decode this selcal, including those from WaveCom, Hoka, Skysweeper, Multimode and others.

Finally, here are some frequencies to check for ANNEX10 selcals (kHz):
2872 2899 2971 3016 4675 5520 5550
5598 5616 5649 8864 8879 8891 8906
8918 11279 11309 11330 11336 13291
13306 17946

Dial up the USB frequency indicated, listen for activity and switch to AM to receive the selcals when sent.

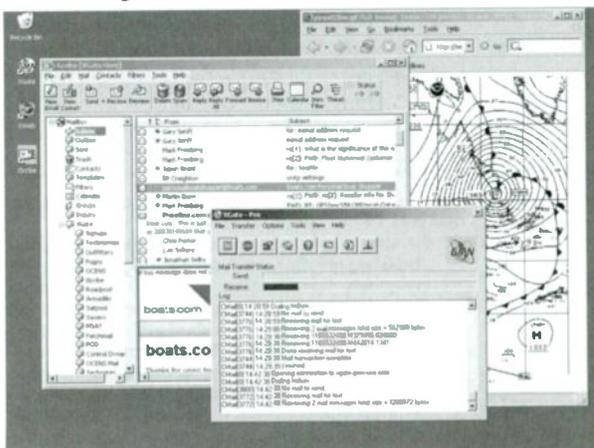
That's it for this month. Enjoy your digital listening.

Resources:

Seawave
XNet Yachting
FCC Database

Canadian Database

www.seawave.com
www.xnetmail.com
svartifoss2.fcc.gov/reports/index.cfm
sd.ic.gc.ca/engdoc/main.jsp



Radio República Becomes a Major Clandestine Broadcaster

In mid-December, Arnie Coro announced Radio Habana Cuba would be testing a new 100 kW transmitter at 0000-0500 in Spanish on 5965. Checking this out on UT Dec 20 at 0000 we heard instead Radio República with an anti-Castro broadcast! RHC came on two minutes later causing a big collision. Could this only be coincidence? RR had been on WRMI for several months, as its major client to the tune of 10 hours a day, but only on 9955, a well-known and well-jammed frequency.

This new broadcast on 5965 continued to announce 9955, but never mentioned WRMI. RR's expansion had been discovered the night before on another frequency, 7110, by Tom Sliva in New York, who tuned in at 0300 hoping to hear Ethiopia. Adán González in Venezuela reported a third new frequency, 6135 until 2400. We soon put together the full schedule: 22-24 6135, 00-02 5965, 02-04 7110. It took a couple weeks for this to be posted at <http://www.radiorepublica.org>. By then 5965 had changed to 6010 to avoid Habana, but 6010 still did not appear on the posted schedule.

Meanwhile, we were trying to figure out where these were coming from. Jeff White of WRMI assured us he had no idea, that the new broadcasts were news to him. RR would only tell him that "someone is helping us out" on condition of not being identified. WYFR denied being the site; so did Sines, Portugal. Other US stations with spare capacity such as WHRI could also be suspected. Reception was good in Oklahoma, but showed some variations consistent with trans-Atlantic propagation from a favorably located site in Europe, as also observed by Mark Taylor in Wisconsin.

Don Moman employed his rotatable log-periodic to get an idea of the direction, which he put at roughly 60 degrees from Lamont, Alberta. That would just miss SW Europe and hit Morocco. He was able to separate RR from the jamming, and noted that frequencies were accurate to 2.5 Hz. Anker Petersen in Denmark said direction finding from Europe ran through central England and Florida. Experienced monitors Kai Ludwig in Germany and Olle Alm in Sweden concluded they were from Europe, not America.

US SW stations are absolutely forbidden from using a frequency like 7110 inside the 40-m hamband, but Europeans feel free to do so, even for broadcasts into our region. Terry Krueger noted that the website of the sponsoring Directorio Democrático Cubano in English at <http://www.directorio.org/#> holds Vaclav Havel in high regard, so could R. Prague be involved? We felt the signals were too good for that; more likely VT Merlin in England or DTK/T-Systems in Germany, or possibly TDF in France, which has had some other shady clandestine clients they won't acknowledge. Or even REE in Noblejas, Spain. It's obviously a high-power, fully professional site, with rapid switching between frequencies at precise times (though RR programming was often out of synch, getting interrupted).

Cuba was slow to catch on and start jamming these. The first jamming was not noted until Dec 22 by Terry Krueger in Florida, and it was on 5965, which meant that Cuba was jamming Radio Habana

as well as Radio República! This continued long after RR had moved Dec 29 to 6010, as discovered by José Bueno, Spain. Mark Taylor in Wisconsin and I were quite amused that Cuba kept jamming Cuba on 5965. In fact, some jammers remained on that frequency even after jamming started on 6010, which had remained free of jamming until January 7 when Curt Deegan in FL and Bogdan Chiochiu in QC began hearing the bubbles on 6010.

The move to 6010 brought immediate condemnation by Radio Mil, Mexico City, which is stuck on that frequency and has been doing its utmost to persuade other broadcasters not to use it. However, this left a seeming gap in the HFCC (High Frequency Coordinating Committee) schedules which RR could not resist filling. But how could you negotiate with the responsible party when RR would not say who was doing the transmitting? As an intermediary, Jeff White tried to get RR to move off 6010, which we hope has been accomplished by the time you read this.

Some of the major programs heard over and over on RR are *Alternativa*, *Barrio Adentro*, *Sencillemente Mujer*, *Entrevista a Fondo*, and *¡Despierta, Cuba!* all primarily political. The frequently-announced address is Radio República, Directorio Democrático Cubano, P. O. Box 110235, Hialeah, FL 33011. IDs also keep plugging RR's one hour a week on Miami MW stations 670 and 1550, UT Sun at 0500.

But that's not all. On Jan. 12, Mark Taylor in Wisconsin discovered another RR transmission, on 7160, same programming but not // the other frequencies. This happened to be a frequency tested one night in December for RMI by DTK in Germany. Jeff White acknowledged that, unlike the other 6/7 MHz channels, this one was indeed brokered by RMI, and carried RR via Germany M-F at 2300-0400 Tu-Sa. The transmission begins with a Radio Miami International ID, and is generally weaker in OK than 7110 and the others. Two nights later, Cuban bubble jammers hit 7160, too, making two frequencies being jammed by Cuba in the Cuban (and American) 40m hamband. Since Cuba feels it's better to jam too much than too little, there has been further collateral damage, with Radio Sweden via Canada also getting hit after RR closes 6010 at 0200.

Brock Whaley tells us he notified ARRL as soon as the 7110 broadcast appeared, but there appears to have been surprisingly little concern amongst the ham community in opposing the intrusions of 7110 and 7160 for broadcasting to Cuba and consequent jamming from Cuba! If they cared, hams could also get a directional fix once and for all on the 7110 site, likely the same as 6135 and 6010. DTK justifies using 7160 since the target for this Cuban service is officially Iceland!

Who is really backing RR? Giampiero Bernardini in Italy did some web research and found via <http://www.informationclearinghouse.info> that DDC got financial support from the International Republican Institute, which got support from the National Endowment for Democracy which was supported by the US Agency for International Development; so he concludes RR is "financed by Washington," however indirectly.

ALBANIA R. Tirana, which had been off the air since Dec 5, was back Dec 20, including English at 1945 on 7465, 7530 (Christopher Lewis, England, *DX LISTENING DIGEST*) Appears entire service restored, at least for time being (Kai Ludwig, Germany, *ibid.*) Was due to 2006 budget cuts by 30%, probably \$160,000 US (Wolfgang Büschel, *ibid.*)

ARGENTINA Yet another Buenos Aires FM station relayed on 15820-USB: Aspen Clasic 102.3, heard at 0445 (Rafael Rodríguez R., Colombia, *condig* list)

BENIN ORTB heard with a new webstream

via <http://www.ortb.net> - sounds like a pickup directly off SW 5025, complete with fading and het, from Uganda 5026? (gh)

According to TWR, the shortwave tower is up and the transmitter building mostly complete. But judging by prayer requests there is quite a lot still to do before broadcasts on MW start! "Please pray for the Higher Authority of Audio-visual Communications (HAAC) and the Department of Communications in Benin to issue the medium wave and shortwave radio licenses. This is needed to put the Benin station on the air." (Steve Whitt, MWC) Should they not get a license before

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-05=winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

building the facility? No such thing as a construction permit in Benin, I guess (gh)

BOLIVIA On 4498.12, R. Estambul, Guayaramerin; +0945-1030+, poor with ranchera music, etc., announces as 4496 (Hideki Watanabe, Radio Nuevo Mundo, Japan) Also on 4498.1 with comunicados, ID until abrupt 0020* (Rafael Rodriguez R., Colombia, *condig* list)

On 5580.31, UT Friday Jan 6 at 0120, Radio San José with a religious program in Plattdeutsch! [Low German] Obviously there is a great German-speaking minority in Santa Cruz. Program lasted until 0216 when an ID for Radio San José was heard, then into modern music. Quite strange to listen to a German program from a Bolivian local station. Very stable signal (Christer Brunström, Sweden, *SW Bulletin*)

BRAZIL Radio Timbira, São Luiz, Maranhão, plans to resume SW, according to Sr. Raimundo Filho. Frequencies are inactive pending some authorization from the state government following a parliamentary recess, and will resume as soon as allowed (Westerley Petrônio, Recife, *radioescutas*) So in Brazil the states have a say in broadcasting regulation. Frequencies were 4975 and 15215 (gh)

CHINA On 6060, Voice of Golden Bridge, as IDed at 1045 and 1100, mostly just conversation in Chinese, from Chengdu, Sichuan province (Ron Howard, CA, *DXLD*) WRTH 2006 refers to this only as the "Life, Travel and City Service," 15 kW (gh) Sichuan PBS 2nd program schedule <http://www.sc.cninfo.net/tanfo/radio/radio06.htm> lists this daily at 0400-0430 & 2330-2400 UT instead (Dave Kernick, UK, *DXLD*)

Another day same show heard *0959-1130, some QRM from Argentina (Ron Howard, *ibid.*)

COLOMBIA WRTH 2006 says new name planned for 5910 is Garita Radio, which means signal-box, as on a railroad. But still heard as Marfil Estéreo, when checked around 0600 Jan 7 (gh)

DOMINICAN REPUBLIC The harmonic on 2280, (2 x 1140), Radio Anacaona, is also a fairly regular catch here, such as 0207, almost non-stop bachata music. ID "Radio Anacaona... del sur" at 0213 (Mark Velthuis, Netherlands, *DXLD*)

ECUADOR I have the sad duty to report that Björn Malm passed away in his home in Quito, Ecuador, on November 29 following a major heart attack. Thus the DX community has lost a member who contributed immensely to our knowledge of contemporary radio in Latin America. Björn was undoubtedly one of Sweden's foremost DXers. For the past several years he had been living in Quito, Ecuador, with his wife Susana (Christer Brunström, Sweden, via Thomas Nilsson, *SW Bulletin*)

How sad; we had excellent info from him to quote in just about every column (gh) His website <http://www.malm-ecuador.com> testifies to his dedication to radio monitoring (Henrik Klemetz, *ibid.*) This was followed by an outpouring of tributes, especially from Latin America (gh) Björn Malm's news and diligent reportage have kept alive the dwindling flame of Latin American shortwave DX. Sadly, I doubt there are other Björn Malms ready to take up the reins in that part of the world, and this loss belongs to all of us (Al Quagliero, *NASWA Journal*)

One of his recent projects was to collect audio clips from Latin American stations and share those on his web site. Losing all this work would be a huge loss. In anticipation of his site going down one day, we have created a memorial site with a copy of the current web site. This can stay up years to come and keep his work available for the rest of us and be the memorial site for this great DXer: <http://malm.hard-core-dx.com/> (Risto Kotlampi (W6RK), Hayward, CA, *HCDX*)

ETHIOPIA Re last month's reference to V. of Ethiopian People mentioning 1998 on website: Ethiopia still uses the Julian calendar, and is therefore some seven years and eight months "behind" the Gregorian calendar. Printed texts tend to use the Julian calendar when written in Amharic, and the Gregorian calendar when written in English! (Alan Roe, UK, *DXLD*)

IRAN When searching for the Australian Yacht Race radio on 6516, I suddenly heard a strange station only in LSB mode: started at 1730 with a national anthem, Qur'an, and then German! It was VOIRI // 6215 and 7185 (Björn Fransson, Gotland, *DXLD*) Maybe an internal backup feeder to the SWBC transmitter sites scattered around Iran? Like Korea North does (gh)

Iran is reputed to be a major jammer of enemy broadcasts, such as Radio Farda, and we know they do so against MW and satellite, but I must say I never hear any jamming on R. Farda SW signals, which can be quite good here, such as 15410 and 9435 around 1500. So is Iran really jamming this? Perhaps only with low-power groundwave transmitters in major cities rather than skywave from one part of Iran to another and bleeding all over the world as in the case of China and Cuba? Iran certainly has plenty otherwise unaccounted-for 500 kW transmitters. See frequency schedule at <http://www.rferl.org/listen/shortwave/default-frd.asp> (gh) Checked a number of Farda frequencies from several sites at different times, and no jamming noted (José Turner, Portugal, *DXLD*)

ISRAEL Kol Israel switched to an alternative frequency instead of 9985 in mid-winter, 13855 for Persian at 1500-1625, with excellent strength here, and continued in Hebrew until 1655. Posted schedule showed 13850 instead until Feb 28 (Bernie O'Shea, ON, *DXLD*)

KOREA NORTH [non] According to Asian Broadcasting Institute, since Dec. 13 "Open Radio for North Korea" (*Yollin Pukhan Pangsong*) on 5880 broadcasts the program of "Free Korean Central Broadcasting Station" (*Jayu Joson Jung-ang Pangsong*) produced by the organization called "Union for Korean Democratization" in the latter half of the broadcast, at 1530-1600. The first half, 1501-1530, is the program of "Freedom North Korea Broadcast" ("Radio Free North Korea") (*Jayu Pukhan Pangsong*). Since Dec 16, 5880 has severe white [noise] jamming. The mailing address of Freedom North Korean Broadcasting is: Room 502, Sinjeong Building,

Sinjeong 7 dong 210-16, Yengcheong-Gu, Seoul, Korea. TEL +82 2 2652 8350; FAX +82 2 2652 8349. Also started new webpage <http://www.nkradio.com> which says E-mail addresses are nkradio@nkradio.com and nkradio@naver.com Telephone +82 2 737 4880, FAX +82 2 737 6715 and gives bank accounts. Secretary-general is Mr Taegyong Ha; Correspondence address: 3901 Fair Ridge Drive, Fairfax, VA 22033 (Takahito Akabayashi, Japan, *DXLD*)

MADEIRA [non] There is no SWBC from this island, but there is a weekly program *Abraço da Madeira* from Funchal on RDP International, continental Portugal, Sundays 1310-1400 on 21655 among others, for Madeirans abroad and visitors (Célio Romais, *Panorama*, @*tividade DX*)

MALAYSIA One better-heard RTM frequency had been inactive for some months, but resumed at yearend (gh) Traxx FM in English heard on 7295 at 1025 and again with news at 1100 (Alan Davies, Thailand, *DXLD*) RTM network 4 service, 7295, tentatively heard New Year's Eve at 1220-1240 with top 40 countdown (Terry L Krueger, FL, *DXLD*) 7295 at 1544, man and woman singing station jingle, strong echo effect sounded like "T-T-T, R-R-R, A-A-A, XX-XX-XX, FM-FM-FM," and through local midnight 1600. They have a good web site: <http://www.traxxfm.net/> (Ron Howard, CA, *DXLD*)

MALDIVES ISLANDS [and non] The cause of freedom and democracy in the Maldives has suffered a blow with the temporary closure of Minivan Radio, an independent and non-partisan radio program into the archipelago, and the popular <http://MinivanNews.com> Web site [later resumed]. Both services, which began in September 2004, were put on hold on January 1st.

The closure follows a visit to the Minivan office in Sri Lanka by eight members of the Interpol division of the Sri Lankan police, according to Dave Hardingham, founder of the Friends of Maldives in the United Kingdom and whose group sponsored the broadcasts and Web site. The visit stemmed from accusations by the Maldivian regime of sedition – that Minivan Radio was broadcasting without a license within Sri Lanka – and that its journalists were involved in an attempt to smuggle arms and weapons in the Maldives.

"After they searched the property and found no guns," Hardingham said, "the (Minivan) team was able to reassure them that nothing like that was taking place... It's basically the long arm of the Maldives police reaching over and trying to intimidate Minivan Radio and Minivan News to shut down." The program was broadcast from high-powered transmitters in Germany – not from Sri Lanka. Hardingham is optimistic that Minivan Radio and MinivanNews.com will resume operations soon (Nick Grace, *Clandestine Radio Watch*)

No longer heard at 1600-1700 on 11800 (Dave Kernick, *Media Network blog*) Via DTK Germany, was using a 250 kW transmitter at Nauen, planned to change to a 100 kW at Jülich from Feb 1 (via Paul Gager, Austria, *BCDX*) Most of Minivan's journalists in the Maldives are being prosecuted, while photoreporter Jennifer Latheef is serving a 10-year prison sentence for an alleged "terrorist act." The Maldives were ranked 148th out of 167 countries in the latest Reporters Without Borders world press freedom index in October (*Reporters Without Borders* via Jeff White, RMI, which brokers the broadcasts) Perhaps they will have regrouped in the UK and resumed SW from there (gh)

MÉXICO As of mid-Jan, XEYU, R. UNAM had yet to come back on 9600; besides 00-02 on same, RHC was also caught on 9600 with a Fidel special at 1909 (gh) In late December they were ready to go but waiting for a replacement tube (Julian Santiago Diez de Bonilla, DF, *condig* list)

NICARAGUA News of Radio Miskut: According to a personal letter from Lic. Evaristo Mercado Pérez, dated Dec. 12, 2005, Radio Miskut has been off the air on shortwave [5770] due to a serious problem in the transmitter. John Freeman brought it back to US for repair, but no news has been heard for more than a year. They are now transmitting only on FM with limited coverage. He hopes to resume shortwave service in 2006 (on the condition that the transmitter is available.) (Tetsuya Hirahara, Japan, *DXLD*)

On 2139.7, Radio La Chontalena (2 x 1070v kHz harmonic), heard both morning and evening. ID at sign on, "1070 AM, La Chontalena, la radio ... en Chontales." Located in the town of Santo Tomás, Chontales, on the east side of Lake Nicaragua. Not sure of their call or power. Saturday sign-on is 1200, weekdays 1100 preceded by 20 minutes of warm-up music; sign-off at 0000 (Hans Johnson, FL, via *NASWA LN*) Excellent catch! Not listed on 1070 or any other frequency in WRTH 2006 (gh)

PERÚ César Pérez Dioses, in Chimbote, reported in *Play DX* on a new station sounding like Radio Mayabít, heard in mid-December at 0130 greeting listeners in Ecuador and Perú, with notices from Distrito Tabaconas, Province of San Ignacio, in Cajamarca (Gabriel Ivan Barrera, Argentina, RN Radio Enlace) on 5800, with Ecuadorian style music, but where is it exactly? (Pérez Dioses to Björn Malm, via *playdx yg*) Could be harmonic of 580, 1160, 1450, but none such listed (gh)

On 6047.05, Radio Santa Rosa, 1118-1130 Dec 24, barely audible, splatter from 6050 HCJB (Chuck Bolland, FL, *DXLD*) 6047.15, R. Santa Rosa at 1132-1139 non-stop religious service, and a few days later at 1050-1120, Spanish programming, clear ID, ads, nice flute music, 1115 mole soloists singing "Ave Maria", fair-poor (Ron Howard, CA, *DXLD*)

Last reported heard by another DXer in May 2005 (Anker Petersen, *DSWCI DX Window*)

RUSSIA Joe Adamov, longtime announcer on the Voice of Russia, best known for *Moscow Mailbag*, died early in December. He began at Radio Moscow in 1942, and continued to be listeners' point of contact in the post-USSR era until a couple of years ago. Many of us had the pleasure of meeting him at a *MONITORING TIMES* convention in Atlanta. The passing of an era (gh)

SCOTLAND [non] Radio Six International is once again available via WBCQ in Maine on 7415, 50 kW, UT Mondays 0300-0500 (Tony Currie, rsi, DXLD) If sked sticks, DST will shift to one UT hour earlier (gh)

SINGAPORE [non] As reported last month under GUAM, AWR Wavescan has resumed, but it is on UT Sundays, via Guam, UAE, and UK sites. Of several airings, the best heard in CNAm were via Guam at 1600 on 12065, 2230 on 11655. Bob Padula is participating with EDXP Reports; another DX segment is from DSWCI DX Window, both read by anonymous studio announcers. Much of the info was outdated, apparently caused by a delay of at least a week between production and broadcast; on Jan 15 these DX segments made up 35% of the 29-minute program. JSWC also provides DX news. There was no participation by Adrian Peterson, who provided so much historical broadcasting info in the old Wavescan (gh, OK)

SLOVAKIA RSI Spanish desk told me that transmissions are guaranteed until March 2006. Of the 55 Slovakian megacrowns needed to maintain it, the state has provided only 10 mega. The reason why RSI is without a director general is that no political party wants to firmly support any candidate, since it is not known who will win the upcoming elections in the summer of 2006. This precarious situation will remain until there is a new government and the continuance of the SW transmissions depends on the political stance of the various parties. Those who are governing are doing nothing now since they don't know if they will remain in control, and the opposition cannot either, without knowing if it will be ruling.

Later in January, however, the website in Spanish said due to austerity measures, RSI was planning to quit SW and transmit only on satellite and internet, sometime in the first quarter of 2006. Furthermore, Spanish and other languages would be dropped, only retaining French, Russian, German and English (via José Miguel Romero, Spain, DXLD)

But the President of Slovakia said that he "personally wanted to take steps to ensure that the Slovak Radio foreign service is preserved" and that he was going to discuss this with the ministers of finance and foreign affairs, as well as the representative of Slovak Radio (Andy Sennitt, DXLD) A commentary said closing Spanish was only "envisaged" (Jean-Michel Aubier, France, *ibid.*) And according to earlier reports Slovak Telecom threatened to switch off the MW and SW transmitters if Slovak Radio did not pay its debts soon. So the end could be imminent (Kai Ludwig, Germany, *ibid.*)

SRI LANKA [non] DTK T-Systems changes include IBC Tamil service from Dec. 22: 0000-0100 on new 6175 via Wertachtal, Germany, 250 kW, 105 degrees, daily to SAs in Tamil, ex 7115/7110/6055 (Observer, Bulgaria)

TAIWAN According to Taiwanese DXer Chengnan Lu, Trans World Broadcasting, Kaohsiung resumed SW on January 2 over CBS 100 kW transmitter to mainland China at 1000-1030 on 11795 (Takahito Akabayashi, Japan, DXLD)

TANZANIA Had been inactive, but 5050.1, R. Tanzania, Dar es Salaam, noted back on 28 Dec at 1937-1954 in Swahili, some audio distortion, and heavily distorted spurs on 5037 & 5063.2 (Carlos Gonçalves, Portugal, DXLD)

TURKEY VOT did not do its homework in planning schedule changes for Jan 1. The brand new Italian service, at 1730-1800 picked a frequency long in use by Vatican Radio, 6185, though DXers in parts of Italy found Turkey overriding Vatican! VR told Dario Monferini to be patient; they were trying to resolve the conflict.

VOT Spanish at 1730-1800 was expanded to 1825, and still on 9780, despite Yemen's only English broadcast long using 9780 from 1800, resulting in a collision monitored by Christopher Lewis, England.

And Observer, Bulgaria found that VOT's new Tatar schedule at 1600-1655 on 6140 collided with Deutsche Welle in DRM (gh)

USA One especially well-done little VOA feature is *Wordmaster*, about oddities of the English language, aired numerous times UT Wednesdays, 0117, 0217, 0406, 0517, 1217, 1317, 1417, 2217, 2317; and also Sundays at 2217, 2317 according to VOA program schedule. Trouble is, we first heard it at another time, 0647 on 7295, which is apparently a repeat of the 0500 semihour (gh)

Bowing to pressure to provide some semblance of balance, AFN finally allowed liberal talkshows on the air, including the USB relays on SW, but not live and less than one hour only of each multi-hour program: M-F at 2007, Ed Schultz, and UT Tue-Sat at 0106, Al Franken. Full schedule is at <http://myafn.dodmedia.osd.mil/radio/afn/schedule.asp> and will no doubt shift one UT hour earlier for DST, besides any other changes (gh)

I have been hearing KOA Denver aux unit again on 25950 around 1700, four dates in late Dec (Alan Roberts, QC, DXLD) Also heard here around same hour, best in narrow FM format (Bob Montgomery, PA, NASWA Flashsheet) At sunspot trough, F2 would hardly support this frequency, but mid-winter sporadic E could (gh)

The International Radio Club of America (IRCA) has been granted permission to act as QSL bureau for stations that participated in the United Radio Broadcasters of New Orleans (URBONO) effort headed by WWL Radio following hurricanes Katrina and Rita. Listeners from around the world are invited to submit their reception reports to receive the special QSL card that has been printed to commemorate this unique response by broadcasters to the disaster. [Besides WWL 870 and WHRI

on several SW frequencies, eight other AM stations and nine FM stations were involved.]

Listeners who wish to receive a QSL card should send a standard reception report including the station they heard, date, time, frequency and as much program detail as possible up to 15 minutes. An individual QSL card will be issued for each station heard and verified. The period that URBONO operated ran from Sept. 2 through Nov. 4, 2005 [WHRI relay stopped a few weeks earlier] and the special QSLs are for that time period. The cards are not intended to verify current loggings.

Be sure to include return postage in the form of mint US stamps for either domestic or international rates - \$1 should be sufficient for most international replies; or IRC(s). Please mail reports to: URBONO QSL, P. O. Box 3777, Memphis, TN, 38173-0777 USA (Jim Pogue, TN, DXLD) Very nice-looking card (gh)

FCC asked us to leave 9320 after Andrews AFB said that WINB was causing interference to their communications; replaced by 9265 at 11-13 and 23-04. 9740 also dropped so 13570 is daily 16-21 (Hans Johnson, WINB, HCDX) 9265 already used by the virtually inaudible WMLK at 17-21 (gh)

This meant WWRB would also have to get off 9320, and indeed the Brother Stair service soon switched to 9385. WWRB has a splatter problem, especially when carrying B.S., who yells a lot, and nobody is watching the modulation levels. On a live Sabbath service around 1600, 11915 was splattering down to 11890. The daily frequency 9320 caused complaints from listeners to WBCQ 9330, and new 9385 we heard accompanied by spurs around 9403 and 9367, the latter bothering WTJC 9370. Overcomer site said 9385 would run from 14 to 23, and 6890 would also change to 3270 at 23-05. Unfortunately, until 1500, 9385 was already occupied by VOA in Korean via Marianas, and there was a terrible collision. That change was made about a sesquimonth into the B-05 season, so perhaps WWRB was unaware of it (gh)

[non] Voice of Joy, a new Christian station advocating the power of music in religion, began SW broadcasts Xmas eve for the ME, especially US troops in Iraq, and then on Saturdays only at 1400-1500 on 6220 via a site somewhere in the former Soviet Union. Would appreciate any reception reports. Please email Dean Philips voiceofjoy@comcast.net (Sophie Wilson, Client Services Assistant, WRN)

I wonder from which of many FSU sites? This of course is the same programmer we discovered in October on Sackville 9530 (gh) 6220 blocked for most of the hour by Italian music pirate Mystery Radio (Patrick Robic, Austria, via Wolfgang Büschel, DXLD) Very nice QSL; postal address is Box 610411, Dallas, TX 75261 (Björn Fransson, Gotland, Sweden, *ibid.*)

UZBEKISTAN In mid-December, the foreign ministry withdrew accreditation from Radio Liberty, effectively outlawing its reporters (Reuters via Moscow Times via Mike Cooper)

At the same time in mid-December, it was discovered that R. Tashkent International and three domestic networks had added online streaming, via <http://www.teleradio.uz> besides SW, with English semihours at 0100, 1200, 1330, 2030 and 2130 (Dave Kernick, England, WORLD OF RADIO) English at 1200 was weak but audible on 7190 Dec 17 (Brian Alexander, PA, DXLD)

But this was but a prelude to abolishing the SW broadcasts at the beginning of 2006! By Jan 6, Helmut Matt noticed the absence of German broadcasts from the usual schedule (Kai Ludwig, Germany, DXLD) The English webstream no longer mentions any SW frequencies (Mike Barraclough, UK, DXLD) Tho the SW schedule remained on website (gh)

This is bizarre; they still play the interval signal on web channel 1; seems this has lost all its meaning (Jonathan Marks, Media Network blog) And a 1 kHz tone on the Web for at least 25 minutes prior to the 1200 transmission. Then signed on with interval signal repeated twice as they always did on shortwave. So apparently nothing changed in the control room (Andy Sennitt, *ibid.*) Further checks for English on SW by Erik Koie, Christopher Lewis found it missing (gh)

Helmut Matt passed on further info from a very reliable source: Funding of Radio Tashkent International has been cut; hence the termination of the SW transmissions. Broadcasting via audio streams will continue until the end of March when a decision over the fate of the editorial staff is to be made. It is expected that many staff members will be laid off already during the next weeks (Kai Ludwig, Germany, DXLD)

ZIMBABWE [and non] In mid-December, the Central Intelligence Organisation raided the Harare offices of Voice of the People, which broadcasts to Zimbabwe via R. Netherlands Madagascar relay. Station manager John Masuku was not there, but he and other staff members were later arrested. The Mugabe government refuses to allow opposition views to be broadcast on the Zimbabwe Broadcasting Corporation (Zimdaily.com via Mike Barraclough) Three staff members were released, but Masuku remained in custody (Committee to Protect Journalists via Artie Bigley) Masuku faces up to two years in jail if convicted of breaching the tough broadcasting law (zimonline via David Pringle-Wood, NZ) A few days later, Masuku was out on bail and will be pleading not guilty (Media Network blog) Because of the raid, VOP were unable to continue producing new programmes, but RN continued rebroadcasting old programmes daily at 1700-1800 on 11705 (Andy Sennitt, RN) Until the Next, Best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH

gaylevanhorn@monitoringtimes.com

0000 UTC on 11975

RUSSIA: Kamchatska Rybatskaya (Fisherman's Program). Strong open carrier at 2350, to signal-on drum roll and clear IDs by male and female hosts. Opening info, a *muzyka* jingle and interview by a fisherman's wife on life in the Kamchatka Peninsula. Rest of programming with unbelievable signal of folk ballads and modern Russian pop music. (Edward Kusalik, Alberta, Canada) Ed, I hope this one QSLs! - ed.

0001 UTC on 4781.39

BOLIVIA: Radio Tacana. Spanish. Time check to regional news... "Radio Tacana informa para todas las comunidades." Station ID: "Radio Tacana" followed by tropical style music. SINPO 24332. Bolivians audible in Spanish (or otherwise indicated) at this session and subsequent ones; **Radio Cruz del Sur** 4876.23, 2345-2350 (Aymara) 0021-0029; **Emisorias Pio XII**, 5952.38, 0903-0923, 1022-1030; **Radio Nacional de Huanuni** 5967.45, 1005-1015; **Radio Virgen de Remedios** 5745.44, 1052-1100; **Radio Fides** 9624.89, 1120-1132; **Radio San José** 5580.26, 2322-2332; (Arnaldo Slaen, Buenos Aires, Argentina)

0020 UTC on 5975

FRENCH GUIANA: BBC-WS relay. *The World Today* feature. *Newshour* monitored on 15190 at 1250, featuring segment on mysterious USAF worldwide flights. (Bob Fraser, Belfast, ME) 15390, 2109-2116 on India's national cricket team. (Joe Wood, Greenback, TN)

0035 UTC on 9700

BULGARIA: Radio Bulgaria. Focus on unearthing a 3rd or 4th century Christian church // 7400. *Arts and Artist* at 2300 on 5800 // 7500. (Fraser, ME) 7500, 1828-1833 (Wood, TN)

0045 UTC on 7325

AUSTRIA: ORF. *Report from Austria* on the CIA and hidden prisoners theory. *Letterbox* program 13675, 1650. (Fraser, ME) *Report from Austria* 9870, 2346-2352+. (Harold Frodge, Midland, MI)

0120 UTC on 6000

CUBA: Cuban music and news of free ophthalmologic surgery to Latin nationals. 9820, 034-0351. (Wood, TN)

0207 UTC on 3945

IRAN: VOIRI. Vernacular. Announcer's numerous mentions of "Islam" to musical bridge. Extended talk on Iraq amid fair signal. Need USB to avoid LSB chatter. (Scott Barbour, Intervale, NH) 7320 at 2000 with report on Iran's iron and steel production. (Fraser, ME)

0210 UTC on 4840

INDIA: All India Radio-Mumbai. Hindi. Talk to brief musical segment pause. Time pips at 0230 followed by ID, but signal fading fast. Poor overall, but signal stayed in late. (D'Angelo, PA) **AIR-Bangalore** (Hindi) 9425, 1015-1024; (Slaen, ARG) **AIR-Bangalore** 11620, 1430-1438+, 1703-1710 (Frodge, MI) **AIR-Bangalore** 9690, 1427. (Joe Wood, Greenback, TN; Fraser, ME) **AIR-Jammu** 4830, 0024-0050. (Rich D'Angelo, Wyomissing, PA/NASWA Flash Sheet)

0405 UTC on 7120

UK Sudan Radio Service. Arabic text to clear ID to African style music. Sign-off routine at 0500. Website lists correspondence address as: c/o EDC, P.O. Box 4392, 00100 Nairobi, Kenya. (Tim Marecki, Tallahassee, FL)

0412 UTC on 6200

CZECH REP: Radio Prague. Talk of barge travel in Czech Republic, to ID at 0415. Language lessons focus on wildlife. (Wood, TN) 21745, 1420. (Fraser, ME)

0414 UTC on 6020

TURKEY: Voice of. *Identity in Iraq* program and segment on Turkish herbs. SIO 333. (Frodge, MI) 5960, 2300 (Fraser, ME)

0925 UTC on 4796.5

BOLIVIA: Radio Mallku. Spanish. Nice flute music to multiple IDs. Program of vocals hosted by male announcer to extra identifications. Fair signal. **Radio Mosoj Chaski** 3310, 0944-0951; **Radio Estambul** 4498.1, 0958-1025; **Radio Yura** 4716.8, 9, 1002-1009. (D'Angelo, PA)

1030 UTC on 4909.23

ECUADOR: Radio Chaskis. Spanish/Quecha. Holiday programming

to long discourse, followed by Ecuadorian music. Quecha noted from 1045, maybe sooner as I caught mentions of "Radio Chaskis," but no formal identification. (Jerry Berg, Lexington, MA/NASWA Flash Sheet) Tentative on this station's Spanish 1121-1135. Mentions of "onda corta" but no ID. Noted again 1030-1110 on subsequent days. (D'Angelo, PA) **HCJB** 12005, 1245-1310. (Fraser, ME) **HCJB** 9745 at 0355. (Wood, TN)

1135 UTC on 4960

INDIA: All India Radio-Ranchi. Vernacular talks from male/female to Hindi musical bits. Ads with doorbell sound effect. Hindi ballads at 1150 to ID at 1200 and doorbell effect repeated. Musical intros at 1202. Fair copy to fading. (Barbour, NH) Additional AIR outlets noted in Hindi as; **AIR-Shillong** 4970, 1144-115; **AIR-Ranchi** 4960, 1145-1235; 1358-1535 with positive Ranchi ID. (Kusalik, CAN); **AIR-Kurseong** 4895, 1154-1205; **AIR-Delhi** 4860, 1228-1234. (D'Angelo, PA)

1224 UTC on 8743 USB

THAILAND: Bangkok Meteorological Radio. Thai/English. Weather forecast in Thai (two-six minute duration) and English for two minutes. Interval signal and several IDs with schedule and frequencies. Poor/fair signal. (Barbour, NH) **Radio Thailand** (Greenville) 5890 at 0031. (Fraser, ME)

1405 UTC on 17515

FRANCE: Radio France Int'l. News coverage on Hussein's trial, followed by update on Iraqi election. News on proposed use of surveillance cameras in Paris. (Wood, TN)

1415 UTC on 12080

MADAGASCAR: Radio Netherlands relay. *Newsline* program and ID, almost unintelligible. (Wood, TN) *Newsline* monitored 11655 at 2000 // 9895, 17810. (Fraser, ME)

1907 UTC on 12035

SPAIN: REE. Spanish talk on Galileo space program. (Wood, TN) 6055, 0018. (Fraser, ME)

2041 UTC on 15385

USA: KJES. Spanish. Normal KJES fare with responsive prayers. Fair to good signal. (Wood, TN) **WYFR** 13695, 1900; **WEWN** 13615, 1904; **WBOH** 5920, 0642-0653; **WWRB** 3185, 0431-0440; **WWCR** 5070, 0551-0556; **KTBN** 15590, 2102-2105 (Wood, TN) **WBCQ** 7415, 0035. (Fraser, ME) **WMLK** 9265.07, 1754-1803; **AFN/AFRTS (Key West)** 12133.5, 2032. (Frodge, MI)

2042 UTC on 15315

NETHERLANDS ANTILLES: Radio Netherlands. Talk on economics theories on the cost of energy in the UK and Europe, 17810, 2035-2040 (Wood, TN) 6165, 0000. (Fraser, ME)

2052 UTC on 13710

BOTSWANA: VOA relay. Music program including tune *Oh Carol*, plus calypso inspired Spanish selections. Time check at 2100 for fair signal. 17895, 1840-1847. (Wood, TN) 4930, 2110. (Frodge, MI)

2212 UTC on 4760

LIBERIA: ELWA. English religious talk, to program close at 2225 with mention of *Old Town Bible* program from Portland, Oregon. Station ID followed by choir music and another program feature. Closing ID with sign-off announcements 2303*. Liberia's **Radio Veritas** 5470, 2243-2301. English programming of vocals, instrumentals and religious programs. Station ID to *Lord's Prayer* and signal close down at 2301. (D'Angelo, PA)

2305 UTC on 5949.79

PERU: Radio Bethel. Spanish. Regional news program by male/female duo, followed by national news. Station ID: "Usted esta en sintonia de Radio Bethel." Regional time check and public service announcement. SINPO 24432. Peruvians audible in Spanish; **Radio Oriente** 6188, 2315-2330; **Radio Tawantinsuyo** 6173.96, 2332-2336. (Slaen, ARG) **Radio La Hora** 4855, 1105-1122. (D'Angelo, PA)

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

PROGRAMMING SPOTLIGHT

WHAT'S ON WHEN AND WHERE?

John Figliozzi, KC2BPU
johnfigliozzi@monitoringtimes.com

Which Station; Which Platform; Which Time?

Since December, we've been detailing the varied ways international broadcasters now use to reach a North American audience. To be sure, it's a lot different than it used to be. Yet, it's also clear that those who claim that shortwave is dead are overstating things. The record demonstrates that, in some ways, shortwave remains a strong component of any reasonable distribution strategy – even in North America.

Whereas the listener's question used to be, "Which station, *what frequency*, what time?"; today it can be modified to, "Which station, *which platform*, what time?" Knowing the frequency helps, but it no longer is – by any means – the whole story. (And sometimes, it isn't even a part of the story.)

So it is with this in mind that we continue our series of program listings for popular international broadcasters. As with last month's, *these listings will include only those broadcasters who actually intend to reach the North American listener*; but then, include *only the means each is using to directly do so*. In other words, shortwave listings in this column will not include broadcasts that can be heard here if the broadcaster is not intentionally directing those shortwave frequencies in our direction.

The abbreviations for days of the week are the same as used in *MT's Shortwave Guide*. The frequencies for the shortwave broadcasts listed may be found in that section of this magazine, as well. Other abbreviations used include:

cbco - CBC Radio Overnight (on AM and FM frequencies across Canada)

Int. - International

inet - Internet

R. - Radio

sw - shortwave (analog)

wrn-na - World R. Network www.wrn.org North America stream. (Channel 140 on Sirius Satellite Radio)

' - minutes

ASIA

We begin – appropriately – with **China Radio International**. CRI quickly has become arguably the most active and ubiquitous station in international radio. It has an aggressive and inclusive cross-platform strategy that seeks to distribute its programming to as wide an audience as possible. There are reports that it is planning a 24 hour radio news service in English and applying for its own dedicated FM frequencies in some countries.

China R. Int.

inet: <http://en.chinabroadcast.cn/>

Four 24/7 live audio streams including international and domestic English services, Easy FM English music service and Language Studio; news and all programs available on-demand.

UTC	Modes	Notes
0000	sw	+
0100	sw	+
0200	wrn/na	RealTime China
0300	sw	+
0400	sw	+
0500	sw	+
0600	sw	+
0700	wrn/na	RealTime China
1100	sw	RealTime Beijing
1300*	sw	+
1400*	sw	+
1500*	sw	+
2100	wrn/na	RealTime China
2300*	sw	+

+ (55') English Service **D 1300, 1400, 1500, 2300, 0000, 0100, 0300, 0400, 0500, 0600**
:00 D News & Reports; :10 S Report on Developing Countries; :15 A Cutting Edge (sci/tech); :20 S CRI Roundup; :30 S In the Spotlight (arts/culture), M People in the Know, T Biz China, W China Horizons (outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden; :55 D Learning Chinese Now.

*UTC one day earlier in these broadcasts
(60') RealTime Beijing **D 1100**
:00 D RealTime Beijing (national/local magazine); :15 S China Beat (popular music), A China Roots (traditional music); :55 D Learning Chinese Now.

(30') RealTime China **D 2100, 0200, 0700.**
News and magazine on Chinese politics, society, economics and culture.

NHK World R. Japan

inet: www.nhk.or.jp/english/index.html

News available live and on demand; last edition of some feature programs available on demand.

sw: (60') **D 0000, 0100*, 0500, 0600*, 1000, 1100, 1500*, 1700*, 2100***. (*to wNA only)

News - D on the hour.

Magazine - 44 Minutes: M-F 0515, 1015, 1715; T-A 0015, 0115, 2115.

Music - Songs for Everyone (pop tune): M-F 0610, 1010, 1110, 1510, 1710; T-A 0010, 0110, 2110. Japan Music Scene: S 0654, 1054; M 0054, 2154. Pop Joins the World (50"): S 0110, 0510, 1710, 2110; A 0610, 1110, 1510. Japan Music Travelogue (30"): M 0625, 1125, 1525. Japan Music Archives (30"): W 0625, 1125, 1525. Music Beat (30") F 0625, 1125, 1525.

Features - Weekend Japanology (44"): S 0610, 1010; M 0010, 2110. Hello from Tokyo (listener contact, incl. sw feature-50"): A 0510, 1010, 1710; S 0010, 1110, 1510; M 0110. Basic Japanese (35"): T 0625, 1125, 1525. Brush Up Your Japanese (35"): H 0625, 1125, 1525.

KBS World R.

inet: <http://world.kbs.co.kr/english/>

Two live audio streams, some in English w/same program as sw but not timed as sw. News and all programs available as audio on-demand w/archive.

sw: (60") **D 1200, 0200***.

1200 D News; 1210 S Korean Pop Interactive (requests), M-F News Commentary, A Worldwide Friendship (letters, DX news); 1215 M-F Seoul Calling (magazine); 1245 M Shaping Korea, T Made in Korea (Korean commerce), W Cultural Promenade, H Korea Today & Tomorrow (peninsula issues), F Seoul Report (interviews).

0200 D News; 0210 S Worldwide Friendship, M Korean Pop Interactive, T-A News Commentary; 0215 T-A Seoul Calling; 0245 T Shaping Korea, W Made in Korea, H Cultural Promenade, F Korea Today & Tomorrow, A Seoul Report..

wrn-na: (30") **D 1030, 1630, 0330***.

:30 D News; :40 M-F News Commentary; :45 S* Korean Pop Interactive, M* Shaping Korea, T* Made in Korea, W* Cultural Promenade, H* Korea Today & Tomorrow, F* Seoul Report, A* Worldwide Friendship.

*UTC one day later during 0200 and 0330 transmissions.

R. Taiwan Int.

inet: <http://english.rti.org.tw/>

All programs available as audio on-demand.

sw: (60") **0200, 0300, 0700.**

:00 D News; :10 S News Talk, M Undiscovered Country, T Made in Taiwan, W Strait Talk, H Trends, F Ilha Formosa, A Bookworm; :20 S Groove Zone, M Taipei Magazine, T Asia Pacific (from R. Australia), W We've Got Mail!, H Speak Out, F People, A New Music Lounge; :25 H Jade Bells & Bamboo Pipes (traditional music); :40 M Stage, Screen & Studio, F H Instant Noodles (the weird); :45 T Let's Learn Chinese.

R. New Zealand Int.

inet: www.rnzi.com

24 hr. English service relays National Radio w/own programs; some RNZI programs available as audio on demand.

wrn-na: (15') M-F **1700 - Korero Pacifica** (Pacific current affairs, followed by a short feature).

(30') A/S **1130 - Dateline Pacific** (the week's news in review from the Pacific region).

V. of Vietnam

inet: www.vov.org.vn

Selected programs available as audio on-demand with archive.

sw: (30') **D 0100, 0230, 0330.**

:00 D News; :05 D Current Affairs; :10 S Weekly Review, M Sunday Show, T-A Press Review; :15 S Music, T Vietnam Land & People, W Culture & Society, H Letters, F

Talk of the Week, A Rural Vietnam; :20
F Vietnam Economy, A Literature and
Arts.

AFRICA

Channel Africa

inet: www.channelfrancia.org

All daily broadcasts and individual programs
available via live stream and as audio on-
demand.

wrn: M-F 0630, 1130, 1830 (30'): Africa Rise
and Shine (news magazine).

A 0630 (30'): Tam Tam Express (govern-
ment in Africa).

cbco: T-A 0805 (local time) Africa Rise and
Shine (see above).

AMERICAS

CBC N. Quebec

sw: 1200-0605 on 9625. Intended as a local
radio service for the communities of northern
Canada, especially Quebec and Nunavut,
not served by a local transmitter. Relays some
CBC Radio One and CBC Premiere Chaine
programming, as well as news and programs
in Inuktitut and Cree. On major Canadian holi-
days, relays CBC Radio One exclusively.

R. Havana Cuba

inet: www.radiohc.cu/ingles/portada.htm

Live audio stream relaying shortwave service (see
below).

sw: (120") D 0100, 0300, 0500.

1st 60'--:00 D International News; :10
M Weekly Review, T-S National News; :15
T-S Viewpoint; :30 M Reports & Music, T-S
News Bulletin; :35 T-A Time Out (sports);
:40 S/W DXers Unlimited, M Mailbag
Show, T/H/F Caribbean Outlook, A
Weekly Review; :50 M Breakthrough (sci-
ence report).

2nd 60'--:60 D International News; :70
M From Habana (Cuban musicians), T-S
National News; :75 T-S Reports & Music;
:90 M The Jazz Place or Top Tens, T-S
News Bulletin; :95 S World of Stamps, T-A
Reports & Music; :100 S Cuban music.

HCJB

inet: www.hcjb.org.ec

sw: D 1100-1300: Christian evangelical and
religious programming.

Media/DX: DX Partyline A 1230.

EUROPE

R. Slovakia Int.

inet: www.rsi.sk

Daily transmission available as audio on demand;
seven day archive maintained.

sw: (30') 0100 D News; 0105 S Slovakia
Today, M Sunday Newsreel, T-A Topical
Issue; 0110 M Listeners' Tribune (letters,
magazine, Slovak music), T Insight Central
Europe, W-A Slovakia Today.

wrn-ng: (30') D 1730*; T-A 0130. Programs
are as for **sw**, except one day earlier in 1730
transmission.

R. Budapest

inet: www.radiobudapest.radio.hu

On-demand audio stream of daily transmission
available, with extensive archive.

sw: (30') D 0200, 0330.

:00 D News; :05 S Insight Central
Europe; M Europe Unlimited (trade) [or]
Heading for Hungary (travel) [or] Spotlight
(culture) [or] And the Gatepost (letters), T-F
Hungary Today (current events magazine), A

The Week; :20 A DX Corner.

wrn-ng: D 0430, 2130*. Programs are as on **sw**.
*one day earlier UTC in this transmission.

R. Polonia

inet: www.radio.com.pl/polonia/

Live streaming and on-demand audio, with some
archives.

wrn: (30') 1800 S Insight Central Europe, M-F
News from Poland, A Europe East; 0400 S
Europe East, M Insight Central Europe, T-A
News from Poland.

cbco: M-F 0930 (local time)

R. Romania Int.

inet: www.rri.ro

All transmissions available via live audio stream
and on-demand.

sw: (55') D 2300, 0100, 0400.

:00 D Radio Newsreel; :10 S The Week,
M Focus, T-A Commentary; :15 S World of
Culture, M Sunday Studio, T Pro Memoria
(history), W Business Club, H Society Today,
F Cards on the Table (debate), A Challenge
for the Future; :20 S RRI Encyclopedia, T
Political Flash, W European Horizons, A
Business Update; :25 S Roots (culture/tradi-
tions), T Business Update, W Visual Arts, F
Listeners' Letterbox, A Practical Guide; :30
S Radio Pictures, M Romanian Itineraries,
H Visit Romania, A Cultural Survey; :35 S
Romanian Itineraries, M Listeners' Let-
terbox, T Pages of Romanian Literature,
W Talking Points or Living Romania [pro-
grams alternate], H Partners in a Changing
World, F Guest at the Microphone, A Over
Coffee (with artists); :40 S Romanian by Radio,
M/F The Skylark (folk music), H Stage and
Screen, A Off Bucharest; :45 S DX Mailbag,
T Romanian Hits, H Romanian Musicians,
A Folk Music Box; :50 M Romanian Folk
Music At Its Best, T Sports Roundup, W
Athlete of the Week, H Sports Club, F
Football Flash, A Sports Weekend.

[All programs one day earlier UT during 2300
transmission.]

wrn: (30'—first 1/2 hr. of **sw** b/c above) D 1100,
1600, 2230.

R. Bulgaria

inet: www.bnr.bg

Programs available as audio on-demand and in
printed transcript, both archived extensively.

sw: (60') 0000, 0300

:00 D News; :10 S/M Views Behind the
News, T-A Events and Developments; :20
S Keyword Bulgaria, M Folk Studio (music),
T Sports, W Magazine Economy, H The Way
We Live, F History Club; :30 S Answering Your
Letters, M-F Keyword Bulgaria, A DX Program;
:40 M Walks and Talks (places), T-F Timeout
for Music; :45 S/A Timeout for Music.

R. Austria Int.

inet: http://oe1.orf.at/service/international_en

24/7 live stream of OE1 domestic network in
German, including English segments. Daily
audio on-demand.

sw: Report from Austria (15') M 1605, 1645, T-
F 1615, T-A 0043. Week in Review w/listener
mail (23') A 1606, S 0033. Insight Central
Europe (23') S 1606, M 0033.

Kol Israel

inet: www.israelradio.org

Separate international schedule available in
streaming audio.

sw: D (15'): 0430, 1030, 1830; (25'): 2000.
(All newscasts)

Most recent English newscast available on de-
mand. Live audio stream of all international
broadcasts, including domestic relays. News

in text.

wrn: D (25') 0030 & 0600: (Rebroadcast of
previous day's 2000 newscast.)

R. Exterior de Espana

inet: www.rve.es/rne/ree

Mp3 downloads of selected programs avail-
able.

sw: (55') D 0000 -- :00 S American Chronicles,
M Window on Spain (culture), T-A News
(international, Spain, Latin America); :14
S Wines of Spain, M Spanish history or
culture series; :17 T-A Spain Day-by-Day
(feature magazine); :24 S Lab Notes and
Field Notes (science); :34 S Musical Inter-
lude, M Radio Club (letters), W Entremeses
(food & tourism), F American Chronicles, A
Food in Spain; :38 S/F Cultural Roundup,
W History Notes, A Africa Today; :48 S
Radio Waves, T-A A Language Without
Bounds (Spanish lesson).

V. of Turkey

inet: www.trt.net.tr

SW schedule simulcast as live audio stream.

sw: (50') D 2300, 0400.

:00 D News; :10 D Press Review; :15 S
Outlook, M Basket of News, T Last Week,
W Live From Turkey [or] A Stranger in
Her Homeland, H Review of the Foreign
Media, F The Balkans, A The European
Union [or] The Magic of Nature; :20 S Once
Upon a Time Traveler [or] DX Corner, T
Hues & Colors of Anatolia, H Letterbox;
:25 M/A Music, F In the Wake of a Contest;
:30 S/T Music; :35 S Prehistoric Addresses
in Turkey, M Yesterday, Today, Forever, T
Sports in the Republican Era, H A Trip to
Turkey, F The Culture Parade, A The Travel
Itinerary of Anatolia.

(Programs during 2300 transmission are one
day earlier.)

R. Ukraine Int.

inet: www.nrcu.gov.ua

Separate schedule w/audio stream of all broad-
casts; news in text form with archive.

sw: (55') D 0100, 0400.

:00 D News; :10 S Ukrainian Diary
(weekly review), M Music from Ukraine, T-A
Ukraine Today (magazine); :15 S The Whole
World on the Radio Dial (DX program); :30
S Hello From Kiev (listener letters/music), M
Roots (culture & education); :45 T-A Closeup
(current issues).

Vatican R.

inet: www.vaticanradio.org

Live audio streams; also—news, features, inspira-
tional messages, liturgies and prayer services
available on demand.

sw: (20') D 0250 consisting of news, current events
items and short features of special interest to
Roman Catholics.

wrn: (15') M-F 1715: News.

See ya in April! Until then, here's wishing you
good listening!

Daniel Sampson's PRIME TIME SHORTWAVE

<http://www.primetimeshortwave.com>

Your guide for up-to-date English
shortwave schedules sorted by time,
country and frequency plus a DX
media program guide and newsletter

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH
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URBONO Disaster QSLing

From contributor Jim Pogue comes word of the *International Radio Club of America* (IRCA) being granted permission to act as the QSL Bureau for those listeners who monitored the Katrina and Rita hurricane disasters.

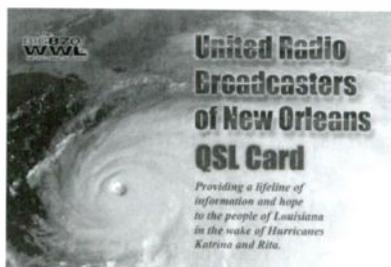
Nineteen stations participated in the United Radio Broadcasters of New Orleans (URBONO) effort, headed by WWL radio following hurricanes Katrina and Rita. Listeners from around the world are invited to submit their reception reports to receive the special QSL card that has been printed to commemorate this unique response by broadcasters to the disaster. Report details should be any time from September 2 through November 4, 2005. This offer does not cover current reporting.

Listeners should send a standard reception report including the station they heard, date, time, frequency and program details of at least 15 minutes if possible. An individual card will be issued for each station heard and verified. Enclose mint postage stamps in the report for either domestic or international rates: One

U.S. dollar or one International Reply Coupon should be sufficient for most international replies. Please adjust the postage, IRCs, or funds if reports for several stations are included. Reports should be mailed to: URBONO QSL, P.O. Box 3777, Memphis, TN 38173-0777 USA.

Stations that participated in URBONO networks were:

Station	Location	Frequency
WWL-AM	New Orleans, LA	870 kHz
WYLD-AM	New Orleans, LA	940 kHz
WJBO-AM	Baton Rouge, LA	1150 kHz
WSKR-AM	Baton Rouge, LA	1210 kHz
WODT-AM	New Orleans, LA	1280 kHz
KJEF-AM	Jennings, LA	1290 kHz
WSMB-AM	New Orleans, LA	1350 kHz
WYNK-AM	Baton Rouge, LA	1380 kHz
KLCL-AM	Lake Charles, LA	1470 kHz
WQUE-FM	New Orleans, LA	93.3 MHz
KRYE-FM	Baton Rouge, LA	96.1 MHz
WYLD-FM	New Orleans, LA	98.5 MHz
WRNO-FM	New Orleans, LA	99.5 MHz
WNOE-FM	New Orleans, LA	101.1 MHz
WLMG-FM	New Orleans, LA	101.9 MHz
WFMF-FM	Baton Rouge, LA	102.5 MHz
KHEV-FM	New Orleans, LA	104.1 MHz
WTKL-FM	New Orleans, LA	105.3 MHz
WHRI	Cypress Creek, SC	shortwave



BOLIVIA

Radio Santa Cruz 6135 kHz. Full data letter stamped with station's seal, marked "es correcta," signed by Ma.Yolanda Marco Escobar-Secretaria De Direccion, plus station sticker. Received in 171 days for an English report, one IRC, one US dollar, and my Applause Card (returned with station seal). Station address: Instituto Radifonica fe y Alegria, Casilla 672 y 3213, Santa Cruz, Bolivia. (Joe Wood, Greenback, TN)



ing the Good News Abroad card, plus station brochure. Spanish and English letters signed by Heidy Chavez. Cultural pennant, map of Guatemala enclosed and receipt of US dollar I sent with report. Received in 452 days after a follow up report, for a total of 1,022 days from initial report. Station address: Apartado, 601, 01901 Guatemala City, Guatemala. Station website: www.radiocultural.com (Kraig Krist, Manassas, VA)

KGDD 1520 AM with QSL letter in 29 days. Station address: Butos Media LLC, 5110 DE Stark St., Portland, OR 97215. (Martin, OR)

MOROCCO

Radio Farda, 9865 kHz. Full data RFE/RL Headquarters card unsigned. Received in 34 days for an English report. Station address: 1201 Connecticut Ave., NW, Washington, DC 20036. (Wilkins, MO)

ITALY

RAI International 11800 kHz. Full data color card unsigned, plus schedule. Received in nine months for an English report. Station address: P.O. Box 320, Correspondence Sector, 00100 Rome, Italy. (Peltz, CA)

PORTUGAL

RDP International. 15560 kHz. Partial data card signed by Isabel Saraiva, Intercambio E Contacto. Goodie package of music CD, personal letter and tourist literature. Received in five months, 13 days for an English report. Station address: Av. Marechal Gomes da Costa No. 37, 1849-030 Lisbon, Portugal. (Wood, TN)

CANADA

Radio Canada International 9770 kHz. Full data multi-colored Maple Leaf Mailbag QSL card signed by Bill Westerhaven, plus schedule, sticker and bookmark. Received in ten days for an email report to: info@rcinet.ca. Station address: P.O. Box 6000, Montreal, Quebec, Canada H3C 3A8. (John Vercellino, Downers Grove, IL)

MEDIUM WAVE

KDJQ 890 kHz AM. Thank You folding card signed by Rob Combs-President, plus souvenir coasters and business card. Received in 28 days for an AM report. Station address: 1050 N. Clover Dr., Boise, ID 83703. (Patrick Martin, Seaside, OR)

UAE

NHK World Radio Japan relay 9575 kHz. Full data Waiting For Their Turn QSL card with site, signed by T. Sato. Received in 32 days for an English report. Station address: (see French Guiana) (Kusalik, CAN)

EGYPT

Radio Cairo 7260 kHz. Friendly handwritten postcard from Listener's Support Team, plus stickers and schedule. Received in nine months for an English report. Station address: P.O. Box 566, Cairo, Egypt. (Jim Peltz, Arcadia, CA)

KFAB 1110 kHz AM. Handwritten, partial data verification on station memo pad sheet, signed by Gary Sadlemeyer. Received in 14 days for an AM report, one dollar (returned) and an address label (used). Station address: 5010 Underwood Ave., Omaha, NE 68132. (Bill Wilkins, Springfield, MO)

UTILITY

JJY/Time Station, 40 kHz AM. Full data color transmitter QSL card. Received in 20 days for my listener card and local postcards, plus two US dollars. Station address: Standards and Measurements Division, Communications Research Laboratory, 2-1, Nukui-kitamachi 4-chome, Koganei-shi, Tokyo, 184, Japan. (Bob Combs KCA6RC, Tome, NM)

FRENCH GUIANA

NHK World Radio Japan relay, 21600 kHz. Full data Reflections of Autumn QSL card signed by T. Sato, plus schedule and report form. Received in 32 days for an English report. Station address: NHK World, Nippon Hoso Kyokai, Tokyo 0150-8001 Japan. (Edward Kusalik VE6EKF, Coaldale, Alberta, Canada)

KWLO 1330 kHz AM. Friendly partial data letter signed by Mark Schumacher-Chief Engineer, plus copy of 1961 coverage map and separate letter of thanks. Received in 359 days for an AM report. Station address: 514 Jefferson St., Waterloo, IA 50701. (Patrick Griffith, Westminster, CO)

UZBEKISTAN

Vatican Radio via Tashkent 12065 kHz. Full data (no site) Pope Benedict against the Vatican skyline card with SW beam antenna, plus schedule, brochure and sticker. Received in 50 days for an English report. Station address: 00120 Citta del Vaticano, Vatican City State. www.vaticanradio.org (Kusalik, CAN)

GUATEMALA

TGNA-Radio Cultural 3300 kHz. Full data Tell-

KXMG 1150 kHz AM. QSL letter signed by J.C. Coyote-Program Director. Received in 30 days for an AM report. Program Director also verified

HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② 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 Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each 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, 7:30 pm Eastern, 6:30 pm Central, etc.).

Find the station you want to hear.

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

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

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

Gayle Van Horn
 Frequency Manager

gaylevanhorn@monitoringtimes.com

Daniel Sampson

danielsampson@monitoringtimes.com

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo, *NASWA Flash Sheet*; *BCL News*; *Cumbre DX*; Adrian Sainsbury, RNZ Intl; Daniel Sampson/*Prime Time-SW*; Anker Petersen, Bob Thomas, Bridgeport, CT; *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
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0000 UTC - 7PM EST / 6PM CST / 4PM PST

0000	0015	vl	Cambodia, National Radio	11940as		
0000	0015		Japan, Radio	6145na	13650as	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	7120va	
			9890va	11760va	15185va	15290va
			17740va			
0000	0045		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
0000	0057		Canada, Radio Canada Intl	9755am	9800as	
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		Bulgaria, Radio	7400na	9700na	
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		China, China Radio Intl	6020na	6075as	
			7180as	7345eu	9570na	
0000	0100		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0000	0100		Germany, Deutsche Welle	6030as	7290as	
0000	0100		Guyana, Voice of	3290do		
0000	0100		Malaysia, RTM/Trax FM	7295as		
0000	0100	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0000	0100		Netherlands, Radio	6165na		
0000	0100		New Zealand, Radio NZ Intl	17675pa		
0000	0100	DRM test	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, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			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	twfha	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	
			17805va			
0000	0100		Zambia, Christian Voice	4965af		
0013	0030	twfha	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	15205va		
0033	0100	sm	Austria, Radio Austria Intl	7325na		
0040	0058	twfha	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 - 8PM EST / 7PM CST / 5PM PST

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
0100	0129	s	Germany, Universal Life		7145as	
0100	0130		Australia, Radio	17775as		
0100	0130		Slovakia, Radio Slovakia Intl		7230na	9440sa
0100	0130		Uzbekistan, Radio Tashkent		7160as	7190as
0100	0130		Vietnam, Voice of	6175na		
0100	0157		Romania, Radio Romania Intl		6150na	9615na
0100	0159		Canada, Radio Canada Intl		9755am	
0100	0200		Anguilla, Caribbean Beacon		6090am	
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	6030va	11860as	11935sa
			153235as	17560va	17685oc	17810as
			17825am	17845as		
0100	0200		Malaysia, RTM/Trax FM		7295as	
0100	0200	vl	Namibia, Namibian BC Corp		3270do	3290do
			6060do	6175do		
0100	0200		Netherlands, Radio		6165na	
0100	0200		New Zealand, Radio NZ Intl		17675pa	
0100	0200	DRM test	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		UK, BBC World Service		6195as	9410as
			11955as	15280as	15310as	15360as
			17790as			
0100	0200		Ukraine, Radio Ukraine Intl		5910na	
0100	0200		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			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	11820va
			17740va			
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	twfha	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	twfha	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
			15060as			
0100	0200		Zambia, Christian Voice		4965af	
0115	0130	twfha	Armenia, FEBA		5885eu	
0130	0200		Australia, HCJB		15405as	
0130	0200		Iran, Voice of the Islamic Rep		6120am	9665am
0130	0200		Sweden, Radio		11550va	
0130	0200	twfha	USA, Voice of America		7405va	9775va
			13740va			

0200 UTC - 9PM EST / 8PM CST / 6PM PST

0200	0220		Vatican City, Vatican Radio	7335as	9865as	
0200	0227		Czech Rep, Radio Prague Intl		6200na	7345na
0200	0227		Iran, Voice of the Islamic Rep		6120am	9665am
0200	0228		Hungary, Radio Budapest		9515na	
0200	0230	s	Australia, HCJB	15405as		
0200	0300		Anguilla, Caribbean Beacon		6090am	
0200	0300	twfha	Argentina, RAE		11710am	
0200	0300		Australia, ABC NT Alice Springs			2310irr
			4835do			

0200	0300	Australia, ABC NT Katherine	5025do		
0200	0300	Australia, ABC NT Tennant Creek	4910do		
0200	0300	Australia, Radio 9660pa	12080pa	13630pa	
		13670va	15415as	15240pa	15515pa
		17750as	21725va		
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	Germany, Overcomer Ministries		6130eu	
0200	0300	Guyana, Voice of 3291do			
0200	0300	Malaysia, RTM/Trax FM	7295as		
0200	0300	Namibia, Namibian BC Corp	3270do	3290do	
		6060do	6175do		
0200	0300	New Zealand, Radio NZ Intl	17675pa		
0200	0300	New Zealand, Radio NZ Intl	15720pa		
0200	0300	North Korea, Voice of	13650as	15100as	
0200	0300	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, Radio Korea Intl	9560na	11810sa	
		15575na			
0200	0300	Taiwan, Radio Taiwan Intl	5950na	9680na	
		11875as	15465as		
0200	0300	UK, BBC World Service	5975ca	6195me	
		9750af	9825ca	11955as	12095ca
		15280as	15310as	15360as	17790as
0200	0300	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		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	USA, WHRI Noblesville IN	5835am	5860am	
0200	0300	USA, WHRI Noblesville IN	7315am	7490am	
0200	0300	USA, WINB Red Lion PA	9265am		
0200	0300	USA, WRMI Miami FL	7385am	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	5985va	6065am	
		9505am	11855va		
0200	0300	Zambia, Christian Voice	4965af		
0215	0230	Nepal, Radio 7165as	3230as	5005as	6100as
0230	0300	Sweden, Radio 6010na			
0230	0300	Vietnam, Voice of 6175na			
0245	0300	Albania, Radio Tirana	6115eu	7455eu	
0245	0300	Myanmar, Radio 9730da			
0250	0300	Vatican City, Vatican Radio	7305am	9605am	

0300 UTC - 10PM EST / 9PM CST / 7PM PST

0300	0315	vi	Croatia, Croatian Radio	7285va	
0300	0320		Vatican City, Vatican Radio	7305am	9605am
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
			11760me	11765af	12035af
			15310as	17760as	17790as
					21660as
0300	0330		USA, KJES Vado NM	7555na	
0300	0330		Vatican City, Vatican Radio	7360af	
0300	0330	vi	Vietnam, Voice of 6175am		
0300	0358	DRM test	New Zealand, Radio NZ Intl	17675pa	
0300	0358		New Zealand, Radio NZ Intl	15720pa	
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
			17750as	21725va	
0300	0400		Bulgaria, Radio 7400na	9700na	
0300	0400	twhf	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
			15110as	11770as	
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 21610oc		
0300	0400		Malaysia, RTM/Trax FM	7295as	
0300	0400		Malaysia, Voice of 6175as	9750as	15295as
0300	0400	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0300	0400		North Korea, Voice of	7140as	9345as
			9730as		
0300	0400	vi	Oman, Radio Oman	15355as	
0300	0400	vi	Papua New Guinea, Wantok R.	Light	7120va
0300	0400		Russia, Voice of 7180na	7350na	15425na
			15475na	15595na	
0300	0400	vi	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
			15320as		
0300	0400	vi	Uganda, Radio 4976do	5026do	7196do
0300	0400	vi/ mtwhf	UK, Sudan Radio Service	7120va	
0300	0400		USA, AFRTS	4319usb	5446usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	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
			6045af	6080af	7290af
			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	5835am	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
			11740va	15255va	
0300	0400		Zambia, Christian Voice	4965af	
0300	0400	vi	Zimbabwe, ZBC Corp	5975do	
0330	0358		Hungary, Radio Budapest	9775eu	
0330	0400	stwhfa	Albania, Radio Tirana	6115eu	7455eu
0330	0400		Sweden, Radio 6010na		
0330	0400		UK, BBC World Service	3255af	6005af
			6190af	7160af	11765af
			15420af		12035af

0400 UTC - 11PM EST / 10PM CST / 8PM PST

0400	0427		Czech Rep, Radio Prague Intl	6100na	7345na
0400	0430		France, Radio France Intl	7315va	9555va
			9805va	11995va	
0400	0430		USA, Voice of America	4930af	4960af
			6080af	7290af	9575af
			9885af		
0400	0430	vi	Vietnam, Voice of 6175na		
0400	0457		Romania, Radio Romania Intl	6115na	9515na
			9690as	11895as	
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	twhf	Canada, CBC NQ SW Service	9625na	
0400	0500		Canada, CFRX Toronto ON	6070do	
0400	0500		Canada, CKZN St John's NF	6160do	
0400	0500		Canada, CKZU Vancouver BC	6160do	
0400	0500		China, China Radio Intl	9690na	9755na

0400	0500	Costa Rica, University Network	5030va	6150va	
		7375va	9725va		
0400	0500	Cuba, Radio Havana	6000na	6060na	
		9820na			
0400	0500	Germany, Deutsche Welle	6180af	9710af	
		15445af			
0400	0500	Guyana, Voice of	3291do		
0400	0500	Malaysia, RTM/Trax FM	7295as		
0400	0500	Malaysia, Voice of	6175as	15295as	
0400	0500	Namibia, Namibian BC Corp	6060do	3270do	3290do
		6175do			
0400	0500	New Zealand, Radio NZ Intl	15720pa		
0400	0500	New Zealand, Radio NZ Intl	13690pa		
0400	0500	Nigeria, Radio/Kaduna	6090do		
0400	0500	Papua New Guinea, Wantok R.	Light	7120va	
0400	0500	Russia, Voice of	7150na	7180na	7350na
		9840na	12010na	15475na	
0400	0500	Russia, Voice of	15595na		
0400	0500	Rwanda, Radio	6055do		
0400	0500	Singapore, Mediacorp Radio	6150do		
0400	0500	South Africa, Channel Africa	7390af		
0400	0500	Turkey, Voice of	6020va	7240va	
0400	0500	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
		21660as			
0400	0500	UK, BBC World Service	6010na		
0400	0500	UK, Sudan Radio Service	7120va		
0400	0500	Ukraine, Radio Ukraine Intl	5910na		
0400	0500	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		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	USA, WHRI Noblesville IN	6100am	7315am	
0400	0500	USA, WHRI Noblesville IN	7315am	7490am	
0400	0500	USA, WMLK Bethel PA	9265eu	9955eu	
0400	0500	USA, WRMI Miami FL	7385am	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	6065am	6855am	
		7780va	9505am	9715am	
0400	0500	Zambia, Christian Voice	6065af		
0400	0500	Zimbabwe, ZBC Corp	5975do		
0430	0445	Israel, Kol Israel	6280va	15640va	
		17600va			
0430	0500	Australia, Radio	15415as		
0430	0500	Czech Rep, Radio Prague Intl	9885va	11600va	
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	
		9575af	9775af		
0445	0500	Italy, RAI Intl	5965af	6120af	7170af

0500 UTC - 12AM EST / 11PM CST / 9PM PST

0500	0507	Canada, CBC NQ SW Service	9625na		
0500	0530	France, Radio France Intl	11850va	11995va	
		15155va			
0500	0530	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	4835do	2310irr	
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	9660po	12080po	13630pa
		13670po	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	7285af	9565af		
		12035af	15410af			
0500	0600	Guyana, Voice of	3291do			
0500	0600	Japan, Radio	5975eu	6110na	7230eu	
		15195as	17810as	21755oc		
0500	0600	Malaysia, RTM/Trax FM	7295as			
0500	0600	Malaysia, Voice of	6175as	9750as	15295as	
0500	0600	Namibia, Namibian BC Corp	6060do	3270do	3290do	
		6175do				
0500	0600	Netherlands, Radio	6165na	11710oc		
0500	0600	New Zealand, Radio NZ Intl	15720pa			
0500	0600	New Zealand, Radio NZ Intl	13690pa			
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	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	Uganda, Radio	4976do	5026do	7196do	
0500	0600	UK, BBC World Service	6195va	9410va		
		11760me	12095eu	15575me		
0500	0600	UK, CVC International	9430af			
0500	0600	UK, Sudan Radio Service	9525va			
0500	0600	USA, AFRTS	4319usb	5446usb	5765usb	
		7590usb	7812usb	12133usb	12579usb	
		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	4930af	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	USA, WHRI Noblesville IN	6100am	7315am		
0500	0600	USA, WHRI Noblesville IN	7315am	7490am		
0500	0600	USA, WMLK Bethel PA	9265eu	9955eu		
0500	0600	USA, WRMI Miami FL	7385am	9955am		
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, Christian Voice	6065af			
0500	0600	Zimbabwe, ZBC Corp	5975do			
0525	0600	Ghana, Ghana BC Corp	3366do	4915do		
0530	0600	Australia, Radio	15415as			
0530	0600	Thailand, Radio	13770eu			
0530	0600	UK, BBC World Service	17885af			
0530	0600	UK, BBC World Service	11955as	15310as		
		15360as	17760as	17790as	21660as	
0545	0600	Rwanda, Radio	6055do			

0600 UTC - 1AM EST / 12AM CST / 10PM PST

0600	0615	as	South Africa, TWR	11640af		
0600	0630		UK, BBC World Service	6005af	6190af	
			6195af	7160af	9410af	11765af
			11940af	17640af		
0600	0630		USA, Voice of America	4930af	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	4835do	2310irr	
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	9660po	11880po	12080po
			13630pa	13670va	15160pa	15240po
			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	15463as
		17540as	17540va		
0600	0700	Costa Rica, University Network		5030va	6150va
		7375va	9725va	11870va	
0600	0700	Cuba, Radia Havana		6000va	6060va
		9550va	9820va	11760va	
0600	0700	Germany, Deutsche Welle		6140eu	7225af
		11785af	15410af		
0600	0700	Ghana, Ghana BC Corp		3366do	4915do
0600	0700	Guyana, Voice of		3291do	
0600	0700	Japan, Radio		7230eu	11690am
		11740as	11760as	15195as	17870oc
0600	0700	Liberia, ELWA		4760do	
0600	0700	Malaysia, RTM/Trax FM		7295as	
0600	0700	Malaysia, Voice of		6175as	15295as
0600	0700	Namibia, Namibian BC Corp		3270do	3290do
		6060do	6175do		
0600	0700	New Zealand, Radio NZ Intl		15720pa	
0600	0700	New Zealand, Radio NZ Intl		13690pa	
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	Papua New Guinea, Wantok		R.Light	712Cva
0600	0700	Russia, Voice of		17665oc	17805oc
0600	0700	Sierra Leone, SLBS 3316do			
0600	0700	Singapore, Mediacorp Radio		6150do	
0600	0700	Solomon Islands, SIBC		5020do	9545do
0600	0700	South Africa, Channel Africa		7240af	15255af
0600	0700	Swaziland, TWR		6120af	9500af
0600	0700	UK, BBC World Service		17885af	
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, AFRTS		4319usb	5446usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	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	USA, WHRI Noblesville IN		5860am	5875am
		6125am			
0600	0700	USA, WHRI Noblesville IN		7315sa	
0600	0700	USA, WMLK Bethel PA		9265eu	9955eu
0600	0700	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		5810va	7780va
		11530af	11580va		
0600	0700	Vanuatu, Radio		4960do	
0600	0700	Yemen, Rep of Yemen Radio		9780me	
0600	0700	Zambia, Christian Voice		6065af	
0600	0700	Zimbabwe, ZBC Corp		5975do	
0605	0630	Austria, Radio Austria Intl		17870me	
0630	0657	Romania, Radio Romania Intl		7180eu	9690eu
		15135pa	17780pa		
0630	0700	UK, BBC World Service		6005af	6190af
		6195va	7160af	9410af	11765af
		11940af	15400af	17640af	
0630	0700	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			

0700 UTC - 2AM EST / 1AM CST / 11PM PST

0700	0710	Vatican City, Vatican Radio		4005eu	5885eu
		6185eu	7250eu	9645eu	11740eu
		15595eu			
0700	0715	UK, BBC World Service		6005af	6190af
		9410af	11765af	11940af	12095af
		15400af	15485af	17640af	17830af
0700	0715	UK, BBC World Service		17885af	
0700	0730	Slovakia, Radio Slovakia Intl		13715pa	15460pa
0700	0730	UK, BBC World Service		11760me	15575me
0700	0745	USA, WYFR Okeechobee FL		7780va	
0700	0759	New Zealand, Radio NZ Intl		15720pa	
0700	0759	New Zealand, Radio NZ Intl		13690pa	
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
		12080pa	13630pa	15160pa	15240pa
		15415as	17750as		
0700	0800	Canada, CFRX Taranta ON		6070do	
0700	0800	Canada, CFPV 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	11880as
		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	11725af
0700	0800	Germany, Deutsche Welle		6140eu	
0700	0800	Ghana, Ghana BC Corp		3366do	4915do
0700	0800	Guyana, Voice of		3291do	5950do
0700	0800	Liberia, ELWA		4760do	
0700	0800	Liberia, Star Radio		9525af	
0700	0800	Malaysia, RTM/Trax FM		7295as	
0700	0800	Malaysia, Voice of		6175as	15295as
0700	0800	Myanmar, Radio		9730do	
0700	0800	Namibia, Namibian BC Corp		3270do	3290do
		6060do	6175do		
0700	0800	Nigeria, Radio/Ibadan		6050do	
0700	0800	Nigeria, Radio/Kaduna		4770do	6090do
0700	0800	Nigeria, Radio/Lagos		3326do	4990do
0700	0800	Papua New Guinea, Wantok		R.Light	7120va
0700	0800	Russia, Voice of		17665oc	17805oc
0700	0800	Sierra Leone, SLBS 3316do			
0700	0800	Singapore, Mediacorp Radio		6150do	
0700	0800	Solomon Islands, SIBC		5020do	9545do
0700	0800	South Africa, Channel Africa		11825af	
0700	0800	Swaziland, TWR		4775af	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, AFRTS		4319usb	5446usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	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	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		5985am	6855am
		7355va	9505va	9715am	9930af
0700	0800	Vanuatu, Radio		4960do	
0700	0800	Zambia, Christian Voice		6065af	
0715	0800	UK, BBC World Service		6190af	9410af
		11765af	11940af	12095af	15400af
		15485af	17640af	17830af	
0715	0800	UK, BBC World Service		17885af	
0730	0745	Vatican City, Vatican Radio		4005va	5885va
		6185va	7250va	9645va	11740va
		15595va			
0730	0800	Bulgaria, Radio		9500eu	11500eu
0730	0800	Germany, Bible Voice Broadcasting			5945eu
0730	0800	Guam, TWR/KTWR		15255as	
0730	0800	UK, BBC World Service		11760me	15575me
0740	0800	Guam, TWR/KTWR		15225as	
0745	0800	Albania, TWR		11865eu	
0745	0800	Albania, TWR		11865eu	
0745	0800	Monaco, TWR		9800eu	

0800 UTC - 3AM EST / 2AM CST / 12AM PST

0800	0827	Czech Rep, Radio Prague Intl		7345eu	9860eu
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	
0800	0830	Swaziland, TWR		4775af	6120af
0800	0900	Albania, TWR		11865eu	
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	

1000	1100	DRM	17585eu	17720va	21755oc		
1000	1100		Luxembourg, Radio		7145eu		
1000	1100		Malaysia, RTM/Trax FM		7295as		
1000	1100		Malaysia, Voice of 6175as		15295as		
1000	1100		Netherlands, Radio		7315as	9795os	
			12065va				
1000	1100		Nigeria, Voice of 7255af				
1000	1100		North Korea, Voice of	6185as	6285am		
			9335ca	9850as			
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, AFRTS	4319usb	5446usb	5765usb	
			7590usb	7812usb	12133usb	12579usb	
			12133usb	12579usb	13362usb	13855usb	
1000	1100		USA, KAIJ Dallas TX		5755na		
1000	1100		USA, KNLS Anchor Point AK		9615as		
1000	1100		USA, KTNB Salt Lake City UT		7505na		
1000	1100		USA, KWHR Naalehu HI		9930as	11565as	
1000	1100		USA, Voice of America		15615va		
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		5950am	5985am	
			6000am	6855am	9450as		
1000	1100		Zambia, Christian Voice		9865af		
1030	1045	mtwhf	Ethiopia, Radio	5990af	7110af	9704af	
1030	1045		Israel, Kol Israel	15640va	17535va		
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 - 6AM EST / 5AM CST / 3AM PST

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		9855eu	6110eu	
1100	1159	s	Germany, Universal Life		6055me		
1100	1200		Anguilla, Caribbean Beacon		11775am		
1100	1200		Australia, ABC NT Alice Springs		4835sirr	2310do	
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	13655eu	
			17490eu				
1100	1200		Costa Rica, University Network	5030va	6150va		
			7375va	9725va	11870va	13750va	
1100	1200		Ecuador, HCJB	12005am	21455am		
1100	1200	DRM/vl	Germany, Deutsche Welle		6140eu		
1100	1200	a	Italy, IRRS		15725va		
1100	1200	vl/as	Italy, IRRS		13840va		
1100	1200		Japan, Radio		9695as	11730as	
1100	1200	DRM	Luxembourg, Radio		7145eu		
1100	1200		Malaysia, RTM/Trax FM		7295as		
1100	1200		Malaysia, Voice of 6175as		15295as		
1100	1200	DRM	Netherlands, Radio		7240eu		
1100	1200		New Zealand, Radio NZ Intl		15530pa		
1100	1200	DRM test	New Zealand, Radio NZ Intl		9460pa		
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				
1100	1200	vl	South Africa, Channel Africa		11825af		
1100	1200		Taiwan, Radio Taiwan Intl		7445as		
1100	1200		USA, AFRTS	4319usb	5446usb	5765usb	
			7590usb	7812usb	12133usb	12579usb	
			12133usb	12579usb	13362usb	13855usb	
1100	1200		USA, KAIJ Dallas TX		5755na		
1100	1200		USA, KTNB Salt Lake City UT		7505na		
1100	1200		USA, KWHR Naalehu HI		9930as	11565as	
1100	1200		USA, Voice of America		13865va	15615va	
			17555va				
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		5950am	5985am	
			6000am	7780va	9550va	9625va	
			9755am				
1100	1200		Zambia, Christian Voice		9865af		
1105	1200		Greece, Voice of 12105eu		15630eu	17525eu	
1130	1157		Czech Rep, Radio Prague Intl		11640eu	21745va	
1130	1159	a	Germany, Universal Life		6055me		
1130	1200		Australia, HCJB		15425as		
1130	1200	a	Germany, Bible Voice Broadcasting		15950as		
1130	1200	s	Germany, Bible Voice Broadcasting		15950as		
1130	1200		Guam, AWR/KSDA 11915as				
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 - 7AM EST / 6AM CST / 4AM PST

1200	1215	vl	Cambodia, National Radio		11940as		
1200	1228		France, Radio France Intl		15275af	21620af	
1200	1230		Malaysia, Voice of 15295as				
1200	1230		Uzbekistan, Radio Tashkent		5060as	7190as	
1200	1259		Canada, Radio Canada Intl		7105as	9665as	
1200	1300		Anguilla, Caribbean Beacon		11775am		
1200	1300		Australia, ABC NT Alice Springs		4835sirr	2310do	
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	DRM/vl	Germany, Deutsche Welle		6140eu		
1200	1300	a	Italy, IRRS		15725va		
1200	1300	vl/as	Italy, IRRS		13840va		
1200	1300	DRM	Luxembourg, Radio		7145eu		
1200	1300		Malaysia, RTM/Trax FM		7295as		
1200	1300		Malaysia, Voice of 6175as				
1200	1300		Netherlands, Radio		9890na		
1200	1300		New Zealand, Radio NZ Intl		15530pa		
1200	1300	DRM test	New Zealand, Radio NZ Intl		9460pa		
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, Radio Korea Intl		9650na		
1200	1300		Taiwan, Radio Taiwan Intl		7130as		
1200	1300		UAE, AWR Africa		15110as		
1200	1300		UK, BBC World Service		6190af	6195as	
			9605ca	9740as	11760me	11855ca	
			11940af	11945as	15190ca	15310as	
			15485af	15575me	17640af	17790as	

1200	1300	17885af	21470af		
1200	1300	Ukraine, Radio Ukraine Intl	9925eu		
		USA, AFRTS	4319usb	5765usb	
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
1200	1300	USA, KAIJ Dallas TX	5755na		
1200	1300	USA, KNLS Anchor Point AK	7355as	9615as	
1200	1300	USA, KTNB Salt Lake City UT	7505na		
1200	1300	USA, KWHR Naalehu HI	9930as	12130as	
1200	1300	USA, Voice of America	6110va	9645va	
		9760va	11705va	15665va	
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	9370na		
1200	1300	USA, WWCN Nashville TN	5070na	5765na	
		5935na	9985na	15825na	
1200	1300	USA, WWRB Manchester TN	3185na		
1200	1300	USA, WYFR Okeechobee FL	5950am	5985am	
		17505va			
1200	1300	Zambia, Christian Voice	9865af		
1215	1300	Egypt, Radio Cairo	17835as		
1230	1245	Germany, Bible Voice Broadcasting		15950as	
1230	1300	Bangladesh, Bangla Betar	7185as		
1230	1300	Bulgaria, Radio	11700eu	15700eu	
1230	1300	Thailand, Radio	9810va		

1300 UTC - 8AM EST / 7AM CST / 5AM PST

1300	1329	Canada, Radio Canada Intl	9665as	9725as	
1300	1330	Ecuador, HCJB	12005am	21455am	
1300	1330	Egypt, Radio Cairo	17835as		
1300	1330	Uzbekistan, Radio Tashkent	5975as	7190as	
1300	1357	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	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	Jordan, Radio	11690na		
1300	1400	vi	Libya, Voice of Africa	21675af	21695af
1300	1400	DRM	Luxembourg, Radio	7145eu	
1300	1400	Malaysia, RTM/Trax FM	7295as		
1300	1400	Malaysia, Voice of 6175as			
1300	1400	DRM test	New Zealand, Radio NZ Intl	9870pa	
1300	1400	New Zealand, Radio NZ Intl	7230pa		
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	vi	Papua New Guinea, Wantok R.Light	7120va	
1300	1400	Poland, Radia Polonia	9525eu	11850eu	
1300	1400	Singapore, Radio Singapore Intl	6150as	6080as	
1300	1400	South Korea, Radio Korea Intl	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, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
1300	1400	USA, KAIJ Dallas TX	5755na		
1300	1400	USA, KTNB Salt Lake City UT	7505na		
1300	1400	USA, KWHR Naalehu HI	9930as	12130as	
1300	1400	USA, Voice of America	6110va	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	

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, WWCN Nashville TN		7465na	9985na
			13845na	15825na	
1300	1400	USA, WWRB Manchester TN		9320na	
1300	1400	USA, WYFR Okeechobee FL		7580as	11560as
			11830am	11865am	11910am
11830am					11830am
1300	1400	Zambia, Christian Voice		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	mtwhfa	Guam, AWR/KSDA	15660as	
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	7420va	11550va	15240na
1330	1400	Turkey, Voice of	11735va	15155eu	
1345	1400	mtwhf	Austria, Radio Austria Intl	17855va	
1350	1400	vl	Turkmenistan, Turkmen Radio	5015eu	

1400 UTC - 9AM EST / 8AM CST / 6AM PST

1400	1415	Russia, FEBA	7370as		
1400	1429	Czech Rep, Radio Prague Intl		11600as	21745na
1400	1430	DRM	Canada, Radio Canada Intl	7240eu	
1400	1430	a	Germany, Pan American BC	13820as	
1400	1430	Thailand, Radio	9725va		
1400	1430	Turkey, Voice of	11735oc	15155eu	
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
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	Canada, Radio Canada Intl		9515am	13655am
			17820am		
1400	1500	China, China Radio Intl		9560as	9700eu
			9795eu	11765as	13610eu
			13675na	13685af	13740na
			17630af		15230na
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		9855eu	6110eu
1400	1500	Guam, TWR/KTWR	9975as		
1400	1500	India, All India Radio		9690as	11620as
			13710as		
1400	1500	Japan, Radio	7200as	9875as	11840oc
1400	1500	Jordan, Radio	11690na		
1400	1500	DRM	Luxembourg, Radio	7145eu	
1400	1500	Malaysia, RTM/Trax FM		7295as	
1400	1500	Malaysia, Voice of 6175as			
1400	1500	Netherlands, Radio		9345as	12080as
			15595as		
1400	1500	New Zealand, Radio NZ Intl		9870pa	
1400	1500	DRM test	New Zealand, Radio NZ Intl	7230pa	
1400	1500	Nigeria, Voice of	7255af		
1400	1500	vi	Oman, Radio Oman	15140as	
1400	1500	vi	Papua New Guinea, Wantok R.Light	7120va	
1400	1500	Singapore, MediCorp Radio		6150do	
1400	1500	vi	South Africa, Channel Africa	11825af	
1400	1500	Taiwan, Radio Taiwan Intl		15265as	
1400	1500	UK, BBC World Service		5970as	6190af
			6195as	9740as	11940af
			12095eu	15310as	15485af
			15575me	17640eu	17790as
			21470af	21660af	17830af
1400	1500	a	UK, BBC World Service	12095af	
1400	1500	USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	13362usb
			12579usb	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, KTNB Salt Lake City UT		7505na	
1400	1500	USA, KWHR Naalehu HI		9930as	
1400	1500	USA, Voice of America		6110va	7125va
			9645va	9760va	11705va
			18910na		15425va
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	USA, WHRI Noblesville IN	9495am	15105am
1400	1500	USA, WHRI Noblesville IN	9840am	11785am
		12020am	13790am	
1400	1500	USA, WINB Red Lion PA	13570am	
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	7580as	11560as
		11830am	11910am	13695am
1400	1500	Zambia, Christian Voice	9865af	17750am
1415	1430	Nepal, Radio	3230as	5005as
		7165as		6100as
1430	1445	Germany, Pan American BC	13800as	
1430	1500	Australia, Radio	9475as	11660as
1430	1500	South Korea, Radio Korea Intl	9770eu	
1430	1500	Sweden, Radio	11550va	

1500 UTC - 10AM EST / 9AM CST / 7AM PST

1500	1500	France, Radio France Intl	7180as	17515as
1500	1515	Russia, FEBA	7340as	
1500	1515	Turkmenistan, Turkmen Radio	5015eu	
1500	1530	Australia, HCJB	15425as	
1500	1530	Mongolia, Voice of	12015eu	
1500	1530	UK, BBC World Service	6190af	11860af
		11940af	12095af	15400af
		15485af	17830af	21490af
1500	1530	USA, Voice of America	7175va	9760va
		9795va	15460va	
1500	1530	Vatican City, Vatican Radio	7240eu	
1500	1545	Germany, Bible Voice Broadcasting		13645as
1500	1557	Canada, Radio Canada Intl	9635as	11975as
1500	1600	Anguilla, Caribbean Beacon	11775am	
1500	1600	Australia, CVC International	13635as	
1500	1600	Australia, Radio	5995pa	6080as
		9475as	9590pa	7240pa
1500	1600	Canada, CBC NQ SW Service	9625na	11660as
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	Canada, Radio Canada Intl	9515am	13655am
		17820qm		
1500	1600	China, China Radio Intl	6100af	7160as
		9435eu	9525eu	9785as
		13685na	13740af	17630af
1500	1600	Costa Rica, University Network	9725va	11870va
		13750va		
1500	1600	Germany, Bible Voice Broadcasting		12035as
1500	1600	Germany, Deutsche Welle	6140eu	
1500	1600	Germany, Overcomer Ministries		6110eu
		9855eu		
1500	1600	Greece, Voice of	9420va	9775va
		15485va	15630va	12105va
1500	1600	Japan, Radio	6190as	7200as
		9875as		9505am
1500	1600	Jordan, Radio	11690na	
1500	1600	Luxembourg, Radio		7145eu
1500	1600	Malaysia, RTM/Trax FM		7295as
1500	1600	Malaysia, Voice of	6175as	
1500	1600	Netherlands, Radio		9345as
1500	1600	New Zealand, Radio NZ Intl		9870pa
1500	1600	New Zealand, Radio NZ Intl		7230pa
1500	1600	North Korea, Voice of		7570eu
		11710na	12015eu	9335na
1500	1600	Papua New Guinea, Wantok R.Light		7120va
1500	1600	Russia, Voice of	6205as	7260as
		7415as		7350as
1500	1600	Russia, Voice of	5810eu	
1500	1600	Singapore, Mediacorp Radio	6150do	
1500	1600	South Africa, Channel Africa	17770af	
1500	1600	Taiwan, Radio Taiwan Intl	9770eu	
1500	1600	UK, BBC World Service	5970as	5975as
		6195as	9740as	12095eu
		15565eu	17640eu	15310as
1500	1600	UK, CVC International	15680af	
1500	1600	UK, Sudan Radio Service	15575va	
1500	1600	USA, AFRTS	4319usb	5446usb
		7590usb	7812usb	5765usb
		12133usb	12579usb	12579usb
		12133usb	12579usb	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
		9645va	9685va	11835va
		13600af	13735va	11895va
		17895af		15255va
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	1600	USA, WHRI Noblesville IN	15105am	
1500	1600	USA, WINB Red Lion PA	13570am	
1500	1600	USA, WRMI Miami FL	7385am	
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	6280as	11830am
		11910am	15520as	15770va
				17750am
1500	1600	Zambia, Christian Voice		9865af
1515	1545	Russia, FEBA	7340as	
1530	1600	Germany, Bible Voice Broadcasting		12035as
1530	1600	Iran, Voice of the Islamic Rep	7330as	9940as
1530	1600	UAE, AWR Africa	9530as	
1530	1600	UK, BBC World Service	6190af	11940af
		12095af	15400af	15485af
		21470af	21660af	17830af
1530	1600	USA, Voice of America	7175va	9760va
		15460va		
1530	1600	Vatican City, Vatican Radio	9310as	11850as
		13765as		
1545	1600	Germany, Bible Voice Broadcasting		12035as
1545	1600	Germany, Pan American BC	13820me	

1600 UTC - 11AM EST / 10AM CST / 8AM PST

1600	1615	Pakistan, Radio	6215as	9385af	11570af
		15725af			
1600	1615	UK, BBC World Service	6190af	11940af	
		12095af	15400af	15485af	17820af
		17830af	21660af		
1600	1627	Iran, Voice of the Islamic Rep	7330as	9940as	
1600	1628	Hungary, Radio Budapest	6025eu	9565eu	
1600	1629	Germany, Universal Life	15640me		
1600	1630	Germany, Pan American BC	13820me		
1600	1630	Guam, AWR/KSDA	9585as	12065as	
1600	1630	Myanmar, Radio	9730do		
1600	1650	New Zealand, Radio NZ Intl		9870pa	
1600	1650	New Zealand, Radio NZ Intl		7230pa	
1600	1659	Canada, Radio Canada Intl	9515am	13655am	
		17870am			
1600	1700	Anguilla, Caribbean Beacon	11775am		
1600	1700	Australia, CVC International	13635as		
1600	1700	Australia, Radio	5995pa	6080as	7240pa
		9475as	9710pa	11660as	11750as
1600	1700	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	11900af
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	7225as	
		11695as	15410as		
1600	1700	Germany, Deutsche Welle		6140eu	
1600	1700	Germany, Overcomer Ministries		9855eu	
1600	1700	Jordan, Radio	11690na		
1600	1700	Luxembourg, Radio		7145eu	
1600	1700	Malaysia, RTM/Trax FM		7295as	
1600	1700	Malaysia, Voice of	6175as		
1600	1700	North Korea, Voice of		9990va	11545va
1600	1700	Papua New Guinea, Wantok R.Light		7120va	
1600	1700	Russia, Voice of	4965as	4975as	6005va
		6130eu	7260as	7320eu	7415as
		9470me			
1600	1700	South Korea, Radio Korea Intl	5975va		
1600	1700	Taiwan, Radio Taiwan Intl	11815as		
1600	1700	UK, BBC World Service	3915as	5975as	
		6195as	7160as	9410as	9740as
		12095eu	15105eu	15310as	15565eu
1600	1700	UK, CVC International	15680af		
1600	1700	UK, Sudan Radio Service	15575va		
1600	1700	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		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	7505na		
1600	1700	USA, KWHR Naalehu HI	9930as		
1600	1700	USA, Voice of America	6110va	7125va	
		9645va	9685va	11835va	11895va
		13600af	13735va	15255va	17715af
1600	1700	USA, Voice of America	4930af	9685va	
		11835va	13600va	15240af	15255va
		15445va	17640va	17895af	
1600	1700	USA, Voice of America	6160va	7125va	

1600	1700		9645va	9760va			
			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 Nablesville 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			
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	11830am		
			11865am	12010as	13695as	15520am	
			17750va	18980va	21455af	21525af	
			Zambia, Christian Voice	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	11980as			
1640	1700	mtwhf	Germany, Bible Voice Broadcasting		9460me		
1645	1700	m	Austria, Radio Austria Intl	13675na			
1645	1700	a	Germany, Bible Voice Broadcasting		9460me		
1651	1700		New Zealand, Radio NZ Intl	11980pa			
1651	1700	DRM test	New Zealand, Radio NZ Intl	11745pa			

1700 UTC - 12PM EST / 11AM CST / 9AM PST

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	15710af		
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	1750		New Zealand, Radio NZ Intl	11980pa			
1700	1750	DRM test	New Zealand, Radio NZ Intl	11745pa			
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	DRM/vl	Germany, Deutsche Welle	6140eu			
1700	1800	DRM/vl	Germany, Deutsche Welle	6140eu			
1700	1800		Japan, Radio	9535am	15355va		
1700	1800	DRM	Luxembourg, Radio	7145eu			
1700	1800		Malaysia, RTM/Trax FM	7295as			
1700	1800		Malaysia, Voice of	6175as			
1700	1800		Nigeria, Voice of	15120va			
1700	1800	vl	Papua New Guinea, Wantok R. Light		7120va		
1700	1800		Russia, Voice of	5910as	7320eu	7360va	
			7415as	9470me			
1700	1800		South Africa, Channell 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, AFRTS	4319usb	5446usb	5765usb	
			7590usb	7812usb	12133usb	12579usb	
			12133usb	12579usb	13362usb	13855usb	
1700	1800		USA, KAIJ Dallas TX	13815na			
1700	1800		USA, KTNB Salt Lake City UT	15590na			
1700	1800		USA, KWHR Naalehu HI	9930as			
1700	1800		USA, Voice of America	13710af	15240af		
			15445af				
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 Nablesville 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	3955af	13695am		
			17795va	18980va	21455af	21680af	
1700	1800		Zambia, Christian Voice	4965af			
1715	1730		Vatican City, Vatican Radio	4005va	5885va		
			7250va	9645va			
1730	1745	vl	Libya, Voice of Africa		11860af		
1730	1745	f	Russia, FEBA	7345as			
1730	1745	mtwhf	UK, United Nations Radio		7170af	9565me	
			17810af				
1730	1800		Guam, AWR/KSDA	9980me			
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	mtwhf	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	11935af	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		
1751	1800		New Zealand, Radio NZ Intl	15720pa			
1751	1800	DRM test	New Zealand, Radio NZ Intl	11610pa			

1800 UTC - 1PM EST / 12PM CST / 10AM PST

1800	1810		Zanzibar, Radio Tanzania	11735af			
1800	1815	a	Germany, Bible Voice Broadcasting		7210me		
1800	1827		Czech Rep, Radio Prague Intl	5930eu	9400va		
1800	1829	s	Germany, Universal Life	15675af			
1800	1830	w f	Austria, AWR Europe	9815af			
1800	1830		Egypt, Radio Cairo	11785af			
1800	1830	a	Germany, Bible Voice Broadcasting		9460me		
1800	1830		South Africa, AWR Africa	3215af	3345af		
			11925af				
1800	1830		Swaziland, TWR	3200af	9500af		
1800	1830		UK, BBC World Service	6190af	3255af	5975as	
			6190af	6195af	9740as	12095af	
			13700af				
1800	1830		Vietnam, Voice of	5955eu			
1800	1850	DRM test	New Zealand, Radio NZ Intl	11610pa			
1800	1857		Romania, Radio Romania Intl	7120eu	9640eu		
1800	1859		Canada, Radio Canada Intl	7185af	9770af		
			11875af	17740af			
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	6100eu			
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	DRM/vl	Germany, Deutsche Welle	6140eu			
1800	1900		India, All India Radio	7410eu	9445eu		
			9950eu	11620eu	11935af	13605af	
			15075af	15155as	17670af		
1800	1900		Liberia, ELWA	4760do			
1800	1900		Malaysia, RTM/Trax FM		7295as		

1800	1900	UK, CVC International	9765af		
1800	1900	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
1800	1900	USA, KAIJ Dallas TX	13815na		
1800	1900	USA, KTBN Salt Lake City UT	15590na		
1800	1900	USA, KWHR Naalehu HI	9930as		
1800	1900	USA, Voice of America	4930af	6035af	
		11975af	13710af	15240af	17895af
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, WIN8 Red Lian PA	13570am		
1800	1900	USA, WMLK Bethel PA	9265eu	15265eu	
1800	1900	USA, WRMI Miami FL	9955am		
1800	1900	USA, WTJC Newport NC	9370na		
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	7240me	
		7425am	13695am	13800am	17525am
		17795va	18980va		
1800	1900	Yemen, Rep of Yemen Radio	9780me		
1800	1900	Zambia, Christian Voice	4965af		
1815	1830	Libya, Voice of Africa	9485af	11615af	
		11635af	11715af	11860af	
1815	1900	Bangladesh, Bangla Betar	7185as		
1830	1845	Israel, Kol Israel	7545va	11590va	
1830	1900	Bulgaria, Radio	5800eu		
1830	1900	Swaziland, TWR	3200af		
1830	1900	Sweden, Radio	6065va		
1830	1900	UK, BBC World Service	3255af	5975me	
		6005af	6190af	9410af	9630af
		9740me	11945af	12095af	13700af
		15400af	15470af		
1845	1900	Congo, RTV Congolaise	4765af	5985af	
1851	1900	DRM test	New Zealand, Radio NZ Intl	13595pa	

1900 UTC - 2PM EST / 1PM CST / 11AM PST

1900	1915	Congo, RTV Congolaise	4765af	5985af	
1900	1929	s	Germany, Universal Life	7105me	
1900	1930	a	Germany, Bible Voice Broadcasting	7260af	
			9460me		
1900	1930	s	Germany, Bible Voice Broadcasting	6015eu	
1900	1930		Lithuania, Radio Vilnius	9710eu	
1900	1930		Philippines, Radio Pilipinas	11720va	15190va
			17720va		
1900	1945		India, All India Radio	7410eu	9445eu
			9950eu	11620eu	11935af
			15075af	15155as	17670af
1900	2000		Anguilla, Caribbean Beacon	11775om	
1900	2000		Australia, Radio	6080pa	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		Eq Guinea, Radio Africa	15190af	
1900	2000	as	Germany, Bible Voice Broadcasting	6015eu	
			9460me		
1900	2000		Germany, Deutsche Welle	11865af	12025af
			15470af		
1900	2000		Germany, Overcomer Ministries	9495af	
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do
1900	2000		Liberia, ELWA	4760da	
1900	2000		Malaysia, RTM/Trax FM	7295as	
1900	2000	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
1900	2000		Netherlands, Radio	7120af	9895af
			11655af		
1900	2000	as	Netherlands, Radio	15315na	15525na
			17735na		
1900	2000		New Zealand, Radio NZ Intl	15720pa	
1900	2000	DRM test	New Zealand, Radio NZ Intl	13595pa	
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	7336eu
			11510af		
1900	2000	irr/vl	Sierra Leone, SLBS 3316do		

1900	2000	vl	Soloman Islands, SIBC	5020do	9545do
1900	2000	vl	South Africa, Channel Africa	3345af	
1900	2000	m	South Africa, Radio League	3215af	
1900	2000		South Korea, Radio Korea Intl	5975va	7275eu
1900	2000	a	Sri Lanka, SLBC	6010eu	
1900	2000		Swaziland, TWR	3200af	
1900	2000	DRM	Sweden, Radio	11805eu	
1900	2000		Thailand, Radio	9805eu	
1900	2000	vl	Uganda, Radio	4976da	5026do
1900	2000		UK, BBC World Service	3255af	5975me
			6005af	6190af	6195va
			9630af	9740me	12095af
			15400af	15420af	17830af
1900	2000		UK, CVC International	9765af	
1900	2000		USA, AFRTS	4319usb	5446usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	13362usb
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
			13640va	13710af	15240af
			17805af		
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, WIN8 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	9370na	
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	3230af	6020af
			6085va	17845af	18930va
1900	2000		Zambia, Christian Voice	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	s	Germany, Bible Voice Broadcasting	7260af	
1930	2000	a	Germany, Pan American BC	7260of	
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		Turkey, Voice of	6055eu	
1935	1955	s	Italy, RAI Intl	6035eu	9760eu
1945	2000	mtwhfa	Albania, Radio Tirana	6225eu	7530eu
1945	2000	vl	Rwanda, Radio	6055do	

2000 UTC - 3PM EST / 2PM CST / 12PM PST

2000	2015	s	Germany, Bible Voice Broadcasting	6015eu	
2000	2015	s	Germany, Pan American BC	7260af	
2000	2025		Israel, Kol Israel	6280va	7545va
			15640af		11590va
2000	2027		Iran, Voice of the Islamic Rep	6010eu	7320eu
			9855af	11695af	
2000	2028		Hungary, Radio Budapest	3975eu	6025eu
2000	2030	s	Germany, Bible Voice Broadcasting	6015eu	
2000	2030		Mongolia, Voice of	12015eu	
2000	2030		South Africa, AWR Africa	9655af	
2000	2030		Swaziland, TWR	3200af	
2000	2030		Turkey, Voice of	6055eu	
2000	2030		USA, Voice of America	4930af	4940af
			6035af	11975af	13710af
			15580af		15240af
2000	2030	as	USA, Voice of America	4940af	
2000	2030		Vatican City, Vatican Radio	7365af	9755af
			11625af		
2000	2100		Anguilla, Caribbean Beacon	11775am	
2000	2100		Australia, ABC NT Alice Springs	4835irr	2310do
2000	2100		Australia, ABC NT Katherine	2485do	
2000	2100		Australia, ABC NT Tennant Creek	2325do	
2000	2100		Australia, Radio	9500as	11650pa
			11880pa	12080pa	11660pa
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		China, China Radio Intl	5960eu	7190eu
2000	2100		7285eu	7295va	9440va
			9600eu	11640af	13630af

SHORTWAVE GUIDE

2000	2100		Costa Rica, University Network	13750va			
2000	2100		Eqt Guinea, Radio Africo	15190af			
2000	2100		Germany, Deutsche Welle	5960of	9660af		
			9675af	9735of	9830of	12025of	
			15410af				
2000	2100	vl	Ghono, Ghono BC Corp	3366do	4915do		
2000	2100		Indonesia, Voice of	9525os	11785pa		
			15150al				
2000	2100	vl/fs	Italy, IRRS	5775vo			
2000	2100	vl/mtwho	Italy, IRRS	5775vo			
2000	2100		Liberio, ELWA	4760do			
2000	2100		Malaysia, RTM/Trax FM	7295as			
2000	2100	vl	Nomibio, Nomibion BC Corp	3270do	3290do		
			6060do	6175do			
2000	2100		Netherlands, Rodio	7120of	9895of		
			11655of	17810of			
2000	2100	os	Netherlands, Radio	15315no	15525no		
			17725no				
2000	2100		New Zealand, Rodio NZ Intl	15720po			
2000	2100	DRM test	New Zealand, Rodio NZ Intl	13595pa			
2000	2100		Nigerio, Radio/Ibadon	6050do			
2000	2100		Nigerio, Radio/Koduno	4770do	6090do		
2000	2100		Nigerio, Radio/Lagos	3326do	4990do		
2000	2100		Nigerio, Voice of	15120vo			
2000	2100		Papuo New Guinea, Catholic Rodio		4960do		
2000	2100		Papuo New Guinea, NBC	4890do			
2000	2100	vl	Papuo New Guinea, Wantok R.Light		7120vo		
2000	2100	DRM	Russia, Voice of	5820eu			
2000	2100		Russia, Voice of	6145eu	7290eu	7330eu	
			15735co				
2000	2100	vl	Solomon Islands, SIBC	5020do	9545do		
2000	2100	vl	South Africa, Chonnel Africo	3345of			
2000	2100	vl	South Korea, Rodio Korea Intl	3955eu			
2000	2100	mtwhf	Spoin, Rodio Exterior Espano	9595of	9680eu		
2000	2100	vl	Ugondo, Rodio	4976do	5026do	7196do	
2000	2100		UK, BBC World Service	3255af	6005of		
			6190af	6195va	9410va	9630of	
			12095af	15400of	17830af		
2000	2100		USA, CVC International	7285af			
2000	2100		USA, AFRTS	4319usb	5446usb	5765usb	
			7590usb	7812usb	12133usb	12579usb	
			12133usb	12579usb	13855usb		
2000	2100		USA, KAIJ Dallos TX	13815no			
2000	2100		USA, KJES Vado NM	15385no			
2000	2100		USA, KTBN Solt Lake City UT	15590no			
2000	2100		USA, WBCQ Kennebunk ME	7415no	9330no		
			18910no				
2000	2100		USA, WBOH Newport NC	5920om			
2000	2100		USA, WEWN Birmingham AL	11645vo	13615vo		
			15745vo	15785vo			
2000	2100		USA, WHRA Greenbush ME	11530na	15665no		
2000	2100		USA, WHRI Noblesville IN	9840am	11885om		
			15285am	15665om			
2000	2100		USA, WINB Red Lion PA	13570om			
2000	2100	mtwhfo	USA, WMLK Bethel PA	9265eu	15265eu		
2000	2100		USA, WRMI Miami FL	9955om			
2000	2100		USA, WTJC Newport NC	9370na			
2000	2100		USA, WWCR Nashville TN	9975na	9985no		
			12160na	13845na	15825no		
2000	2100		USA, WWRB Manchester TN	9385na	11915no		
			15250no				
2000	2100		USA, WYFR Okeechobee FL	3230of	6020af		
			7360va	13800om	15195of	17725vo	
			17750vo	17795am	17845af	18980vo	
2000	2100		Zambia, Christian Voice	4965af			
2000	2100	vl	Zimbobwe, ZBC Corp	5975do			
2000	2130		China, Chino Radio Intl	11640af	13630of		
2005	2100		Syria, Rodio Damascus	9330eu	12085eu		
			13610al				
2020	2045	vl/ m	Vatican City, Vatican Radio	6185eu			
2025	2045		Italy, RAI Intl	6020of			
2030	2045	vl	Libyo, Voice of Africo	11635of			
2030	2045		Thoilond, Rodio	9535eu			
2030	2100	thf	Belorus, Rodio	7125eu	7340eu	7440eu	
2030	2100		Cuba, Rodio Hovono	9505vo		11760vo	
2030	2100		Egypt, Rodio Cairo	15375of			
2030	2100		Sweden, Rodio	6065vo	7420vo		
2030	2100		USA, Voice of Americo	4930of	6035af		
			7595os	11975of	13710of	15240of	
			15580of				
2030	2100		Uzbekiston, Rodio Toshkent	7185os			
2045	2100		Indio, All Indio Rodio	7410eu	9445eu		
			9910oc	9950eu	11620vo	11715oc	
2045	2100	DRM	Voticon City, Vatican Rodio	9800no			
2050	2100		Voticon City, Vatican Rodio	4005eu	5885eu		
			7250eu				
2100 UTC - 4PM EST / 3PM CST / 1PM PST							
2100	2120		Vatican City, Vatican Rodio	4005eu	5885eu		
			7250eu				
2100	2127		Czech Rep, Rodio Progue Intl	5930vo	9430vo		
2100	2130		Australia, ABC NT Kotherine	2485do			
2100	2130		Australia, ABC NT Tennont Creek		2325do		
2100	2130		Australia, Radio	9500as	11695os		
2100	2130	o	Conado, CBC NQ SW Service	9625na			
2100	2130		Cuba, Rodio Hovono	9505vo	11760vo		
2100	2130	vl/mtwha	Italy, IRRS	5775vo			
2100	2130	vl	South Korea, Rodio Korea Intl	3955eu			
2100	2130	mtwhf	UK, BBC World Service	15390co			
2100	2130		USA, Voice of Americo	7575as			
2100	2130	DRM	Vatican City, Vatican Rodio	9800no			
2100	2145		Nigerio, Rodio/Ibadon	6050do			
2100	2159		Conado, Rodio Canado Intl	5850eu	9770eu		
			15180am				
2100	2200		Anguillo, Coribbeon Beacon	11775am			
2100	2200		Australia, ABC NT Alice Springs		2310do		
			4835irr				
2100	2200		Australia, Rodio	9660po	7240pa	11650pa	
			11660pa	12080pa	13630pa	15515pa	
2100	2200		Austria, AWR Europe	9830of			
2100	2200		Conado, CFRX Toronto ON	6070do			
2100	2200		Conado, CFPV Colgory AB	6030do			
2100	2200		Conado, CKZN St John's NF	6160do			
2100	2200		Conado, CKZU Vancouver BC	6160do			
2100	2200		Chino, China Radio Intl	5960eu	7285eu		
			9490eu	9600eu			
2100	2200		Costo Rica, University Network	13750va			
2100	2200		Egypt, Rodio Coiro	15375of			
2100	2200		Eqt Guinea, Rodio Africo	15190af			
2100	2200		Germany, Deutsche Welle	7345of	9615af		
			11690af				
2100	2200	vl	Ghono, Ghono BC Corp	3366do	4915do		
2100	2200		Guyono, Voice of	3291do	5950do		
2100	2200		Indio, All Indio Rodio	7410eu	9445eu		
			9910oc	9950eu	11620vo	11715oc	
2100	2200	vl/fs	Italy, IRRS	5775vo			
2100	2200		Japan, Rodio	6035oc	6090eu	6180eu	
			11855vo	17825no	21670po		
2100	2200		Liberio, ELWA	4760do			
2100	2200		Liberio, Star Radio	11960af			
2100	2200		Malaysia, RTM/Trax FM	7295as			
2100	2200	vl	Nomibio, Namibian BC Corp	3270do	3290do		
			6060do	6175do			
2100	2200		New Zealand, Rodio NZ Intl	15720po			
2100	2200	DRM test	New Zealand, Rodio NZ Intl	13595pa			
2100	2200		Nigerio, Rodio/Koduno	4770do	6090do		
2100	2200		Nigerio, Rodio/Lagos	3326do	4990do		
2100	2200		North Korea, Voice of	7570eu	12015eu		
2100	2200		Papuo New Guinea, Catholic Rodio		4960do		
2100	2200		Papuo New Guinea, NBC	4890do			
2100	2200	vl	Papuo New Guinea, Wantok R.Light		7120va		
2100	2200	DRM	Russia, Voice of	5820eu			
2100	2200		Russia, Voice of	7330eu	15735co		
2100	2200	vl	Rwondo, Rodio	6055do			
2100	2200	irr/vl	Sierra Leone, SLBS	3316do			
2100	2200	vl	South Africa, Chonnel Africo	3345of			
2100	2200		Syrio, Rodio Damoscus	9330eu	12085eu		
			13610al				
2100	2200		UK, BBC World Service	3255af	3915as		
			5965os	6005of	6110os	6190af	
			6195eu	9410eu	9605af	11675co	
			15400of				
2100	2200		USA, AFRTS	4319usb	5446usb	5765usb	
			7590usb	7812usb	12133usb	12579usb	
			12133usb	12579usb	13362usb	13855usb	
2100	2200		USA, KAIJ Dallos TX	13815no			
2100	2200		USA, KTBN Solt Lake City UT	15590na			
2100	2200		USA, Voice of Americo	4930af	6035of		
			11975af	13710of	15240af	15580af	
2100	2200		USA, WBCQ Kennebunk ME	7415no	9330na		
			18910no				
2100	2200		USA, WBOH Newport NC	5920am			
2100	2200		USA, WEWN Birmingham AL	11645vo	13615vo		
			15745va	15785va			
2100	2200		USA, WHRA Greenbush ME	11530no	15665no		
2100	2200		USA, WHRI Noblesville IN	7315om	9840om		
			11885om	15665om			
2100	2200		USA, WINB Red Lion PA	13570om			
2100	2200		USA, WMLK Bethel PA	9265eu	15265eu		
2100	2200		USA, WRMI Miami FL	9955om			
2100	2200		USA, WTJC Newport NC	9370no			
2100	2200		USA, WWCR Nashville TN	9975no	9985no		
			12160na	13845na	15825no		
2100	2200		USA, WWRB Monchester TN	9385no	11915no		
			15250no				
2100	2200		USA, WYFR Okeechobee FL	7260vo	11565vo		
			11655of	13800om	15195of	17725of	
			17795vo	17845vo	18980va		
2100	2200		Zambia, Christian Voice	4965af			
2100	2200	vl	Zimbobwe, ZBC Corp	5975do			
2115	2130	vl	Libyo, Voice of Africo	11635of			
2115	2200		Egypt, Rodio Coiro	9990eu			
2115	2200		USA, WYFR Okeechobee FL	11875of			
2130	2157		Romonio, Rodio Romonio Intl	7145eu	9650eu		
			9755no	11940no			
2130	2200		Australia, ABC NT Kotherine	5025do			
2130	2200		Australia, ABC NT Tennont Creek		4910do		
2130	2200	mtwhfo	Conado, CBC NQ SW Service	9625no			

2130	2200		Guam, AWR/KSDA 11960as		
2130	2200	DRM	Netherlands, Radia	9800na	
2130	2200		Turkey, Voice of	9525va	
2130	2200	f	UK, BBC World Service	11680ca	
2130	2200		USA, Voice of America	6235as	
2130	2200		Uzbekistan, Radia Tashkent	7185as	

2200 UTC - 5PM EST / 4PM CST / 2PM PST

2200	2210		Syria, Radio Damascus	9330eu	12085eu
2200	2228		Hungary, Radio Budapest	6025eu	9735eu
2200	2229		Canada, Radio Canada Intl	11990sa	
2200	2230	s	Belarus, Radio	7125eu	7440eu
2200	2230		India, All India Radio	7410eu	9445eu
			9910oc	9950eu	11620va
					11715oc
2200	2230		Papua New Guinea, NBC	9675do	
2200	2230		Turkey, Voice of	9525va	
2200	2235		New Zealand, Radio NZ Intl	15720pa	
2200	2235	DRM test	New Zealand, Radio NZ Intl	13595pa	
2200	2245		Egypt, Radio Cairo	9990eu	
2200	2257		Czech Rep, Radio Prague Intl	5930na	7345af
2200	2300		Anguilla, Caribbean Beacon	6090am	
2200	2300		Australia, ABC NT Alice Springs	4835irr	2310do
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Creek		4910do
2200	2300		Australia, Radio	12010va	13620pa
			15230pa	15240as	15515pa
				17795pa	17785pa
2200	2300		Bulgaria, Radio	5800eu	7500eu
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	DRM	Canada, Radio Canada Intl	9800na	
2200	2300		China, China Radio Intl	7170eu	
2200	2300		Costa Rica, University Network	13750va	
2200	2300		Eat Guinea, Radia Africa	15190af	
2200	2300		Germany, Deutsche Welle	6180as	6225as
2200	2300	vi	Ghana, Ghana BC Corp	3366da	4915do
2200	2300		Guyana, Voice of	3291do	
2200	2300	vi/fs	Italy, IRRS	5775va	
2200	2300		Malaysia, RTM/Trax FM	7295as	
2200	2300	vi	Namibia, Namibian BC Corp	3270da	3290do
			6060do	6175do	
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 Radia		4960do
2200	2300	vi	Papua New Guinea, Wantok R.Light		7120va
2200	2300	irr/vi	Sierra Leone, SLBS 3316da		
2200	2300	vi	Saloman Islands, SIBC	5020do	9545do
2200	2300	as	Spain, Radia Exterior Espana	6125eu	9595af
2200	2300		Taiwan, Radio Taiwan Intl	9355eu	
2200	2300		UK, BBC World Service	5955as	5965as
			5975as	5990as	6195as
			9740as	15400af	9605af
2200	2300		Ukraine, Radia Ukraine Intl	5840eu	
2200	2300		USA, AFRTS	4319usb	5765usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	13362usb
					13855usb
2200	2300		USA, KAIJ Dallas TX	13815na	
2200	2300		USA, KTBN Salt Lake City UT	15590na	
2200	2300		USA, Voice of America	6235as	7120va
			9890vo	15185va	15290va
					15305va
			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 Lian 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 Monchaster TN	9385na	11915na
			15250na		
2200	2300		USA, WYFR Okeechabee FL	11740am	11875af
			15770af		
2200	2300		Zambia, Christian Voice	4965af	
2205	2230		Italy, RAI Intl	6090as	
2230	2259		Canada, Radia Conada Intl	6160as	7195as
			9730as		
2230	2300	mtwhfa	Albania, Radio Tirana	7110eu	
2230	2300	as	Australia, HCJB	15530as	
2230	2300		Guam, AWR/KSDA 11655as		
2230	2300		Sweden, Radia	6065va	

2230	2300		USA, Voice of America	7230va	9780va
			13755va		
2236	2300		New Zealand, Radio NZ Intl	17675pa	
2236	2300	DRM test	New Zealand, Radio NZ Intl	15720pa	
2245	2300		India, All India Radia	9705as	9950as
			11620as	11645as	13605as

2300 UTC - 6PM EST / 5PM CST / 3PM PST

2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	4835irr	2310do
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennant Creek		4910do
2300	0000		Australia, Radio	9660pa	12010va
			13620as	13630pa	13670va
				17785pa	17795pa
					21740pa
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 Radia Intl	5915as	5990am
			6040na	7180as	11970na
2300	0000		Costa Rica, University Network	9725va	
2300	0000		Cuba, Radio Havana	9550am	
2300	0000		Egypt, Radio Caira	11885na	
2300	0000		Germany, Deutsche Welle	9865as	6070as
					9815as
2300	0000	DRM	Germany, Deutsche Welle	9800na	
2300	0000	vi	Ghana, Ghana BC Corp	3366do	4915da
2300	0000		Guyana, Voice of	3291do	
2300	0000		India, All India Radia	9705as	9950as
			11620as	11645as	13605as
2300	0000		Malaysia, RTM/Trax FM	7295as	
2300	0000	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
2300	0000		New Zealand, Radio NZ Intl	17675pa	
2300	0000	DRM test	New Zealand, Radio NZ Intl	15720pa	
2300	0000		Papua New Guinea, Catholic Radio		4960do
2300	0000		Papua New Guinea, NBC	9675da	
2300	0000	vi	Papua New Guinea, Wantok R.Light		7120va
2300	0000	irr/vi	Sierra Leone, SLBS 3316da		
2300	0000		Singapore, Mediacorp Radia	6150do	
2300	0000	vi	Saloman Islands, SIBC	5020do	9545da
2300	0000		Turkey, Voice of	5960va	
2300	0000		UK, BBC World Service	3915as	5965as
			6195as	9605as	9740as
					11945as
			11955as		
2300	0000		USA, AFRTS	4319usb	5446usb
			7590usb	7812usb	12133usb
			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	6235as
			7205va	9780va	11655va
					13640va
			15150va		
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 Okeechabee FL	11740am	15255va
			17750va		
2300	2315		Nigeria, Radio/Kaduna	4770do	6090do
2300	2315		Nigeria, Radio/Lagos	3326do	
2300	2315		USA, WYFR Okeechabee FL	11875af	
2300	2329		Canada, Radio Canada Intl	6160as	7195as
			9730as		
2300	2330		Australia, Radio	15240as	
2300	2357		Romania, Radia Romania Intl	7105eu	9610na
			9640eu	11730na	
2300	2359		Canada, Radio Canada Intl	6100am	
2315	2330	vi	Croatia, Craatian Radio	7285va	
2330	0000		Australia, Radia	15415as	17750as
2330	0000		Burmo, Dem Voice of Burma	5955eu	
2330	0000		Lithuania, Radio Vilnius	7325na	
2330	0000		UK, BBC World Service	3915as	5965as
			6035as	6170as	6195as
			9740as	11945as	11955as
2330	2357		Czech Rep, Radio Prague Intl	5930na	7345af
2335	0000	sm	Austria, Radia Austrio Intl	9870sa	
2345	2358	twhfa	Austria, Radia Austria Intl	9870sa	

Monitoring Military Flight Demonstration Groups Equipment and Schedules

The forepart to this guide for monitoring airshows starts on page 10 and addresses how to find the frequencies to monitor. Now we turn to two more critical requirements for successful monitoring – Where can you find an airshow, and what equipment will you need to listen in?

EQUIPMENT

Not Just Any Old Scanner

I am frequently asked which scanner I recommend for air show monitoring. While I don't have a favorite in this regard, I have prepared the list below as a purchase guide for receivers that meet all the requirements. Some scanners currently being marketed and almost all older scanners on the used market are *not* suited for air show monitoring. There are certain requirements your air show radio has to meet in order to successfully listen to the two major military aerial demonstration teams – the Blue Angels and the Thunderbirds.

If you are going to a Thunderbird show, you will need a scanner that can monitor the 138-150 MHz military land mobile band in the AM mode. Most of the older Uniden scanners cannot be used for air show monitoring due to their lack of independent transmission mode selection.

You will also need a scanner that has the 225-400 MHz military aeronautical band in it. Most of the action (especially for the Blues) will be heard in this military UHF portion of the spectrum. Adding this criterion to the mix of possible radios narrows down our choice for air show scanners even further.

The information below includes current Grove Enterprises stock codes/prices (if carried by Grove) for the items indicated, but does not include shipping or taxes (if applicable). Prices are subject to change without notice, so be sure to call the Grove order department at 800-438-8155 or visit www.grove-ent.com (or *MT* advertisers) for current pricing and availability.

Handheld Unit	Grove #	Price
Alinco DJ-X7	SCN03	\$179.95
Alinco DJ-X10T	SCN01	\$319.95
Alinco DJ-X2000T	SCN10	\$549.95
AOR AR-8200 Mk III	SCN51	\$589.95
Icom IC R-3	SCN07	\$349.95
Icom IC R-5	SCN02	\$199.95
Icom IC R-20	SCN20	\$519.95*
Radio Shack Pro-97	----	\$199.99
Uniden BC-296D	SCN42	\$489.95**
Uniden BR-330T	SCN30	\$279.95
Uniden BCD-396T	SCN47	\$524.95**

Handheld Listening Tip: If you are going to use a handheld scanner at the air show, there is another purchase you should consider – an extra set of charged batteries. Murphy's Law applies and nothing is worse than having your batteries die half way through the show with no replacements.

Base/Mobile Unit	Grove #	Price
AOR AR-3000AB	SCN26	\$1062.95
AOR AR-5000A+3B	RCV44P	\$2569.95
AOR AR-8600 Mk II	SCN11	\$889.95
JRC NRD-545	RCV21DS	\$1799.95
(Must order the optional ACC11DS VHF-UHF converter at \$349.95)		
Radio Shack Pro-2055	----	\$229.99
Uniden BC-898T	SCN44	\$209.95
Uniden BC-796D	SCN43	\$519.95**

Computer Hosted

Receivers	Grove #	Price
WinRadio WR-1550e	RCV47-E	\$549.95
WR-1550i	RCV47-I	\$499.95
WR-3150e	RCV48-E	\$1849.95
WR-3150i-DSP	RCV48-I	\$1849.95
WR-3500e	RCV49-E	\$2395.95
WR-3500i-DSP	RCV49-I	\$2395.95
WR-3700e	RCV50-E	\$2895.95
WR-3700i-DSP	RCV50-I	\$2895.95

* Per our *MT* review (November 2004), this unit has a lack of sensitivity from 280-295 MHz which does affect UHF military aircraft monitoring.

** Includes APCO-digital/trunk capability

SCHEDULE

2006 Performance Calendar

Note: If security levels increase in a base to Threat Condition "Bravo" or above, many military installations will not have public air shows. Consequently, demonstration schedules dates listed below are subject to change or cancellation without notice.

Demonstration Group Abbreviations:

BA	.....Navy Blue Angels
BD	.....Army Black Daggers
CF18	.....Canadian Forces CF-18 Hornet Demo Team
F15W	.....ACC F-15 West Coast Demo Team
F16W	.....Viper West F-16 Demo team
GK	.....Army Golden Knights
SB	.....Canadian Snowbirds
SW	.....Army Silver Wings
TB	.....Air Force Thunderbirds

Base Abbreviations

AB	.....Air Base
ACC	.....Air Combat Command
AFAF	.....Air Force Auxiliary Field
AFB	.....Air Force Base
ARB	.....Air Reserve Base
CFB	.....Canadian Forces Base
JRB	.....Joint Reserve Base
MCAS	.....Marine Corps Air Station
NAF	.....Naval Air Facility
NAS	.....Naval Air Station
TBD	.....To Be Determined

Dates Group: Locations

Mar 11	BA/F16W: NAF El Centro, CA
Mar 18-19	BA: Sacramento, CA; SW: Columbus, GA; F16W: Punta Gorda, FL
Mar 25-26	BA: TBD; TB: Ft Smith, AR
Mar 26	SW: Hamilton, GA
Apr 1-2	BA: NAS Kingsville, TX; TB/GK: Punta Gorda, FL; SW: Jasper, TX; F15W: St. Petersburg, FL; F16W: Davis Monthan, AZ
Apr 8	BA: Charleston AFB, SC; TB/GK: Maxwell AFB, AL
Apr 8-9	F16W: NAS Corpus Christi, TX
Apr 9	TB/GK: Columbus AFB, MS
Apr 15-16	F15W: Wilmington, NC
Apr 22	F15W: Shaw AFB, SC; F16W: Louisville, KY
Apr 22-23	BA: Louisville, KY; TB/GK: Tyndall AFB, FL
Apr 29	SW: Auburn, AL
Apr 29-30	BA/GK: NAS Atlanta, GA; TB: March ARB, CA; SB: Vidalia, GA; F15W: Ft Lauderdale, FL; F16W: Nacogdoches, TX
May 5-7	BA/SB/GK: Ft Lauderdale, FL; TB/CF18/GK: Langley AFB, VA; F16W: Temple, TX; F15W: MCAS Cherry Point, NC
May 10	SB: Pope AFB, NC
May 13	F16W: Shafter, CA
May 13-14	BA/GK: NAS Fort Worth, TX; TB: Robins AFB, GA; F15W: Tyndall AFB, FL; SB: New River, NC; GK: Dover AFB, DE
May 14	F16W: Van Nuys, CA
May 17	SB: Kingston, ON Canada
May 19-21	BA/GK: Andrews AFB, MD
May 20	TB: Altus AFB, OK
May 20-21	F15W: Millville, NJ; F16W: Selfridge ANGB, MI
May 20-22	SB: North Bay, ON Canada
May 21	TB: Dyess AFB, TX
May 24	BA: USNA, Annapolis, MD; St Thomas, ON Canada
May 24-26	F15W: Maxwell AFB, AL
May 26	BA: USNA Graduation Flyover, Annapolis, MD
May 27-28	BA/GK: Jones Beach, NY; TB: Cannon AFB, NM; SB: Virden, MB Canada; CF18: Tullahoma, TN

- May 31 TB: US Air Force Academy, Colorado Springs, CO
- Jun 3-4 BA: Davenport, IA; TB/GK: Beale AFB, CA; F16W: McGuire AFB, NJ; SB: Portage Le Prairie, MB Canada; CF18: Southport, MB Canada
- Jun 4 F15W: Malmstrom AFB, MT
- Jun 7 SB: Thunder Bay, ON Canada
- Jun 9-11 GK: Janesville, WI
- Jun 10-11 BA/SB/CF18: Quebec City, PQ Canada; TB: Hill AFB, UT; F15W: Rochester, NY
- Jun 14 SB: Riv du Loup, PQ Canada
- Jun 16-17 BA: Leeuwarden AB, Netherlands
- Jun 16-18 F15W: Muncie, IN
- Jun 17-18 TB: NAS/JRB Willow Grove, PA; SB/CF18: Ottawa, ON Canada; GK: Whiteman AFB, MO
- Jun 21 SB: TBD
- Jun 22-25 F16W/GK: Evansville, IN
- Jun 23-25 CF18: Borden, ON Canada
- Jun 24 SB: Oshawa, ON Canada
- Jun 24-25 BA: Barnes ANGB, Westfield, MA; TB/GK: North Kingston, RI
- Jun 25 SB: Borden, ON Canada
- Jun 28 SB: Cobourg, ON Canada
- Jul 1 TB/GK: Kirtland AFB, NM; SB: Ottawa - Canada Day
- Jul 1-2 BA: Traverse City, MI; F15W: Tinker AFB, OK
- Jul 3-4 TB: Battle Creek, MI
- Jul 4 SB: Battle Creek, MI
- Jul 8-9 BA/F15W: Pittsburgh, PA; TB/GK: Duluth, MN; F16W: Fargo, ND
- Jul 15-16 BA: Pensacola Beach, FL; TB/GK/F16W: Milwaukee, WI; F15W: Dayton, OH
- Jul 20 SB: Meadow Lake, SK Canada
- Jul 21-30 SW: Rantoul, IL
- Jul 22 TB: Grand Forks AFB, ND; SB/CF18: Yellowknife, NT Canada
- Jul 22-23 BA: Sioux Falls, SD; GK: Muskegon, MI
- Jul 23 TB/GK: Casper, WY; CF18: Peace River, AB Canada
- Jul 24 SB: Ft Smith, NW Canada
- Jul 26 TB: Cheyenne, WY; SB: Dawson Creek, BC Canada
- Jul 29 SB: Lethbridge, AB Canada
- Jul 29-30 BA: Dayton, OH; TB: Fairchild AFB, WA; F15W: McChord AFB, WA; F16W: Oswego, NY; CF-18 Lethbridge, AB Canada
- Aug 2 SB: Williams Lake, BC Canada
- Aug 4-6 BA: Seattle, WA; GK: Portland Hillsboro, OR
- Aug 5-6 SB/F16W: Comox, BC Canada
- Aug 6 GK: Buckley ANGB, CO
- Aug 11-13 SB/CF18: Abbotsford, BC Canada
- Aug 12-13 BA/GK: Elmendorf AFB, AK; TB: Scott AFB, IL; F15W: Minot AFB, ND; F16W: Klamath Falls, OR
- Aug 15 CF18: Rocky Mountain House, AB Canada
- Aug 16 SB: Rocky Mountain House, AB Canada
- Aug 18-20 BA/GK/F15W: Chicago, IL
- Aug 19-20 TB/GK: Burlington, VT; SB/CF18: Saskatoon, SK Canada
- Aug 23 TB/GK: Atlantic City, NJ
- Aug 25-27 F16W: Santa Maria, CA
- Aug 26 F15W: Ellsworth AFB, SD
- Aug 26-27 TB: Mt Comfort, IN; SB: St Catharines, ON Canada; CF18: Niagara Falls, ON Canada
- Aug 30 F15W: Atlantic City, NJ; SB: Brantford, ON Canada
- Sep 2-4 BA/GK: Cleveland, OH; TB: Gary, IN; SB/CF18: Toronto, ON Canada
- Sep 9 F16W: Cannon AFB, NM
- Sep 9-10 BA: NAS Oceana, VA; TB/GK: McConnell AFB, KS; SB/CF18: Halifax, NS Canada; F15W: Clarinda, IA
- Sep 13 SB: Gander, NF Canada
- Sep 15-17 TB: Reno, NV
- Sep 16-17 BA/GK: Kansas City, KS; SB: Summerside, PE Canada; F15W/F16W: Mountain Home AFB, ID
- Sep 20 SB: LaTuque, PQ Canada
- Sep 23-24 BA/GK: Lincoln, NE; TB: Rockford, IL; SB/CF18: Sarnia, ON Canada; F15W: Fort Worth, TX; F16W: Martinsburg, WV
- Sep 30-Oct 1 BA: Nantucket, MA; TB: Forth Worth, TX; SB: Redding, CA; F15W: Salinas, CA
- Oct 4 SB: Mojave, CA
- Oct 7-8 BA/F16W: San Francisco, CA; TB: NAS Pax River, MD; SB/GK: El Paso, TX; F15W: San Angelo, TX
- Oct 13 SB: Moose Jaw, SK Canada
- Oct 14-15 BA/GK/F16W: MCAS Miramar, CA; F15W: Travis AFB, CA
- Oct 15 TB: Seymour Johnson AFB, NC
- Oct 21-22 BA: Goodyear, AZ; TB: Houston, TX; F16W: Edwards AFB, CA
- Oct 26 F15W: La Aurora, Guatemala
- Oct 28-29 BA: NAS Jacksonville, FL; TB: Edwards AFB, CA; F15W: Ilopango, El Salvador; F16W: Glendale, AZ
- Nov 1 F15W: Acapulco, Mexico
- Nov 4 F16W: Keesler AFB, MS
- Nov 4-5 BA: Little Rock AFB, AR; TB: Lackland AFB, TX; F15W: Randolph AFB, TX
- Nov 10-11 BA: NAS Pensacola, FL
- Nov 11-12 TB/F16W: Nellis AFB, NV; F15W: Stuart, FL

Welcome to the Micro Standard!

DJ-X7T Wide Range Pocket Size Communications Receiver

100KHz to 1.3GHz* Triple conversion AM/NFM; double conversion WFM, plus FM, SW, and TV

Super small "credit card" size delivers AMAZING audio quality in a size and weight (as thin as 14.5 mm, as light as 103g) that you can take almost anywhere. Easy to read illuminated LCD, 1,000 memory channels, five operating modes, three different antenna modes, easy to program with free downloadable software (optional cable required), cable-clone, and a long-lasting Lithium ion battery! Standard adapter charges the Li-Ion battery AND operates with AC power, even at the same time, so you can listen while charging.

DJ-X2000T Multimode Wide Range "Intelligent Receiver"

100KHz to 2.15GHz*

Experience monitoring on a whole new level with the DJ-X2000T "Intelligent Receiver". This triple conversion handheld receiver offers many unique features such as Flash Tune™ which locks onto nearby signals, Transweeper™ "bug" detector, and Channel Scope™ spectrum display. It also has 2000 memory channels, alphanumeric labeling, RF frequency counter, digital sound recorder, and receives AM, WFM, NFM, LSB, USB, CW, and FM stereo.** Super extras include an on-line "help" feature, 20 scan programs, computer programmable capabilities (download "rec" software from Alinco website), CTCSS decode, two level attenuator, field strength meter, and more!

DJ-X3TD Multimode Wide Range Communications Receiver

100KHz to 1.3GHz*

WFM mono and stereo**, NFM, AM

Small but powerful triple conversion receiver with excellent audio, SMA flex and internal ferrite bar antennas, large easy-to-read display, 700 memories, NiMH battery, four scan modes, and dry cell battery pack. Computer programmable with free control software from www.alinco.com

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Distributed in North America by Ham Distribution, Inc., 15 South Trade Center Pkwy, #B5, Conroe, Texas, 77385.

Phone: 936-271-3366. Fax: 936-271-3398. email: Alinco@consolidated.net

Specifications subject to change without notice or obligation. *Cellular blocked in USA. Unblocked versions available to qualified users, documentation required. **Optional stereo headphones required.

Many Mysteries of Federal Communications

Things always seem to be changing in one way or another, and listening to federal frequencies these days proves that things are indeed changing. Every day there seem to be new frequencies or new channels and trying to figure out what is happening can be a challenge. So, as Rod Searling used to say on *The Twilight Zone*, "submitted for your approval" here are a few mysteries from *The Fed Files*...

❖ New TSA Frequencies?

It has been assumed that the Transportation Security Administration (TSA) is using a standard national channel plan, but I have received some reports that indicate the TSA may be expanding the frequencies they use across the country. The original, widely circulated list of TSA frequencies most likely came from someone with the company under contract to provide the radio equipment. Here is that original list (frequencies MHz):

- F01 172.1500 - simplex, digital
- F02 172.1500 - simplex, digital
- F03 172.1500 - simplex, digital
- F04 172.1500 - simplex, digital
- F05 172.9000 - simplex, digital
- F06 169.3000 - simplex, digital
- F07 169.3000 TX / 172.9000 RX - repeater, digital
- F08 169.3000 TX / 172.9000 RX - repeater, digital
- F09 169.3000 TX / 172.9000 RX - repeater, digital
- F10 172.9000 - simplex, digital
- F11 172.9000 - simplex, digital
- F12 166.4625, 103.5 PL - simplex, analog (DHS common)
- F13 166.4625 - simplex, digital (DHS common)

These frequencies have proven to be accurate for most airport TSA operations across the country, although some smaller airports may not be using radios at all. But there have been a few instances where these frequencies were not in use, or where additional frequencies were heard with what sounds like TSA traffic.

In many trips through the Dallas-Fort Worth airport in Grapevine, Texas, I was unable to locate any TSA radio traffic on the above channels. In fact, most of the TSA employees had no radios at all and the supervisors seemed to be carrying UHF hand-held radios. However, recent reports from the Dallas area indicate that the TSA might be using a new repeater on 169.1625 MHz (input frequency is unknown).

Also, when I was on a recent trip to the New York City area, I came across some radio traffic at JFK airport on a couple of frequencies that might be used by the TSA. 172.3125 MHz and 173.6675 MHz were heard with P-25 digital activity that seemed to indicate a possible use by the TSA. If anyone in the New York City area can monitor or confirm these frequencies, please let us know at the *Fed Files*!

One reason for some additional frequencies may be that the TSA has started to become more involved in different aspects of travel security. Since the formation of the TSA (veteran air travelers insist that their name stands for *Taking Scissors Away*), the agency has been involved with commercial passenger security at airports. But they are also involved in airfreight security as well as security for railroads and shipping.



In October of 2005, the Federal Air Marshal's Service was transferred from the Immigration and Customs Enforcement (ICE) division of the Department of Homeland Security (DHS) back to the TSA. An incident in December of 2005 involving an Air Marshal shooting an agitated passenger in Miami brought up some speculation about the types of communications gear that they may be using.

The Federal Air Marshal Service was at one time part of the Federal Aviation Administration (FAA), so they may have had access to some of the FAA National Radio Communications System (NARACS) frequencies in the past. The best guess is that they probably have access to the TSA operational channels, but there are unconfirmed rumors of a new, super-secret worldwide communications system that is to be deployed.

❖ Federal Nationwide Paging Frequency?

In my travels around the country, I always do a lot of searching through the federal bands. In recent months, one particular frequency has been showing activity in more and more sites that I visit. That frequency is 167.8625 MHz, and in most locations it appears to be carrying voice and digital paging information. This frequency was unused until a few months ago in my home base of Portland, Oregon. Then it suddenly became busy with paging data for several weeks, but has now gone quiet again. In some cities this channel appears to be used by

the local Veterans Administration (VA) Medical Centers for medical paging. But is this VA allocation nationwide? Let us know if you hear anything on this frequency in your area.

❖ Federal UHF Band Reorganization?

With the Department of Defense trunking systems starting to move out of the federal UHF band in favor of the new 380 - 400 MHz Land Mobile band, there appears to be some re-organizing of allocations going on. Some new frequencies have started to become active, but definite confirmation of who is using them is proving difficult, due to constant use of encryption. The most active of these new frequencies include the following:

- 406.3375 MHz, 407.1250 MHz, 407.1375 MHz,
- 407.1500 MHz, 407.1875 MHz, 407.7750 MHz,
- 409.9375 MHz

Who is using these frequencies? In some of these areas, the US Postal Inspectors channels of 414.7250, 414.7500, and 415.0000 MHz have gone silent, possibly indicating that some of these new frequencies may belong to them. Punch these into your scanners and let us know if they are active in your area.

❖ Feds Going All Nextel?

One of the main reasons for less federal radio traffic in recent years can be summed up in one word - Nextel. Many federal agencies were early adopters of the Nextel mobile phone service and represent a large group of subscribers today. Early in the addition of the Nextel service, there were numerous studies as to their usefulness and reliability to federal agents in the field. The studies showed that federal users liked the phones for day-to-day use, but they all agreed they would not rely on the Nextel phones exclusively by trading in their agency radios.



Together with NEXTEL

In November of 2005 rumors were flying around the Internet about Sprint/Nextel selling off their entire nationwide iDEN (Integrated Digital Enhanced Network, a trademark of Motorola) mobile network to the federal government for their own use. Rumors had all federal and military facilities around the United States moving to this government owned network in 2007.

Additional information from a Sprint/Nextel source indicates that most of the rumors floating around are simply not true. But apparently the idea of some federal government involvement in the Sprint/Nextel iDEN network has been discussed. Keep an eye out for further developments on this topic.

❖ Pittsburgh Area Trunked System

While on a recent trip to Pittsburgh, Pennsylvania, I came across a federal trunked system that I had not heard before. After monitoring it for a while, it appears that this system is located at the Department of Energy Bechtel Bettis Navy Reactor Facility in West Mifflin, a suburb of Pittsburgh. You can see more about this facility at these web sites:
www.nnsa.doe.gov/siteoffices.htm#pittnaval
www.bettislab.com/

Here are the particulars of this trunked system:

System ID – ff0
 Tower 101
 406.9750 MHz, 407.1375 MHz, 407.3875 MHz, 407.7875 MHz, 408.1750 MHz



A couple of interesting items about this system include that it is a true APCO-25 trunked system, using radios and system hardware sold by E.F. Johnson, but it is using an unusual method of frequency identification. For those who are familiar with trunked radio systems, this system is not set up like a "normal" APCO-25 trunked system, but more like an LTR system with APCO-25 voice channels.

Programming this system requires some special settings which will not work with standard trunk tracking scanners. Local listeners in

the Pittsburgh area have reported success with the Radio Shack PRO-96 and PRO-2096 scanners on this system by programming a "custom table" for each frequency. However, since the Uniden digital scanners only allow for three custom settings for trunked systems, they may be unable to track this system.

Could this be a sign of things to come? It's known that E.F. Johnson has acquired some federal radio equipment contracts, but this is the first instance we've seen of an APCO-25 federal trunked system using this method of broadcasting voice channels. Let us know if there are others out there!

❖ Frequencies from the West Coast

On a recent business trip to the Los Angeles area I managed to get a little searching time in, and found these frequencies active:

162.6125 Unknown
 163.0000 Unknown
 163.4375 Army Corps of Engineers - reports of water levels and rain
 163.5875 Repeater - keyed up with noise
 164.1625 Unknown
 164.4000 USSS Papa P-25
 164.9375 USFS or NPS? Analog repeater
 165.1875 Army Corps of Engineers - input to 163.4875 repeater?
 165.2375 DHS Customs and Border Protection (CBP) Net 1
 165.2875 BATF – P25
 165.3125 USCG Operations - Blackfin & Sector
 165.7875 USSS Baker – P-25 Encrypted
 166.2250 Unknown
 166.5875 DHS CBP input to Net 3 - 10A562 calling Sector
 166.8875 P-25, Possible Border Patrol system
 166.9125 P-25 Encrypted
 166.9500 Unknown - weak signal in downtown LA
 167.2875 Federal Bureau of Investigation (FBI)
 167.3125 FBI
 167.4125 FBI
 167.4625 FBI
 167.5125 P-25, Possible Border Patrol system
 167.5250 P-25, Possible Border Patrol system
 167.6000 P-25, Possible Border Patrol system

167.8250 Unknown
 167.9625 Repeater - keyed up with noise
 168.7500 Unknown
 169.4250 Unknown
 169.6375 P-25 Encrypted
 170.0625 Unknown
 171.6500 Analog repeater
 171.7000 Unknown
 172.1500 P-25 DHS TSA
 172.4000 P-25, Possible Border Patrol system
 172.5125 P-25 Encrypted
 172.9000 P-25 DHS TSA
 173.9750 P-25, Possible Border Patrol system
 406.1250 FAA data?
 406.4250 Motorola Control Channel, Sys 6a34, LA Air Force Station TRS
 406.8000 Unknown - analog repeater
 407.2250 Unknown
 407.6000 Unknown
 408.0000 Unknown
 409.1250 Unknown
 411.0125 Paging data
 411.4500 Possible DEA?
 413.6250 Unknown - sounded like P-25 going through an analog repeater
 413.7750 Unknown
 414.7250 US Postal Inspectors
 415.0500 US Postal Inspectors
 415.3000 VA Medical Center Security
 415.5250 US Forest Service
 416.0000 Unknown
 417.2000 DHS FPS (Federal Protective Service)
 418.3000 US Postal Service Postal Security Police
 418.6750 DEA F4 with OTAR (over-the-air rekeying) data
 419.1750 DHS FPS Input to 417.2000

I also managed to catch some active federal frequencies that were in use at the Rose Bowl football game in January 2006. While the game was in progress I managed to snag the following:

167.2375 P-25 - seemed to be a primary operations channel for the federal operations at the stadium.
 169.6125 Analog - sounded like some aircraft operations near the stadium.
 170.3500 P25 encrypted and clear
 171.6250 P-25 encrypted and clear
 173.1000 P25 encrypted

Thanks for all your letters and E-mails and we'll be back with more in May!

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Railroad Radio's Golden Years?

Welcome back to the railroad segment of *Boats, Planes and Trains*. We last discussed Yaesu's new VX-170 handheld 2-meter ham radio for monitoring the railroad frequencies. We will discuss the "Golden Years" of railroad radio in this issue.

Usually, when one thinks of the "golden years," we envision retirement in Florida or Arizona. We also think of being able to spend our children's inheritance while spoiling our grandkids with gifts. However, since this is a column on railscanning, let's discuss the "golden years" of scanning railroad frequencies.

Duane, my railfan and railroad industry friend from Colorado, posed an interesting question, asking when would we consider these "golden years" to have been – or better yet, whether they might occur in the future? I thought I would try to answer Duane's question by looking at the past and the future from a personal perspective.

Modest Beginnings

Railroad communications have progressed immensely since I began listening to the Monon Railroad in 1971 using my mom's Realistic Patrolman tunable radio. I was a member of the Purdue Railroad Club and learned there that the railroads used two-way radios for communications.

I had read an article on these radios in *Trains* magazine which piqued my interest in listening to railroad communications. The article listed the frequency range for railroad communications in the VHF (Very High Frequency) range. These radio channels in the 160-162 MHz range were just above the police frequency to which my mother listened. Her radio did receive the railroad communications, but I wanted something better and more precise. Catching the chatter on the railroad radios was hit or miss at best.

Upon graduating from Purdue University in 1972, I managed to gather the cash to purchase my first camera and pursued my passion for photographing locomotives to use for my model work. Early in 1974, I stopped in the local electronics store to buy some parts for one of the model projects I was working on. The store had an early Channel Master portable scanner with four crystal-controlled channels. I bought the radio for \$100, but then found I had to buy the frequency crystals for another \$10 each. Fortunately, the shop had a handwritten list on the wall for the local Penn Central yard frequencies. I was in heaven with this radio, and my interest in radio has continued throughout the years.

A Homebrew Heathkit Scanner

I wanted a better scanner and the Heath Company advertised a new 8-channel scanner kit in their 1974 catalog. I bought two of these: one for a friend and one for me. I remember taking the kit with me while on business to Detroit. I sat in the hotel one evening with instructions and a soldering iron in hand while I assembled one of the kits. It worked just great!

The channel indicator lamps were incandescent bulbs and the scanner made a gentle popping sound in the audio while scanning. My railfan friend, Tim, knew the radio maintainer in the yard and took me to meet him. With help of Larry and his Motorola signal generator, I tuned the Heath scanner for the best reception.

Buying "rocks" or frequency crystals was expensive. The U.S. has 91 railroad channels, plus an additional marine channel (161.610 MHz) used by the Rock Island Railroad. There are 97 railroad channels altogether, as used in Canada and the United States, so you can see buying crystals was costly at \$10 apiece. Different scanners used crystals with different intermediate frequencies (IF), so a Regency crystal would not function in a Bearcat scanner and vice versa.

Next came the Regency Whammo scanner. I still have this one down in the basement in a box. The Whammo had ten channels and LED (light emitting diode) channel indicators. It used a programming device which looked like a metal comb. The frequency combs had teeth, which were broken off to match a code. They cost approximately 50 cents each. Even so, this scanner was expensive and could only scan ten channels.

Then there was the Bearcat 210 scanner with ten programmed channels. It was a great innovation. The frequencies could be digitally entered on a keyboard with the frequencies being displayed on an LED frequency display. The Bearcat 250, with thirty channels, was soon to follow. I still have that Bearcat scanner, but it lies in a box in my basement needing repair for the display circuit. It was an excellent scanner.

During these early years, I was also purchasing railroad radio frequency information for \$1 per channel per railroad from Pro Customs Hobbies in New Jersey. I paid \$3 for the three radio channels the Grand Trunk Western Railroad used in Indiana and their Chicago Elsdon Yard.

The 1970 Golden Years?

The late 1970s could have been the "Golden Years," since it took so much "gold" to buy a scanner, the radio frequencies, and the crystals needed to listen to the trains! Still, I wanted more radio frequencies for the railroads and began my

search.

The Internet did not exist in the 1970s and finding a railroad radio frequency was often a matter of luck. Railfan magazines sometimes printed a few frequencies, but the majority of my work lay ahead of me. I began gathering all the information I could find on railroad radio frequencies and what their exact channel uses were.

I began networking with other railfans through the enthusiast magazine *Extra 2200 South* in the late 1970s. I authored a railscanning column in this magazine for years, while gathering all the railroad radio frequency data I could. All the data was written on 3x5 cards, meticulously sorted and retained for future reference.

Another railfan and I also edited the "Rail-scanning" column in the RCMA (Radio Communications Monitoring Association) magazine during the 1980s and into the 1990s until *The RCMA Journal* ended publication. Many friends were made during this time, and many railroad radio frequencies with their exact uses were collected.

The first edition of my book, *The Compendium of American Railroad Radio Frequencies* was published in 1981. It was a booklet which listed many radio frequencies for the railroads in the United States and Canada. The book grew from 25 pages to more than 200 pages before publication was ended in 2001. *The Compendium* was one of the best books of its kind for railfans and can still be found for sale on eBay among other websites.

The early 1980s brought about the first programmable handheld scanner, too. It cost \$200 and was produced by Bearcat. The BC100 has sixteen channels and was push-button programmable. The radio was a flop in my eyes, but it paved the way for the future handheld scanner field.

Regency's 1984 entry into the programmable handheld scanning field was the HX-1000 scanner. It was easily programmed and had great railroad reception with thirty channels. It was expensive at \$250, but was and still is an awesome scanner. It featured an LCD display, but lacked a direct channel selection feature which is handy on so many scanners today.

The Compendium of American Railroad Radio Frequencies shared railroad radio frequencies with the fans, and the HX-1000 was the best scanner that had been produced for fans: surely we hit "Gold" here, it seemed to me.

I bought and sold scanners during the 1990s while living in Fort Wayne. I also became a ham radio operator and radios seemed to fill every crevice in the house, including one in the bathroom! Railroad chatter was to be found in every room.

I erected different ham radio antennas for use in listening to the railroads. My search for better radios and antennas continued.

During the era the *Compendium* was published, I spent much time writing various railroads to gather radio frequency information. I still retain a large box of this correspondence in the basement. Letters were written on everything from a manual typewriter to a word processor to a PC. Many railroads were quite helpful; however, railfans were the greatest and probably the most reliable source of the data printed.

The Internet came along in the mid-1990s and it led to a revolution in data gathering and sharing among fans. My interest in ham radio and monitoring the railroads also increased. The *Compendium* was now published by a railfan publisher and was sold worldwide. However, our data was also published on various websites on the Internet.

Scanners now scanned at faster rates and had more than enough memories to scan the entire 97-channel railroad allocation in a few seconds. The *Compendium* was no longer in demand. The technology of radio scanning, along with the Internet, had brought about a new "golden era" in railscanning for consumers.

My interest in more recent years has been in using ham radios for railroad scanning. These radios are dual-purpose and have great reception. They can be used for transmitting on amateur 2-meter frequencies and are a good value. Many of these ham radios cost less than scanners and perform more satisfactorily. I have no interest in scanning the municipal police and fire departments, so these 2-meter ham radios are just right

for me and they could be for you.

I have relayed my thoughts in this issue concerning the "golden years" of railroad radio frequency monitoring – without a conclusion. We have run out of space this month, so I will need to continue my thoughts in the next issue of *MT*.

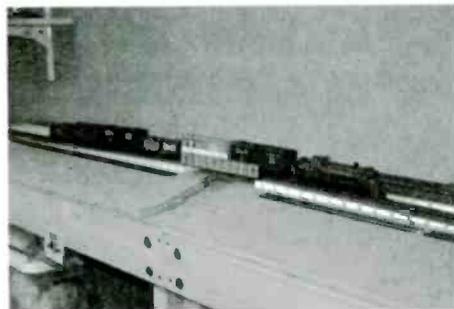
Meanwhile, what do you think is/was the golden age of railroad radio? Is it in the future? The railroads will be making changes in the near future and I will discuss some of these shortly.

❖ A Round Robin

My friends and I have continued to work on the model railroad in my basement. We have an informal group called a "Round Robin," which gathers at various modelers' homes. There is no club charter or any dues. We gather at each other's homes to have fun and fellowship.

Nine of us met in my basement on a recent Saturday morning. We did everything from laying track to moving a siding to build a mountain (as opposed to real life, in which mountains are moved to build sidings). Promptly at noon we stopped work and went to beans (railroad lingo for going to lunch).

We used a router to cut the Homasote board. Homasote board is an insulation board made of old newspapers that some model railroaders use as a foundation for their railroads. Next, I glued several Woodland Scenics foam risers in place for the cork roadbed. The grade on either side of the bridge is two percent, which is a rise of two inches for every run of 100 inches. Then I have to lay the mainlines back in place and do some electrical work so we can run trains again.



This is one of the new bridges on my layout. The other will lie behind the first bridge along the wall.

Modeling is one way to relax and have fun with friends. We all enjoy working on model railroads. This summer I will run an antenna feed to the basement for the scanner. Listening in to the railroads while we work will be great!

❖ New Website for Railscanners

I have a new personal website posted on the Internet. The URL is www.rrradioman.com. Check out my site to see pictures of prototype railroading in the Fort Wayne area and the construction of my model train layout in the basement. I have posted the railroad radio frequencies I monitor here in northeast Indiana. I operate a ShoutCast server here at my home. Instructions on how to listen to my railroad radio audio feed are posted on the site.

So train your thoughts on the June 2006 issue of *MT* when we will see you again! Until then, have fun monitoring the rails!

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Tune into Natural Radio

DXing beacons can be a lot of fun, but sometimes you need a change of pace. This month, we'll explore a way that you can tune into the "lowest of the low" radio frequencies – the land of Natural Radio. Perhaps you've read about the signals that can be heard here: Sferics, Tweaks, Whistlers, and Dawn Chorus, to name a few. Now is your chance to hear these sounds for yourself using a homebrew receiver.

You're invited to join me as I build up a "Bare Bones Basic" BBB-4 receiver along the lines of the one described on the web at: www.auroralchorus.com/bbb4rx3.htm. I've given enough detail here for you to build your own receiver, but I recommend visiting the web site for helpful background information and operating tips.

❖ The Receiver

The BBB-4 is a wideband ELF (extra low frequency) receiver with a peak response near 2 kHz. It was designed by Stephen P. McGreevy (CA) and is very similar to the WR-3 commercial model that was offered for sale for many years. As explained on Stephen's web site – www.auroralchorus.com/ – he is now focusing mainly on his interest as a natural radio recordist. Be sure to visit his web site for some excellent material on natural radio including sound clips. If you read nothing else, be sure to check Stephen's *VLF Story*, at www.auroralchorus.com/vlfstory.htm. This article gives you an excellent overview of what can be heard down on these frequencies.

The BBB-4 is, as its name implies, about as basic as you can get and still have good natural radio performance. All of the parts for the receiver are readily available from Radio Shack (www.radioshack.com), Digi-Key Corp. (www.digikey.com) or Mouser (www.mouser.com). Those with a well stocked junk box might be able to build it without making any parts purchases.

The schematics shown on the web are composed of text characters to ensure compatibility with all browsers and computer platforms. While the diagrams are readable, I chose to redraw them for improved clarity before beginning construction. Figures 1 & 2 show the new artwork.

In re-drawing the circuits, I made two minor changes: First, I combined the "front-end" and filter schematics into one drawing. Secondly, I changed the values of resistors R3 and R4 to al-

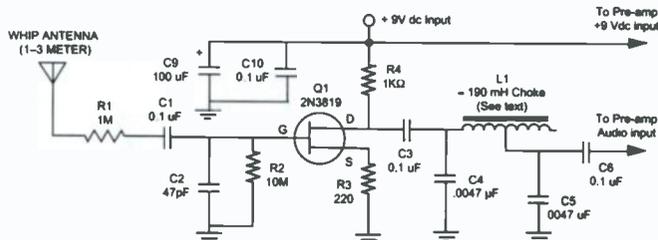


Figure 1. Natural Radio Receiver Schematic

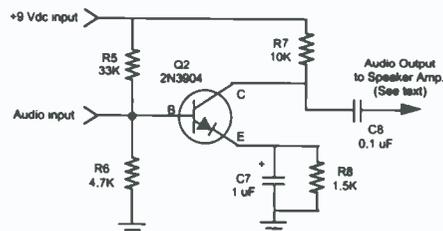


Figure 2. Audio Pre-Amplifier Schematic

low using a Radio Shack 2N3819 for Q1 instead of the harder to find 2N5484. (These changes are recommended in the original text when a 2N3819 transistor is used.)

❖ Mechanical Considerations

I'm building the BBB-4 on a small piece of "perfboard" using simple point-to-point wiring. Sheets of this material are available from Radio Shack and may be cut to the desired size. Stand-off spacers and bolts may be used at the corners of the board to mount it inside an enclosure.

A metal enclosure is recommended for RF shielding. I chose an aluminum project box (Radio Shack No. 270-238), as it has lots of room inside for mounting the perfboard, connectors, 9V battery, etc. A somewhat smaller box could probably be used, but I wanted the extra room to experiment – at least for now.

❖ Whip Antenna

The project calls for using a whip antenna 1 to 3 meters long. I selected a "universal replacement" type that extends to roughly 1 meter. To mount the antenna, some ingenuity will be required. The most important thing is to make sure it is completely insulated from the metal enclosure.

I suggest insulating the bottom few inches of the antenna with heat shrink tubing (or electrical tape), and then mounting it to the inside of the metal box with a pair of cable straps. A short "pigtail" of wire can be used to connect the antenna rod to the circuit board.

❖ Component Notes

Most of the parts values on the schematic are self-explanatory. An item that may need some explanation is L1, the 180-200 milliHenry choke. If you have a choke in this range, go ahead and use it. If not, an acceptable substitute is the primary winding of a 1k ohm center-tapped audio transformer (Radio Shack No. 273-1380). According to the instructions, you'll need to use the black (center tap) lead and either the green or blue wire (end of the primary) for the proper inductance. All other leads of the transformer are unused.

Remember that Q1 is a field-effect transistor (FET) and it is subject to damage from static electricity. Use caution to avoid static discharge when handling the FET, and install it into the circuit last.

❖ Outboard Amplifier

The BBB-4 as shown will provide sufficient output to drive a tape recorder input or an audio amplifier, but it is not high enough for direct listening with a speaker. (A small earphone might work without amplification, but I have not tried this.) An inexpensive outboard amplifier such as the Radio Shack No. 277-1008 is recommended for this purpose. It is a compact unit with a built-in speaker and volume control.

❖ Parts Sources

Most readers probably have a Radio Shack store within easy driving distance, but if you prefer to order parts by mail or have trouble locating a particular part, there are other options. Here are two well-known suppliers to the electronics hobby:

Mouser
958 N. Main St.
Mansfield, TX 76063-4827
tel 800-346-6873

Digi-Key Corp.
701 Brooks Ave. S.
Thief River Falls, MN 56701-0677
tel 800-344-4539

You should now have plenty of information to get started on your own receiver. Next month, I'll discuss final assembly and turning the receiver on for the first time. Till then, happy building.

Florida Hams Oppose Anti-Pirate Felony Law

In 2005 the state of Florida enacted legislation that was intended to make it a felony to operate a pirate radio station within the boundaries of Florida. The state has long been a hotbed for unlicensed radio broadcasting, particularly FM pirates, but also for anti-Castro clandestine radio broadcasting. This legislative crackdown on unlicensed broadcasting had support from a wide range of licensed broadcasters in Florida, who feared both interference and loss of commercial ratings.

In late February of 2005, a little-noticed move by the Amateur Radio Relay League actually opposed this statute. The ARRL filed a Request for Declaratory Ruling with the Federal Communications Commission asking that the Florida state law be declared null and void.

It may seem strange that a respected national association of licensed amateur radio operators would work with the FCC to overturn anti-pirate radio laws within a state. But, the ARRL says on their web site:

"What is clear is that no radio transmissions, licensed or not, are permitted if they result in interference to public or commercial radio stations licensed by the Commission," the ARRL said. "Thus, it would appear that Commission-licensed Amateur Radio stations in Florida are subject to felony prosecution if their transmissions interfere with interference-susceptible broadcast or other radio receivers used in listening to public or commercial radio stations."

The ARRL fears that inadvertent interference by licensed amateur radio operators is now classified as a third degree felony under Florida law, if the inadvertent transmissions happen to interfere with reception of a licensed commercial station. Even if the interference to a radio receiver was caused by an inadequate front end of a poorly designed radio receiver, the Florida statute could subject Florida amateur radio operators to felony prosecution. The ARRL also says that the law even prohibits fully legal low power part 15 broadcasting in Florida, should this low power broadcasting inadvertently cause any interference to a commercial licensed broadcasting station.

The law creates an incentive for Florida residents to call their local police, rather than the FCC, if they experience interference problems from amateur radio operators, according to the ARRL.

Further, the ARRL cites a long history of case law on this issue from a large volume of prior litigation in United States courts. The ARRL points out that the FCC has been given

exclusive authority to regulate the RF radio spectrum in the United States. Hence, the ARRL maintains that the Florida Legislature has no authority to regulate radio broadcasting in the state of Florida, since the FCC has that exclusive authority.

Thus, the ARRL maintains that the anti-pirate radio legislation enacted by the legislature and governor in Florida has been drafted in an excessively broad fashion. While perhaps designed to target a historically large volume of unauthorized pirate radio broadcasting in Florida, it actually subjects fully licensed users of the radio spectrum to felony prosecution. Hence, the ARRL has asked the FCC to declare that the Florida law is "void as preempted by federal communications law."

As of press time, the FCC has not issued a ruling on this matter.

What do you think? Let us know here at *Monitoring Times*, and let the FCC and ARRL know how you feel about this, too.

❖ What We Are Hearing

Monitoring Times readers heard two dozen 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. More than 95% of all North American shortwave pirate broadcasts are heard on the primary North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz.

Captain Morgan- This captain supplements his rock and roll tunes with TV audio from the *Twilight Zone* and other TV programs. (None, says to send loggings to the Free Radio Network web site, and has QSLed lately)

Channel Z Radio- They often relay Eupirates, so be careful when identifying them. As we see here this month, they use a 10 watt Corsair transmitter. (Uses channelzradio@gmail.com e-mail)



Commander Bunny- The longtime voice of the rodent revolution has been on lately

with numbers station parodies. This guy is also the main character on veteran pirate **WBNY**. (None)

Cracker Radio- Their programming is primarily southern regional comedy, not promotions for saltines. Sometimes their IDs are in CW Morse code. (Uses Merlin and crackerradio@pmoll.com e-mail)

Ground Zero Radio- Dave Gunn claims that his rock music is transmitted from an abandoned military missile base. (Elkhorn)

KIPM- Alan Maxwell still produces extremely complex drama broadcasts. (Elkhorn)

KOF- This unusual station has returned with a combination of foreign music and news coverage from a pirate perspective. (None)

KRMI- Radio Michigan International normally programs rock music, but sometimes they play the old "Lincolnshire Poacher" numbers station interval signal. (Uses krmi6955@yahoo.com e-mail)

Mac Shortwave- A new one in 2006, they have been broadcasting guitar music on 6950 kHz, not 6955 kHz. (Uses macshortwave@yahoo.com e-mail)

North Pole Radio- Even Santa had a pirate station back during the holidays. He must have known who was listening, and whether they were naughty or nice, since he gave no address. (None)

Old Turkey Radio- This gruff-voiced old timer programs parody tunes about over-eating and other turkey jokes. (Uses oldturkeyradio@yahoo.com e-mail)

Radio Pigeat International- This one is not really an advertisement for the pork producers. Instead it focuses on rock music shows. (Belfast)

Sierra Papa- This new pirate surfaced as a two-way QSO advocacy station. It is unclear if his calls to turn 3475, 6760, and 13755 kHz into a pirate version of the ham bands will have any influence. (None)

Take it Easy Radio- Their theme song by the Eagles is usually played at sign-offs, but other rock music and pirate radio discussions round out the entertainment. (Merlin)

The Crystal Ship- The Poet's rock music and left wing political commentary is heard on various random and unusual frequencies, such as 1710, 3320, 6854, 6875, 6925, and 9057 kHz. (Belfast and uses tcshortwave@yahoo.com e-mail)

Undercover Radio- Dr. Benway transmits rock music "from the middle of nowhere," and he defines nowhere differently each time. (Merlin and uses undercoverradio@mail.com e-mail)

Voice of Captain Ron Shortwave- Rock music and pirate radio advocacy are still heard here, sometimes with live time checks. (Uses captainronswr@yahoo.com e-mail)

Continued on page 61

You Can Never Have Too Many Keys

As far as I am concerned, there are only two "perfect machines" in the world. One is the bicycle, the other is the CW key. While there are many variants, the basic idea behind these two devices remains simple. A bicycle, in its purest form, conveys its rider from place to place. A CW key sends dits and dahs, conveying information from place to place.

I was having a CW ragchew not too long ago and the OM on the other end of the ether raised the question, "How many keys do you own?" At that moment my best answer was "I don't really know." At the time I was using my Vibroplex paddles, but sitting alongside were my Bencher paddles, my NYE Viking straight key, my original NorCal "kit" paddles (Now marketed by Vibroplex under the name Code Warrior), and a set of classic Hi-Mound paddles I like to use from time to time. In my "go bag" for my Elecraft K1, I have a couple of different small paddles and even a miniature straight key designed for portable operation.

Over my operating position, on a shelf, are a couple of old Heathkit and NYE keyer/paddle units. Then above those is my collection of Vibroplex semi-automatic "bugs" and military keys. I know I have a couple of more up in the attic and one or two down in the work shop for testing purposes. It's fairly easy to lose track when the CW key bug (no pun intended) bites.

Some have memories attached. My NYE straight key has been with me since my Novice days. One of my bugs was passed on to me

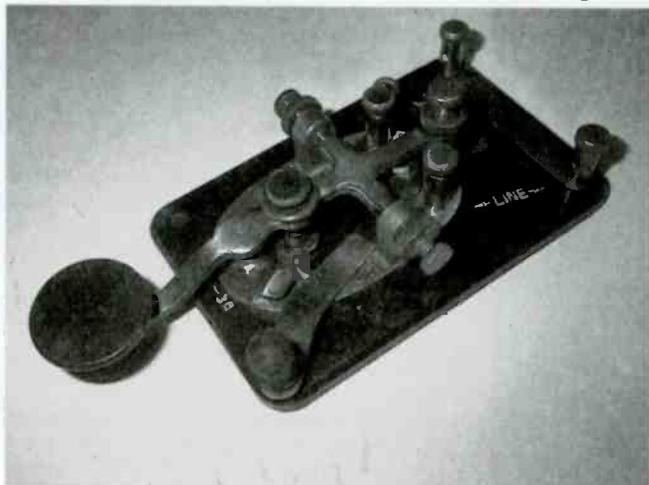
by a dear friend who is now Silent Key. Most have been bought out of curiosity. Only one or two were purchased by way of an outright understanding of their future value as collectables. I've always subscribed to the idea that all keys (even collectable ones) should be put on the air from time to time and shared with others in that way. At any given time as many as half a dozen or so are in active use at my operating position, switched out on little more than a whim. I find pleasure in using all of them.

I've even tried my hand at building a few keys, either from designs in the hobby press or based upon my own view of the world. (Every ham should get on the air at least once with a home brewed "Great Lakes Swiper" made from an old hack saw blade!)

While I could never afford them myself, I have had the pleasure of using a few of the greatest keys ever made. Keys such as the N2DAN "Mercury." I've also had fun playing with a number of historic designs such as the McElroy Mac-Key.

❖ Beauty is as Beauty Does

Well, if you have read down this far in the column, you probably have at least a curiosity about CW keys and may want to look into ways to start filling up a shelf or two with some examples of the art. You don't even need to be an on-air CW enthusiast to get with the program. However, once you have one or two keys on the shelf, like I said earlier, it would be a shame to have them just sit there collecting dust.



The U.S. Army Signal Corps J-38 straight key is a great, inexpensive key to start your collection.

Let's start out by looking at choosing a key for use on the air and then we'll get into the mania of key collecting.

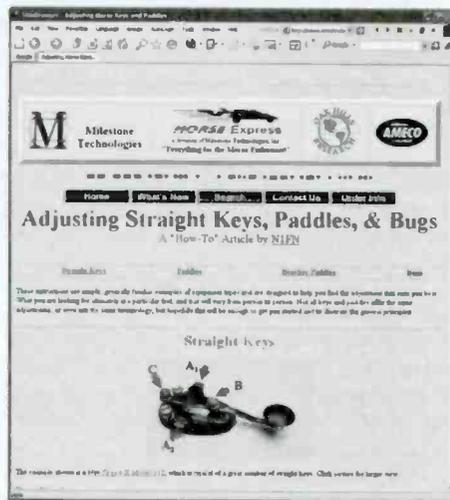
In my mind, the two important factors in choosing a key for use on the air are *feel* and *speed*. Allow me to unpack those terms a bit.

Feel is just that... How does the key feel in use? A key needs a heavy enough base (or other support) to not only keep it from moving around on your desk top, but to allow the key to sit at the correct height and angle for your use.

Many CW Ops put their entire forearm on the desktop with the key sitting perpendicular to his or her torso. There is no hard, fast rule on this, but, in my experience, this has helped me to avoid the CW malady known as *glass arm* for over 30 years. Operating in this position also allows you to further stabilize your key with your other hand.

Once the key is in the right position, you can then test the other aspects of its feel. This would include such things as contact spacing and spring tension. A good quality key will also have fairly wide adjustability on these factors. That being said, any well made key should be able to be brought into a good end user feel without too much trouble. If you can't get a key to feel right with a few simple adjustments, it will probably never suit you.

As with many manufactured products, it is possible for two different examples of the same model of key to feel very different. My point here is that, if your intent is to hunker down on 40 meters for a couple of hours each night, you will want to give any key a good test drive before purchasing. If you want a good tutorial on the ins and outs of adjusting all sorts of CW keys, I highly recommend N1FN Marshall Emm's web page on the subject www.mtechnologies.com/misc/keyadj.htm



Speed is something else you need to consider when choosing a CW key. If you are a beginner or normally operate at a speed less than 20 words per minute (WPM), you will probably find almost any well made, adjustable key to your liking. When your CW speeds begin to creep higher than 25 WPM,

you will start to notice that some keys cut the mustard better than others. Here is where you really see the difference between a \$50 key and a \$500 key.

Earlier I mentioned the venerable N2DAN Mercury. When I first had the chance to use one of these keys, my average speed was probably about 15 WPM. I couldn't see what all the fuss was about. Many years later (and sadly after Steve Nurkiewicz's death so I couldn't get one built) I cranked the speed on the keyer up to around 35 WPM (I get a nose bleed when I operate that fast but I just had to know) and I was able to say "Now I get it!" The high tolerance machining found in premium CW keys makes all the difference in the world when you start to operate QRQ. So, when buying a key for your daily use, don't forget that, as your proficiency improves, you may run up against the limits of the key you chose. But then, that sounds like an excuse to buy a new key to me, so it's all good!

The notable exception to choosing a key for speed in this way is when you get into semi-automatic "bugs." Because these keys use a sprung weight system to generate their dits, it is fairly hard to get them to a good speed balance much below about 20 WPM. The old rule of thumb for military and ship board operators was that you used a straight key for anything under about 18 WPM. You will sometimes hear an inexperienced operator trying to slow a bug down on the air. Long dahs followed by way too many dits to make any letter in the known alphabet is usually a sign of this problem.

❖ The Key to a Good Collection

So now you have a key or two (or three or four) you have put into use in your shack, but you couldn't help noticing that some keys have become quite collectable. Well preserved examples of even originally inexpensive keys can bring very good prices and, as with most

collectables, will only go up in value over time.

You can enter into the fun of collecting CW keys with almost any budget. A good place to get started is collecting military keys. One classic that remains very reasonable in price is the U.S. Signal Corps J-38 straight key. This key was in high production throughout World War II, and for some time thereafter. Many examples can be found and their collector's value is usually based on overall condition. Extra value is placed on having the original box as well.

While this key was made by many different manufacturers during its run, one particular model draws additional attention and higher prices when sold. J-38 keys produced by The Lionel Corporation (yes, the same folks that make the toy trains) are highly prized by collectors. If you find a J-38 at a flea market with an "L" on the bottom side of its base, you have a real treasure on your hands. K6IX Scott Hill's page on the J-38 and its variants is a great place to learn everything you ever wanted to know (and more) about getting started in J-38 key collecting: <http://k6ix.net/J38Keys.html>

By the way, beyond its value as a collectable, the J-38 is a fine straight key in its own right. Many folks still use them daily. I take mine down from the shelf and give it a spin on a regular basis, especially on ARRL Straight Key Night.

Can't find a J-38 to suit your tastes? The J-37 was in common use up through the Viet Nam Conflict and many examples of this key can be found on line or at flea markets and hamfests. You will also find several other keys with the "J" designation that will be worth a look as you learn more about this aspect of the CW world.

Looking for a Navy equivalent key? Keep an eye out for examples of the CMI-26003A and other variants.

Other military keys that are showing up on the market at reasonable prices include units that were used by the Soviet Union and the People's Republic of China. Often, these can be found as "new old stock" in their original boxes at reasonable prices. These keys are sure to go up in value in the future. The Soviet TKF straight key is a good place to start, as are the Chinese K4 and K5 keys.

Not of a military mind set? Not to worry! Older Vibroplex and McElroy keys are fairly common and well documented on the Internet. "New York" Vibroplexes are fairly easy to find, although prices can be somewhat inflated. Remember that almost all Vibros can be fully restored with existing parts so even a rough unit can be brought up to snuff.

A good book that conveys a general overview of CW key collecting is K4TJW Dave Ingram's *Keys Keys Keys* - \$9.95 from CQ Communications, Inc. 25 Newbridge Road, Hicksville, NY 11801.

So next time you hear me on the bottom end of 40 meters, I may not be able to tell you how many keys I own, but I'll be happy to talk about the one I am using at the time. I have fun!

Outer Limits continued from Page 59

Voice of the Islands- This new one caused some excitement when it was at first thought to be a European pirate on frequencies such as 13888 kHz. But, on-air announcements now claim that their rock music shows come from an Island in Lake Erie. (Merlin)

WBMR- This one is mainly noteworthy for their announcer's name, Mike O. Farad. He usually discusses pirate radio technology, which is appropriate. (None)

WKEG- Their rock music programming follows a novel interval signal from the beeping noise in a medical EKG machine. At sign-off, the EKG beeps stop, as the program dies. They normally use 6955 kHz but they say that occasional tests on 3300 kHz are possible. (Uses wekgradio@yahoo.com e-mail)

WHYP- James Brownard's comedy, rock music, and ancient Lake Erie weather reports may be the most prominent pirate on the shortwave bands today. (Belfast and uses whypradio@gmail.com e-mail)

WMPR- Their "micropower radio" slogan still is used during techno-rock "dance party" broadcasts. (None, has QSLed only at the Winter SWL Festival)

QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations, especially 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 niel@ican.net. A few pirates will sometimes QSL reports left on the Free Radio Network web site, at www.frn.net on the internet.

Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brassstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Artie Bigley, Columbus, OH; Wendel Craighead, Prairie Village, KS; Rich D'Angelo, Wyomissing, PA; Gerry Dexter, Lake Geneva, WI; Brian Duddy, Nyack, NY; Harold Frogde, Midland, MI; William T. Hassig, Mt. Prospect, IL; Gerald Kercher, Quaker Hill, CT; Dan Kuej, South Burlington, VT; Harald Kuhl, Germany; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Bill Matthews, Columbus, OH; John Poet, Belfast, NY; Lee Reynolds, Lempster, NH; Jim Ronda, Tulsa, OK; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Lee Silvi, Mentor, OH; Bob Wilkner, Pompano Beach, FL; Niel Wolfish, Toronto, Ontario; and Joe Wood, Greenback, TN.

UNCLE SKIP'S CONTEST CALENDAR
ARRL International DX Contest (SSB) Mar 4 0000 UTC - Mar 5 2400 UTC
Oklahoma QSO Party Mar 11 1400 UTC - Mar 12 0200 UTC Mar 13 1400 UTC - 2000 UTC
North American Sprint (RTTY) Mar 12 0000 UTC - 0400 UTC
Wisconsin QSO Party Mar 12 1800 UTC - Mar 13 0100 UTC
10-10 International Mobile Contest Mar 18 0001 UTC - 2359 UTC
Virginia QSO Party Mar 18 1800 UTC - Mar 20 0200 UTC
CQ WW WPX Contest (SSB) Mar 25 0000 UTC - Mar 26 2359 UTC
GRP ARCI Spring Homebrewer Sprint Mar 27 0000 UTC - 0400 UTC

Antenna Farm in a Suitcase: Conclusion

Last month we discussed antenna modeling and how to make antenna models in order to study antenna performance. This month we'll continue with some more ideas on how to use those antenna models.

❖ Polarization

The polarization of an antenna or of a radio wave is determined by the orientation of the flow of electrical energy in the antenna, or of the direction of the electrical field of the wave. Antennas capture more energy from passing radio waves when the antenna's polarization matches the polarization of the incoming wave that they are receiving.

As a rule of thumb, the polarization of vertically-oriented antennas is vertical, and that of horizontally-oriented antennas is horizontal. There are exceptions, but this is generally true. For example, a horizontally-oriented dipole has horizontal polarization, and emits horizontally-polarized waves. It also captures horizontally-polarized waves more efficiently than it does those vertically polarized.

You may find that reception is poor if you use a vertically-oriented ground-plane antenna to receive horizontally-polarized waves. Orienting the ground-plane antenna such that its vertical element is horizontal would improve reception in that case. In the US, television signals are horizontally-polarized, but most signals on the VHF and UHF bands are polarized vertically.

Try your model antennas at different angles from vertical to horizontal. Often signals will be found to change polarization if they have not reached the receiving antenna by direct-

wave (no reflections) propagation.

❖ Ground Effects

The earth beneath an antenna is capable of both absorbing and reflecting radio waves. This means that some of the waves emitted from the antenna will be reflected from earth, but, due to absorption, they will be weaker than when they left the antenna. This earth-reflected energy changes the antenna's radiation pattern from its free-space patterning.

The effect of the earth is difficult to accurately model unless you have access to some of the material designed to serve as artificial earth in modeling applications. Although I have heard of this material I don't know of a source for it. I suppose you could mount the small model antenna near actual earth, but this seems unlikely to be convenient for testing.

The upside of modeling the earth's effects is that, when antennas are a few wavelengths above the earth, the earth's effects are minimal. So if you check your model's performance when it is mounted a few wavelengths above earth you will get reasonable indications of what that antenna would do at lower frequencies – if that lower-frequency antenna were also mounted that same number of wavelengths above earth. But bear in mind that wavelengths of the lower frequency will be longer than at the modeling frequency.

The length of one wavelength in air, measured in feet, can be found by: $\text{Length} = 984/\text{Frequency (in MHz)}$. Thus, one wavelength at 984 MHz would be 1 foot. For one wavelength in air, measured in meters, use: $\text{Length} = 300/\text{Frequency (in MHz)}$.

❖ Anechoic Boxes

To avoid errors in determining your model antenna's reception patterns, the checking of the model's performance is best done in an area free of any objects which might reflect radio waves. When antenna engineers check antenna performance they often use an electromagnetic anechoic box. The box's walls are lined with material designed and shaped to reduce to a bare minimum reflection which would distort the antenna's patterning. A more likely choice for our "low-budget" approach is doing our testing in open spaces.

❖ Other Kinds of Antenna Modeling

We actually discussed two different kinds of antenna modeling last month: antenna models constructed at frequencies with short wavelengths, and mathematical models of antennas. The antennas that we constructed were actual, physical models of the desired antenna, and the formulas we used to determine length and spacing were very simple mathematical models of the antenna we were designing.

There are also mathematical formulas for antenna gain, directivity, and other variables. So engineers can get very elegant with mathematical models of antennas, and determine fairly well the important characteristics of an antenna by mathematical solutions before constructing an antenna. The most elegant form of this approach utilizes antenna-design computer programs and digital computers. But, in the "olden days" before we even had digital computers, G. H. Brown, a well-known antenna-research scientist, designed an analog computer that could model directional patterns of some antennas.

Computer modeling is much easier, much less expensive, and much faster than model building.

❖ A Meter for Checking Antenna Function

When an antenna is used for transmitting it is often useful to have some means of checking on the strength of the signals being launched from the antenna. One device used for this is called a "field strength meter" (FSM). One means used to determine the horizontal radiation pattern of a broadcast station is to have an engineer use an FSM to check the station's signal strength. This can

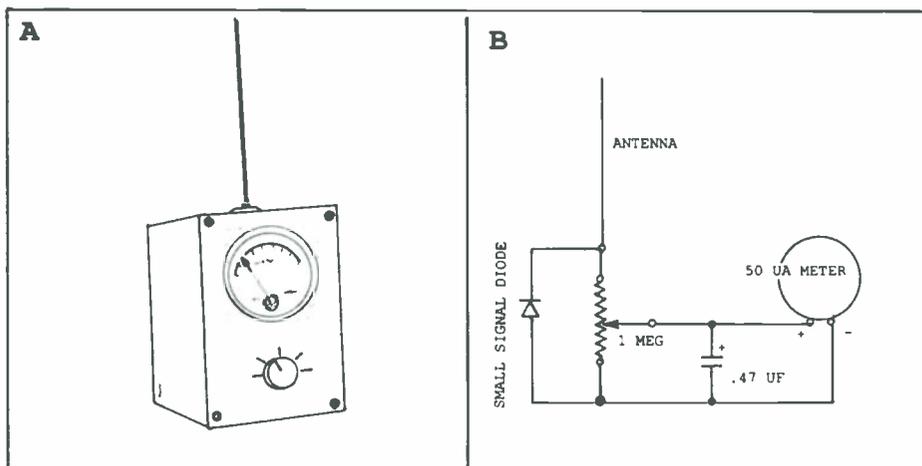


Fig. 1. A simple field-strength meter (A), and the schematic diagram for the meter (B).

This Month's Interesting Antenna-Related Web site:

Here's a look inside one anechoic antenna test box:
www.cushcraft.com/amateur/index93.html
 A site discussing antenna fundamentals:
www.kyes.com/antenna/dipole.html
 An interesting remembrance of a great radio pioneer:
www.wia.org.au/news/2005/20051217-01.php

be done by taking FSM measurements while flying in circles in an aircraft at a fixed distances from the station's antenna. A horizontal radiation pattern can be then constructed from the resulting measurements.

Ham radio operators often use a simple FSM such as that shown in fig. 1A and 1B to monitor the output of their station's antenna. Most small-signal diodes will work OK in this device. A meter with a higher full-scale current than that shown will work; however, the lower the level of current required for full-scale meter-movement, the more sensitive the FSM. The antenna can be a foot or two length of stiff wire, a rod, or a whip antenna.

Of course, this FSM is not calibrated, and its readings are relative. In other words, it tells when the signal is stronger or weaker, but not what the signal level is in microvolts or in any other measurement. The farther from the antenna the readings are taken, the more accurate their field-strength indications will be.

Most analog volt-ohm meters will also work as an FSM simply by connecting a small-signal diode between the two test prods. Set the meter for measuring the lowest range of current. If this doesn't work for you, reverse the diode connections. The test leads function as an antenna. Remember that you can burn out the diode or damage the meter in this or other FSMs by getting their antennas too close to a powerful source of radio-frequency waves.

❖ **A Useful Antenna Book**

The Easy Way: HF Antenna Systems by John Haerle, WB5IIR, is an unusual book in that it was developed for talks given over the air waves. Thus, it presents its information without pictures or graphics of any kind. This book is an excellent source of information on a variety of both wire and beam antennas. A good indication of the value of this book is that the venerable Kurt N. Sturba, K5KNS, recommends it "100% plus."

It is available for \$12.00 plus \$2.00 S/H from WorldRadio Books, 2120 28th St. Sacramento, CA, 95818, phone 916-457-3655, www.wr6wr.com. Since it doesn't depend on graphics, it is great listening for those with impaired vision. An audio recorded edition of this book is available from Courage Center, 3915 Golden Valley Road, Minneapolis, MN, 55422, or 1-888-846-8253, or www.handiham.org/mod.php?mod=userpage&menu=41&page_id=16

RADIO RIDDLES

Last Month:

I asked: "Are there other kinds of antenna modeling than the one that we discussed above?" I'm sure you noticed that the answer to that question was covered above.

This Month:

Are the model antennas that are built for checking antenna function somehow different than ordinary antennas? Are they only models, or can they be used as working antennas in regular communication applications?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, and 73.

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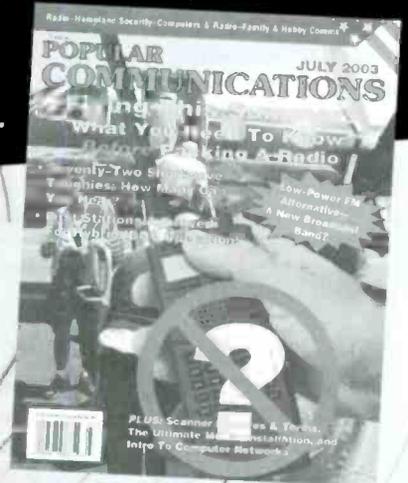
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The HQ-120 Comes to Life

The Story So Far

The restoration of this set began, as usual, with replacement of all of its paper and electrolytic capacitors. In more cases than not, when replacement is done carefully, this step results in a radio that will at least pick up signals -- though it might not yet be performing up to factory standards. But that was not to be the case with the HQ-120, which remained completely mute after being powered up.

I soon found out that I had a short in one of the B-plus lines which, in fact, was causing one of the power supply filter chokes to smoke and overheat. It took a bit of detective work to trace out the short through the radio's crowded and cabled wiring. But once isolated, the problem was easily identified. I had accidentally created the short while installing some replacement capacitors in a tricky spot.

Feeling quite elated at finally coming to the end of this long troubleshooting session, I lost no time in powering up the radio to see what I might hear. Though no stations were picked up, there were signs of life at last. I could hear static in the speaker when moving the bandswitch or touching one of the antenna terminals with a screwdriver. These signs suggested that I was now a lot closer to waking up the HQ-120.

I shut off the power briefly to set up for the signal tracing session that had been interrupted when I noticed the short circuit. But when I powered up the set again, the signs of life had disappeared and the radio was as mute has it had been when I first plugged it in.

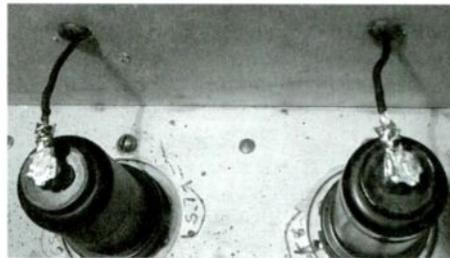
❖ Hidden Horrors

Before continuing with the troubleshooting, I thought it would be prudent to replace



This is the view that met my eyes when I removed the output filter choke, except that the cloth electrical tape has already been removed.

the filter choke that had been stressed with an identical unit from the parts set. Though the original choke didn't appear to be damaged (no shorts to ground and d.c. resistance about right), I thought that it was just possible that its operation had become intermittent.



Because of seriously deteriorating insulation, it was necessary to install new grid leads for the r.f. amplifier and mixer tubes -- along with new grommets for the leads to pass through. Tube type markings were added by a previous owner.

Once I had dismantled the old choke, I was very glad I had decided to make the change. Underneath the choke and hidden by it were the leads from the output transformer, which were about as messed up as they could be. Apparently as part of some earlier troubleshooting effort, all of the transformer leads had been clipped, then reconnected with crude solder joints. These were insulated with old-fashioned cloth electrical tape now so brittle that it was ready to break into powder at a touch.

Furthermore, the leads themselves had obviously been overheated enough, at some point, that some of the insulation had broken down into a gooey compound that ran off the wires, exposing bare copper. Other wiring associated with the output transformer had also been disconnected, then reconnected without benefit of solder. It was at this point that I began to think of the set as "that radio from hell."

Now I would obviously have to replace the output transformer, as well as the output filter choke, with the ones in the parts set. While I was at it, I also switched over the input choke because the wire insulation on the one in the "radio from hell" was broken in a few places where the leads had been flexed.

Luckily the leads in the components from the parts set were in very good shape. After I had completed all of the rewiring and reinstallation, I felt as if I had made a solid contribution to the stability and longevity of this radio.

❖ Voices at Last!

Crossing my fingers, I powered up the HQ-120 once more and began tuning across the broadcast band. I was more than delighted to hear voices, or at least things that sounded like voices, accompanied by loud microphonics, static, and other disturbances. The radio chassis was extremely sensitive to the touch. The slightest tap anywhere would set off a new series of carsplitting disturbances. By now, I was resigned to the fact that this radio was going to fight me to the end!

However, the microphonics problem was easily solved. Tapping the tubes one by one, I soon came to a tube that wasn't completely seated in its socket. Dealing with that little matter took care of the microphonics, and I found that I could pick up readable signals on most bandswitch positions with the set in my basement workshop and using just a few feet of wire for an antenna.

Now that I could pull in signals, I began trying out some of the radio's functions and found that the BFO (beat frequency oscillator) was inoperable. It was soon obvious that there was no voltage on the plate or screen of the 6J7 BFO tube, and as I continued to poke around in the BFO shield can, I quickly found out why.

In installing replacement caps in those tight quarters, I had accidentally disconnected a dropping resistor that fed the plate and screen. A couple of drops of solder in the right place and the BFO was back in operation -- imparting a pure adjustable tone to incoming CW signals.

❖ Murphy Still in Business

But Mr. Murphy was still at work in this radio! As I tuned around the bands, I noticed that the signal would occasionally cut out. Tapping tubes again, I was fortunate enough to pin-point the trouble fairly quickly. It was in the lead from the tuning capacitor to the grid cap of the 6S7 r.f. amplifier.

In the HQ-120, the large and elaborate tuning capacitor assembly is covered by a wraparound shield. Leads to the grid caps of the 6S7 r.f. amplifier and the 6K8 mixer tube pass through grommets in the shield. In my set, both the grommets and the insulation on the leads themselves had failed. In the case of the 6S7, the insulation was so far gone that bare wire would occasionally and unpredictably short to the shield, interrupting reception.

To remove the shield cover, I would have to cut the grid caps off both leads so that the leads could slide back through the holes as the cover was withdrawn. This I did, taking a little time to salvage the grid caps and remove most of the old solder. The cover was then freed by removing the four screws at the corners (two of them performing double duty as pilot lamp assembly holders) and slid off.

I was a little surprised to find that each grid lead was fastened to the free end of a resistor that was connected, at its other end, to a lug on the tuning capacitor. The resistor-to-wire splice was protected by a bit of spaghetti, but was just hanging unsupported in the air. Somehow I would have expected better mechanical construction in a receiver of this degree of sophistication and with such a fine reputation.

Yet, I wasn't really surprised. I think I may have remarked earlier on the extensive employment of unused tube socket lugs as tie points. This, in itself, isn't exactly a sin, but (except for a couple of porcelain units in critical spots) the sockets are inexpensive wafer types having lugs with very small openings. Some of these inadequate lugs have to accommodate as many as four leads when used as tie points. This has made the restoration work a bit tricky at times!

Removing the old leads from the resistors, I spliced on new wires – making them extra long so that I could easily thread them through the holes in the shield. I found some bits of spaghetti of the right size to protect the splices and slide snugly over the resistors. My parts drawer also yielded some tiny grommets that just fit the shield holes.

Sliding the free ends of the wires through their holes, I refastened the cover and gently took up the slack – pulling the wires through the grommets until meeting resistance. Then I cut the wires to the proper length and reattached the salvaged grid caps.

❖ I.F. Alignment

With that little problem taken care of, I was ready to try aligning the radio. Beginning with the i.f.s as usual, I had no sooner laid a screwdriver on the first adjustment when Mr. Murphy bared his fangs once more. Any movement of the screw resulted in a cacophony of static and microphonics. I moved the screw back and forth though most of its travel several times, but was unable to clear the disturbances.

Luckily, this particular transformer wasn't hard to disconnect and remove (only three leads, all in the clear). So I took it out and substituted the one from the parts set. I honestly don't know how I could have handled this particular restoration without a parts set to fall back on!

To backtrack just a bit, Hammarlund's procedure for adjusting the i.f.s on the HQ-120 is a little different from usual. Normally, one would feed a modulated signal directly into the i.f. channel at the 455 kHz i.f. frequency and proceed with the adjustments. Instead, Hammarlund advises the serviceman to feed any modulated signal within the frequency

range of the receiver into the antenna circuit and tune it in accurately. The i.f. adjustments are then maximized using the usual output meter.

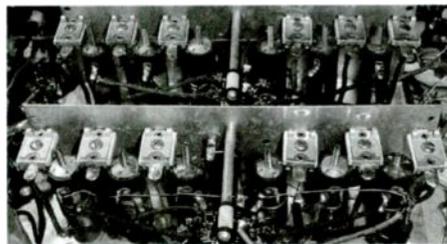
This presupposes, of course, that the oscillator for the receiver band being used is set accurately enough so that an exact 455 kHz difference frequency is generated. I'm not exactly sure why Hammarlund decided to go with this method. It might be that the shield covering the entire tuning capacitor assembly makes it difficult to access an appropriate point for directly feeding the i.f. channel.

The new i.f. transformer adjusted without incident, as did all the others. And the radio seems to pull in signals with appropriate sensitivity. However, I do feel a little uneasy about the i.f. alignment. There were definite peaks, of course, but they were hardly razor sharp – suggesting a flat-topped i.f. response designed to improve fidelity in a.m. mode.

The alignment procedure for the later HQ-129X, which is quite similar electrically to the HQ-120 and seems to use the same i.f. transformers, requires the use of a sweep generator and oscilloscope so that one may observe the shapes of the response curves as the transformers are adjusted. I believe I will revisit this alignment as soon as I can put together the required instruments and eventually report on it in this column.

❖ R.F. and Oscillator Adjustments

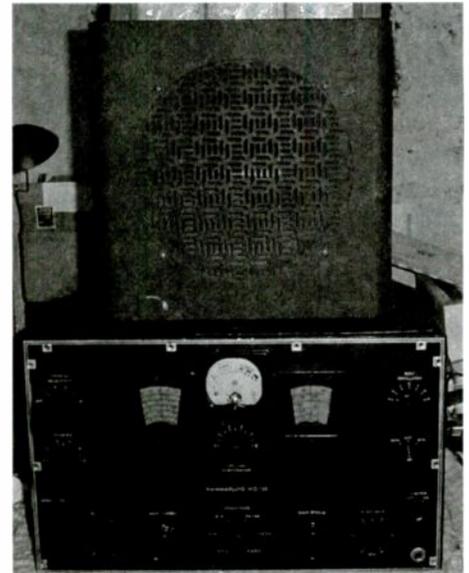
These adjustments are substantially the same as those we have done in the past for various communications receivers. There are two sets of adjustments; one for the r.f. input from the antenna and the other for the oscillator. The latter control the dial calibration. Each set contains a trimmer capacitor and an adjustable inductance for each band covered by the receiver.



The r.f. input and oscillator adjustment points for the HQ-120 (see text). Back row of trimmers and coils is for r.f. adjustment; front row is for oscillator adjustment.

The alignment instructions specify two test frequencies for each band; one near the low end of the band and one near the high end. The r.f. input and oscillator trimmers are adjusted for maximum output with the receiver tuning dial and the signal generator set to the higher test frequency; the r.f. input and oscillator coils are adjusted for maximum output with the receiver tuning dial and the signal generator set to the lower test frequency.

This is a somewhat tedious but straightforward process and must be done in a pains-



The completed HQ-120 still sitting on the bench but ready to be put back to work. The rare HQ-120 speaker was a lucky flea market find, but cost me as much as I had paid for the radio!

taking manner. Small adjustments can have large effects, particularly in oscillator tuning. All of these adjustments went very smoothly – requiring little change from the factory setting.

See you next month when, with this project finally out of the way, we'll move on to another topic.

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Build the FlexTenna for Wideband Reception

By Bob Grove, W8JHD

How would you like to have a high-performance, wideband receiving antenna at virtually no cost and about 15 minutes time? It is capable of monitoring signals from the lowest part of the radio spectrum clear up through at least 2500 MHz (that's the limit of my test equipment).

Although I use mine as the primary receiving antenna here at home, its pre-eminent portability lends itself to camping, DXpeditions, Field Day monitoring, vacation listening and other applications where a high-efficiency, easily-erectable antenna would be ideal.

Wouldn't it be nice to have an antenna that could be rolled up to be conveniently packed into a suitcase or accessory box for transport? It's easy. Even easier, Grove Enterprises has turned this clever design into a low-cost product for those who don't have the tools, time or patience to build one themselves. You can view the full-spectrum FlexTenna at www.grove-ent.com/grovehvu.html, and the smaller VHF/UHF-only version at www.grove-ent.com/grovevu.html.

But let's review the basics for builders.

❖ A little theory...

Any piece of wire will receive signals, but there are some guidelines. If the antenna wire is too long, it becomes highly directional, and if it's operated at even harmonics of the desired frequency ranges, the high impedances represent a lossy match to the receiver. Plus, the higher the frequency, the more likely the wavelength patterns will oppose an efficient transfer of signal to the transmission line.

However, there is an interesting fix for the impedance problem: If you put two wire elements in parallel and feed them commonly at one end, when one element is a poor match, the other will take over – provided the relative lengths are well chosen!

As to the phasing problem, a good length of wire has a lot of aperture (signal-capture area), compensating for some of the cancellation losses.

❖ ...and a lot of experimenting

Hanging a random wire from a tree limb is not a brain-burner; but what length should that wire be? Time-tested experiments have shown that an element 25-40 feet or so in length makes a dandy receiving antenna for the entire shortwave spectrum. In fact, decades ago, the Coast Guard determined that a five-foot whip was adequate if properly impedance-matched.

Still, this antenna should be fed with coax, but what if we simply let the shield float ungrounded at the feedpoint? That certainly would be simpler, but would it have serious consequences in the quality of reception? And what is the best length – or pair of lengths – for modern, sensitive receivers? Those were the two questions to be answered.

❖ The extremely-wideband (and longer) version

Starting with an assortment of random wire specimens I had around the workshop, I used lengths from 14-35 feet connected to my IFR 1100 spectrum analyzer. As expected, signals were somewhat reduced on the shorter wire, but so was the atmospheric noise, so the signal above the noise remained the same. In other words, the signal sounded just as good on the shorter wire.

Comparing the "FlexTenna" wire to my commercial GAP Titan vertical for HF, the farther below about 7-9 MHz I went, the better the Flex performed. From 10-50 MHz or so, responses were typically within 4-6 dB, with signal propagation sometimes favoring one antenna over the other.

Not surprisingly, since the Titan is an HF antenna, at 150-170 MHz the Flex was about 8 dB better, at 450-470 MHz about 18 dB better, and at 800 MHz 10-20 dB better. The response was roughly equivalent to the popular Grove OMNI scanner antenna.

Eventually, a very satisfactory combination of lengths trimmed from the two wires on a piece

of zip cord was found. (Speaker wire with clear vinyl insulation and the heavier lamp cord worked equally well.) It was a 24-foot length with one wire stripped back five feet and cut off, making the pair 24 and 19 feet in length.

❖ Wiring it up for that first real test

With the wire antenna dangling from the tree, I twisted together the two bare wires at the bottom and attached them to the center lead of a length of RG-6/U coax. (Yes, I know, it's 75 ohm, not 50 ohm, but that doesn't hurt a thing; remember, you are using this antenna over an extremely wide frequency range, and no antenna will maintain a constant impedance under those conditions! Even better, RG-6/U has less loss than RG-58/U, especially at the higher frequencies.)

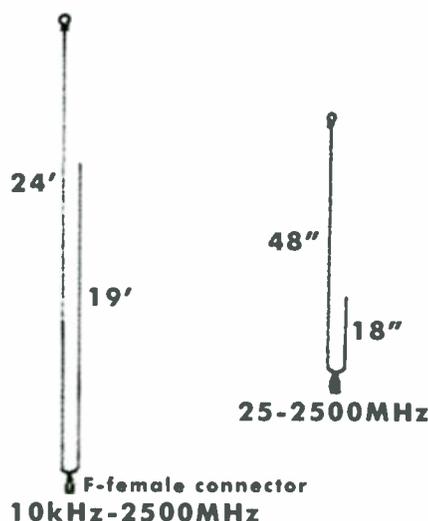
With the indoor end of the coax feedline attached to my AOR AR5000+ receiver, I began tuning through the spectrum. To my amazement, I was hearing ELF signals from the very bottom of the spectrum (18 kHz Navy RTTY) clear up through 2500 MHz (Wi-Fi packets)! It was time to finish up the antenna.

❖ A good, finished product

To duplicate this project, you'll need a 24-foot length of two-conductor zip cord (speaker or lamp cord; I used 18 gauge), a female F connector (They are cheap, easy to mount, very efficient through UHF, and accommodate a host of inter-series adaptors), a few inches of 1/4" and 3/8" heat-shrink tubing (optional; you can even use rubber tape or PVC electrical tape), and a crimp-type ring terminal (16-14AWG, 1/4" stud); alternatively, a small loop may be made of the last few inches of the wire antenna for support).

Tools will include wire cutters, a soldering gun and rosin-core solder, and a crimper or a pair of pliers for the ring terminal.

- (1) Begin by stripping away five feet of one of the 24-foot wires and cut it off, leaving the remaining 19 feet still attached to the molded pair.
- (2) Strip away about 1/4" of the insulation from the common (lower) end of the wire pair and twist the leads together; tin them with solder.
- (3) Solder the twisted wires to the center pin of your choice of connector.
- (4) Wrap a couple of turns of the rubber tape or vinyl electrical tape around the soldered connection and the F-connector base to support the wire connection, then slide a 3/4" piece of the 3/8" heat-shrink tubing over the



antenna wire and down over the base of the connector. Heat and shrink it. Alternatively, you may wish to use rubber tape and anchor it with PVC tape. You may choose the tape option over the heat-shrink tubing for the following steps as well.

- (5) Slide a half-inch piece of the 1/4" heat-shrink tubing over the upper end of the short wire and heat and shrink it tightly to the other wire.
- (6) Slip another 1/2" piece 1/4" heat-shrink tubing over the upper end of the wire in preparation for covering the ring terminal. Push the insulated wire into the crimp end of the ring terminal and crimp it securely. (It isn't necessary to make electrical contact; it's just a support.)
- (7) Slip the tubing over the crimp end of the ring terminal and heat and shrink it.

And now, the VHF/UHF (shorter) version:

If your primary mission is scanning between 25 MHz and 2500 MHz, the project is even easier. You will need only 48 inches of the zip cord, and you will strip back and snip off 30 inches of one of the leads, leaving the shortened wire at 18 inches. The rest of the steps are the same.

❖ A few final notes

It's possible to use the longer model in an elevated, horizontal position (as an end-fed zep) for 10 kHz-30 MHz applications, but for VHF/UHF, vertical suspension is strongly recommended since virtually all signals here will be vertically-polarized. With this in mind, the

shorter, VHF/UHF version *must* be suspended vertically for best reception.

With the abundance of electronic appliances every home now has (especially we radio buffs!), it's important to locate the FlexTenna as far from the residence as practical. Mine is about 50 feet away, and still I am occasionally reminded of my equipment!

In some cases, connecting the shield of the coax at the antenna feedpoint to a grounding stake may reduce interference; it won't hurt, so it's worth a try. But first, sling the antenna temporarily and sequentially over a variety of tree limbs and listen across spectrum, making reception and interference notes so you can choose the best, permanent, mounting location.

And finally, if you make any improvements, let me know and we'll share them with other readers.

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MT



REVIEW

Comet CHA-250B Broadband Vertical Antenna

By Bob Grove W8JHD

Can simplicity yield good two-way communications? Is it really necessary to have ground radials, traps, counterpoise elements, reflectors and directors on antennas to provide usable communications? Even better, what if an antenna never needed tuning or adjustment on any frequency in the HF spectrum?

Comet Antennas has released their new CHA-250B HF vertical antenna – a straight, aluminum pipe with no parasitic elements, designed for continuous (no gaps) transmit coverage from 3.5-57 MHz (claimed voltage standing wave ratio less than 1.5:1), and reception from 1 to at least 90 MHz (claimed VSWR 3:1 at 150 MHz). Its power-handling capacity will accommodate most any conventional HF transceiver – 125 watts full carrier (AM/FM/CW) and 250 watts single side band.

A hermetically-sealed matching unit at the base is affixed with a standard SO-239 connector to fit PL-259-terminated coax cable. This lightweight antenna (7 lbs.) is 24 feet long; its thin profile accepts wind loading to 67 MPH without permanent deformation. Nonetheless, it's going to sway in the breeze!

But don't be misled by the light weight; with 24 feet of leverage, even a few pounds on the long end can put considerable torque on the guy holding the short end! The instructions wisely point out that installation requires four hands.

❖ Assembly

Everything necessary to assemble the antenna, including an Allen wrench for final set-screw tightening, is in the box; all you will need to provide will be a ruler or tape measure to insert

the element sections the correct depth, and a screwdriver to tighten one clamp. Hole alignments are accurate and burr-free; the entire assembly procedure takes about 15 minutes. Two husky U-clamps allow the antenna to be attached to any mast pipe of up to nearly 3 inches in diameter.

❖ Our field test

We decided that the best way to appraise the performance of the new Comet antenna was to do an A/B test against a competitor, the well-established GAP Titan. Since it's approximately the same maximum length, but a different architecture, it would be an interesting comparison.

While the GAP can be mounted close to the ground (it also operates without a ground plane or radials), the instructions that come with the Comet say it "must be installed at least 35 feet above the ground." Was that elevation really necessary, or just a recommendation to avoid obstructions? We decided to test it up high and down low to find out if there was any difference.

❖ Reception

Over a two-day period to get average daytime/nighttime performance throughout the HF spectrum, we switched between the two antennas and discovered that whether the Comet was near the ground with its element touching tree leaves, or 15 feet above ground and out in the open, reception was the same.

Below 2 MHz, the GAP outperformed the Comet by an average of 40 dB; from 2-6.5

MHz, the two antennas were equal in performance; from 6.5-8 MHz the GAP was ahead by a few dB; from 8-12 MHz the Comet was ahead by a few dB; and from 12-28 MHz the GAP won again.

❖ Transmission

So how about transmission? On 40 and 20 meters, the GAP was 2-3 S-units (as much as 18 dB) better than the Comet; this was consistent with the difference in reception. All contacts reported a considerable difference between the two antennas, with the GAP always noticeably stronger.

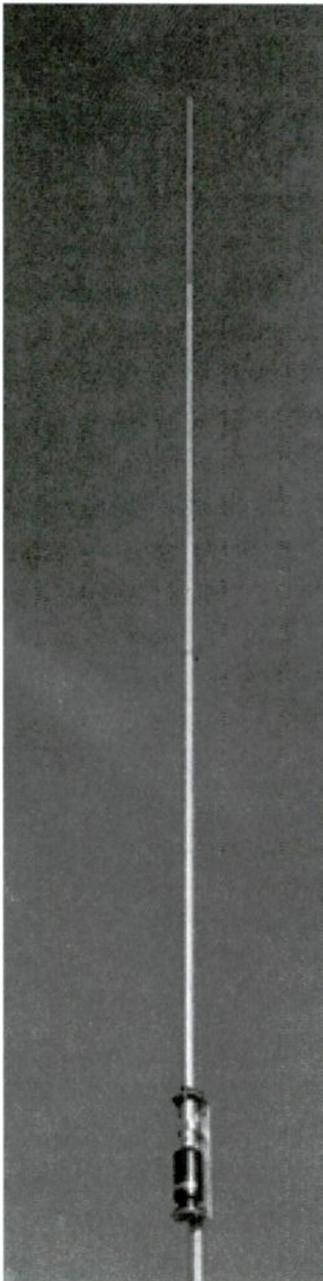
❖ Recommendations

At a manufacturer's listing of \$469, the antenna may seem a bit pricey, especially when compared to the superior performance of the GAP Titan which is priced more than \$100 less. Some moderate discounting is available from MT's amateur radio advertisers.

Even as a "low profile" shortwave-listening antenna, LF Engineering's high-performance H800 Skymatch active antenna is only 3 feet high and one-third the cost of the Comet, yet the Skymatch's reception is roughly equivalent to a 100-foot wire antenna! So what is the attraction for the CHA-250B?

Although not a competitive DX antenna, and with the full understanding that more cumbersome antennas have better performance, there are applications for the CHA-250B. Its full-HF, continuous-frequency-coverage capability without tuning or adjustments, light weight, minimal composition, ease of assembly, and no power-supply requirement like that of active antennas, make the Comet antenna appealing for Field Day, emergency deployment, portable operating, DXpeditions, low-profile receiving and two-way installations, local HF communications, and scene-of-disaster communications.

For additional information on the Comet CHA-250B HF vertical, contact NCG Companies, Inc., 1275 North Grove St., Anaheim, CA 92806; toll-free phone 800.962.2611; they can also be contacted by email at sales@natcommgroup.com, or visit their web site at www.cometantenna.com.



Kinetic Avionics SBS-1 Real-Time Virtual Radar

By Lee Reynolds, KD1SQ

In the scientific world there exists a concept known as “convergent evolution” – the process whereby organisms not closely related independently acquire similar characteristics while evolving in separate and sometimes varying ecosystems. Think of the wing, for example, as used by bats, birds and insects.

Bet you didn't know we have it in the radio hobby too, eh?

For this column we are reviewing the SBS-1 from Kinetic Avionics in the UK (www.kinetic-avionics.com). Developed by folk from the professional aviation end of the spectrum for the commercial market, it's a fascinating device that just happens to be a really neat toy if you're into hobbyist-level plane spotting and monitoring (that's why I say convergent evolution!). It works, the software that goes with it is very well done, and it offers the enthusiast a window into aviation monitoring that was completely inaccessible until this device came along. It's even priced at a point where, if you save a few pennies, the individual can afford it. Allow me to explain...

❖ What are we receiving?

For some time now, aircraft have carried radar transponders operating at 1090 MHz that can respond to requests from the ground by sending altitude and identity data back to the interrogating station – Secondary Surveillance Radar or “Mode S” as it is better known. This system has been developed as an improvement over the decades old radar addressing and response systems that have been used up till now for managing air traffic.

Optionally piggybacked onto this can be Automatic Dependent Surveillance Broadcast “ADS-B” capability, which not only transmits aircraft identity and altitude, but also airspeed and location many times a minute. Think of it as being an ACARS on steroids that tells you everything you might want to know about where that plane is, who it is, where it's headed for and how fast.

All this was very interesting in an academic way; a hobbyist could listen to the milliseconds-long data squitters on 1090 MHz if he had a good enough antenna and receiver – but that was all. Decoding this data was something that took commercial equipment and commercial funding levels. Not for the little guy, in other words.

Enter Kinetic Avionics and their entrepreneurial eye for a potential market! Kinetic already had a history in the avionics business,

notably Distance Measuring Equipment or DME (which is an air and ground based system for defining how far an aircraft is from a given DME ground station), and the company decided that there was a demand for a low cost virtual radar system that could be marketed to small airfields, flight training establishments, ATC training schools and any other body that needs to monitor flight movements, and, somewhat incidentally, the hobbyist. With these markets in mind, Kinetic produced a commercially-targeted product that can decode Mode S and ADS-B data bursts and then display the derived data in a form that closely mimics the radar display and logging devices that the aviation professional may well already be familiar with.

❖ What's in the box?

When the package arrived, the contents were laid out as you see in figure 1. The contents were:

- The SBS-1 receiver
- SBS-1 Basestation software on CD-ROM
- Magnetic mount base and antenna for 1090 MHz
- 3 meters of low loss coaxial cable with terminations for the antenna and the receiver
- USB cable
- Power cube (the SBS-1 can also be powered via the USB connection)
- European and UK connector power cables for the cube
- “Read this First” documentation intended to help you get up and running quickly
- Miscellaneous fliers, advertising materials and brochures for SBS-1 accessories

Notable for its absence is a printed user manual. A PDF format reference manual for the Basestation software is provided on the software CD-ROM. It's a good software reference manual, but I'd say that Kinetic is presupposing a certain level of knowledge of aviation traffic control, radar transponders, waypoints, etc., on the part of the customer and so has not included any detailed information for the absolute beginner.

System requirements are fairly reasonable; although you're not going to be running this setup on a PI-233, you *must* be using Windows 98 or later (for the USB hardware support in the Operating System). Testing suggests that you're best off using a system with a 500MHz Pentium III processor at least, a USB port and a minimum of 256MB of RAM. Fortunately nowadays that level of system can be purchased second hand pretty cheaply if you're presently using a computer that's not already up to those specs.

❖ Putting it together

Assembly is very straightforward. You screw the coax cable connector and antenna element into the magnetic mount base and connect the BNC connector on the other end of the coax to the receiver. Then you plug one end of the USB cable into the receiver (leaving the other end disconnected), the PSU into the receiver and the PSU power lead into the mains. The connectors are unambiguous with only one of each type in the setup; you'd have to try hard to make a mistake putting the hardware together.

Installation of the Basestation software is simple; you can put the application wherever you'd like on your system. Pop the CD-ROM into the drive, tell the installer where you want it, and you're done.

Once the hardware and software are set up, plug the other end of that USB cable into your PC and install the SBS-1 drivers in the fashion appropriate to the particular version of Windows you have. Once done, start the Basestation software, answer two simple questions – connection type (USB or Ethernet between the PC and the SBS-1) and your geographical location, and you should be ready for business.

One caveat at this point is that when starting up for the very first time, the software looks for transponder messages coming from the receiver. It does this for 60 seconds before it times out (if it doesn't see any) and gives you the option of trying again or starting the software without communication with the receiver. What this means is that you need to have the antenna set up in a reasonable location where it's likely to be able to capture these gigahertz radar transponder signals – if you don't, you'll be scratching your head and retrying that software/receiver link for a very long time as the software looks for a data burst and fails to find it!



Figure 1

❖ Once it's all working...

...you'll be presented with a very credible reproduction of an Air Traffic Control (ATC) radar screen (Figure 2). The top left hand screen is the 'radar' screen itself – this shows the aircraft detected in just the same way as the professional's screen does, displaying the aircraft, its hexadecimal ADS-B ID, registration number, flight bearing, flight speed, squawk and altitude. Additional data such as geographic features, waypoints, airports and flight trails (to aid in visualization of flight course) can be selected/deselected by the user.

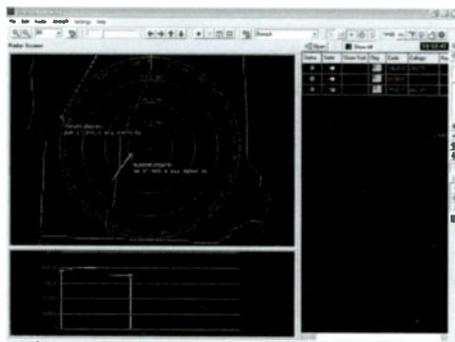


Figure 2

Below the 'radar' screen is a user-selectable window that displays the altitude of all flights being tracked in a graphic, easy-to-understand way.

On the right hand of the screen is the 'Aircraft Details' window. This window (which can be expanded to take up most of the screen, if desired) displays a large amount of user-selectable data on flights currently being tracked.

❖ How well does it work?

It works darn well! It is a very good simulation of what an ATC radar display would show for traffic in your area (Figures 3 and 3a). These two illustrations show two flights that were being tracked – the first one in the "looking-down" radar display, the second is the accompanying display of altitude of the flights over time. Looking at them both, you can clearly see that flight MAS90 is heading SSW and has just begun to descend from 40,000 feet and is presently at almost 38,000 feet. Geographic



Figure 3



Figure 3a

detail is displayed, aviation ground data can be displayed, airport layout can be shown. Flights using ADS-B appear onscreen displaying user-selectable data about themselves, showing exactly where they are going and clearly displaying level, ascending or descending flight.

In practice, I found that reception ranges were largely comparable to those obtained when receiving ACARS data in the 130 MHz region. Using an antenna that was only reasonably well placed (in a window on a steel sheet for a ground plane but with a clear view to the horizon), enabled me to receive aircraft over a hundred miles away. If I had used a mast mounted preamplifier and/or antenna cut to the right frequency (such devices can be purchased from Kinetic) I would have seen hits from further away still.

Flights that are not using ADS-B but Mode S only, cannot be displayed on the radar map because they do not transmit their location. They do, however, transmit their ID, squawk and altitude. This makes Mode S much like a standard ACARS squitter that contains no positional data – you know who you heard and that they're in the area, but not precisely where. These transmissions can be filtered out entirely or can be recorded, but you will only be able to see them in the Aircraft Details window and in the Basestation log files. Not bad at all, even so.

Reliability – I ran this application for a week under Windows XP. No problems, no exceptions, no Blue Screens of Death. I'd say the software can run indefinitely without a problem. (Windows may not do so, but this application can). The only item of note was that the software can pull down 24-25% of a 2.4GHz CPU's available processing power.

Logging – Here's where you can see that the SBS-1 came from a different parentage than most aircraft tracking packages we are familiar with: The software does do a very nice job of logging extensive details of flights heard (both ADS-B and Mode S), but instead of producing a delimited text file or straight (basically) formatted text file or Airmaster formatted log, it builds a card file, so to speak. Each aircraft has its own XML (it's sort of like HTML – both can be used to write web pages) "card" created and all the details of sightings are recorded therein (Figure 4). They're nicely formatted and laid out, but they'd take a lot of massaging to turn them into something that, for example, AirNav Suite could import and use.

Data exchange – At this time the SBS-1 Basestation software does not use DDE to receive or send data to other applications that are running (this is another method of exchanging data commonly used between hobbyist applications).

A few minor observations are –

Registration Data

Mode S (Hex): 4004DF	Registration: G-BHWQ	Country: United Kingdom
Status: Registered	Previous ID: NEW USA	Current Reg Date: 02/03/1992
First Reg Date: 02/03/1992	De-reg Date:	
Manufacturer: BOEING COMPANY	Type: BOEING 787-338	Serial No: 25442
Popular Name: -	Aircraft Class: FIXED-WING LANDPLANE	
Generic Name: 787	Engines:	
Ownership Status: Owned	MTOW: 181436kg	C of A Cat.: TRANSPORT (PASSENGER)
Total Hours: 40481 at 31/12/2001	Year Built: 1982	C of A Expiry: 01/03/2005
Registered Owners:		

UserNotes

Sightings

Callign	Date	Time	On Ground	Lat	Lon	Speed	Altitude	V. Rate	Track
BAW1502	2006/01/14	18:43:10	No	43 128	-72.519	523.7 kts	35,000 ft	-64 ft	39.3
BAW1502	2006/01/11	18:41:53	No	43.031	-72.250	533.2 kts	35,000 ft	0 ft	60.7
1503	2006/01/09	12:29:50	No	44 617	-72.224	401.5 kts	38,025 ft	0 ft	202.1

Figure 4

- The user base and software are somewhat Eurocentric at the moment – Kinetic has mainly been marketing the product in the UK and Europe but hope to expand into the North American market.
- I've been reading the Kinetic online forums; user consensus is that Kinetic listens to them and responds to their needs.
- At present the ratio (in North America) of Mode S to ADS-B equipped aircraft is about 72/25 (it's higher in Europe). In the next few years, as more aircraft are ADS-B equipped, it's anticipated that their numbers will quadruple or better (this translates to many more trackable aircraft appearing on the virtual radar screen!).
- Antenna siting is all-important – if you live on Long Island you'll get by with the antenna sitting on the radiator in the radio room. If you're not living in Aircraft Central (like Long Island), you'll need to get the antenna up on a decent ground plane and outside with as unobstructed a view of the sky as you can in order to maximize the number of flights you can catch.
- Kinetic is working on a shared server system (accessible through the Internet, of course) that SBS-1 users will be able to log into to share data being received on a worldwide scale. If you're in Podunk, Vermont, you'll be able to see what's in the airspace over Baghdad International in real time. This will be a subscription service, unfortunately.

❖ Pros

- A window into a unique part of the aviation/avionics world
- Well written, reliable software with good ergonomics and user display
- Highly configurable by the user
- Excellent visualization tool for what that flight is really doing
- Authors have a reputation for listening to the user and implementing those "got-tahave" features we all love
- A realistic reproduction (within limits) of what the Pros use
- The manufacturer is responsive to enthusiast feedback and requests
- An active user community exists that is busy producing third party add-on utilities for the SBS-1

❖ Cons

- Moderately expensive
- A little heavy on CPU utilization (24% on a 2.4GHz P4 system)
- Does not support DDE links or produce logs in any format usable by other aviation enthusiast programs (at this time)

- A more fail-safe and informative method of making sure that the initial hardware and software setup is successful is needed – the user can be left wondering if things are fully functional or not. Part of this problem can be attributed to the shortcomings of Windows, but developers should work to minimize this gray area of uncertainty.

❖ Conclusion

This is a somewhat pricey, but very unique and informative, tool for the dedicated aviation enthusiast. It can decode, interpret and display far more information on a trackable flight than any ACARS decoder presently on the market and, because of this and the way it displays this data, it is invaluable for getting a really good gut-level feel for flight paths, waypoints, airports and aircraft behavior around them in general. Although its ancestry is rooted in the professional aviation world (as can be seen by the orientation of its feature set and lack of ability to talk to/work with other programs in common hobbyist use), I anticipate that we will see this product become even more hobbyist friendly in the near future and of greater use to us still.

❖ To learn more

The SBS-1 Virtual Radar is distributed worldwide by Martin Lynch & Sons Ltd (Outline House, 73 Guildford Street, Chertsey, Surrey, KT16 9AS; Email: Kinetic@MLandS.co.uk; Tel: 0845 2300 599 or +44 1932 567 333; Fax: 0845 2300 339 or +44 1932 567 222). Their price is £500 or \$759.95 USD. MLS is seeking new international dealers. For a dealer in your area, check <http://www.kineticavionics.co.uk/communicationsdealers.php>

New on the market is also a scanner interface which will tune your scanner to the aircraft at the same time as you're watching the VR display. Interfaces are currently available for the ICOM IC-PCR1000, AOR 8200 and AOR 8600, and more are in development. Check www.SBS-2.co.uk for the latest products and accessories.

MT'S AVIATION CONTEST

Enter and Win the SBS-1!

As you see in our review, the SBS-1 Virtual Radar can be a cost-effective tool or a superlative toy, depending on whether you are a dedicated aero hobbyist or make your living in aviation. If you're into aviation, we have exciting news for you: Kinetic Avionics and their distributor, Martin Lynch & Sons, have donated our review model as a grand prize worth \$800 in a contest open exclusively to MT readers.

To enter the contest, send us a short essay describing how you got started in radio, what radio and computer equipment you operate today, what you enjoy about aviation monitoring, how you plan to use the SBS-1 Virtual Radar and why you think we should award it to you. If your interest is professional, answer the same questions as they apply to your situation. The winner will be chosen on the basis of who has made the best case for why he or she deserves to win!

Send your entry (with your name, address, and daytime phone number) to Monitoring Times' Aviation Contest, 7540 Hwy 64 West, Brasstown, NC 28902, postmarked *no later than May 1st*; or you may email your entry to editor@monitoringtimes.com, subject line MT Contest, by May 1st. (If I receive your email, you will receive an acknowledgement from mtditor@brmemc.net by the next business day.)

The winning entry will be published in the July issue.

Real-time Virtual Radar



Combining state-of-the-art electronics and new technological advances has enabled Kinetic Avionic Products Limited to produce the revolutionary SBS-1.

For the first time aircraft enthusiasts worldwide are able to directly monitor the skies in an unprecedented fashion. Additionally, the SBS-1 provides small and medium sized airfields with many of the safety and operational benefits previously only available to large international airports - at a fraction of current radar costs. Coupled with a Mode-S/ADS-B transponder the SBS-1 becomes an invaluable tool in flight training operations.

New product feature. Radio Interface for the SBS-1.

STOP PRESS... Kinetic Avionic Products Limited (KAPL) has enhanced its award-winning SBS-1 Real-Time Virtual Radar system by adding a new interface mechanism for connectivity to a range of popular radio scanners, thus allowing users to watch aircraft and listen to air traffic in a single consolidated action.

The SBS-1 allows users to track aircraft at ranges of up to 250 miles. Now, with two mouse clicks, an attached radio scanner will be automatically tuned to the frequencies selected. Frequencies can either be entered freehand or associated with waypoints.

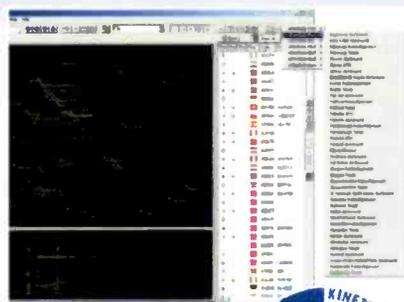
The initial release will ship with interface libraries for the ICOM IC-PCR1000, the AOR 8200 and the AOR 8600. The modular plug-in nature of the interface means that support for additional scanner models can be added easily, and many more interface modules are under development.

There are literally hundreds of aviation frequencies in use in the UK, over many different geographical zones.

Coordinating the joint tracking of an aircraft by both the SBS-1 and a scanner previously required either an encyclopaedic memory or a frantic scrawl through a frequency list - now it just takes a couple of clicks.

RSI Radio Interface for the SBS-1 is available now at an introductory offer of only \$55.

Interface cables are also available for either the Icom or AOR scanner.



The receiver module connects to your PC via USB (1.1 or 2.0). An external magnetic mount and DC power supply are provided for instant operation. The SBS-1 is designed for portable or base use and can be powered directly from the USB port (provided the port can supply up to 330mA). Additional tuned antennas, mounts and extension cables are also available.



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*UK airspace from March 2005 and for all categories of flights in all other airspace from March 2008.

ML&S are appointed distributors for the SBS-1 and associated products.

For full details see our website: www.SBS-1.co.uk

E-mail: Kinetic@SBS-1.co.uk **OVERSEAS DISTRIBUTORS REQUIRED**

SysLabs' RadioControl and FTP Navigator

This month we'll look at two very different programs, RadioControl and FTP Navigator. We'll begin with RadioControl – and, by the way, the missing space between words is intentional on their part.

There are many software products that are capable of controlling receivers and that include an integrated database. This month we'll look at a commercial European (Austrian) program whose roots go way back to 1995. The program is squarely aimed at "scanners and amateur radios equipped with a computer interface." RadioControl will be of interest to both monitors and hams, since it controls receivers as well as transceivers.

RadioControl's stated purpose is "... to create a modular and flexible application to be well prepared for the future." The creators of RadioControl wanted the program to operate with the "feel" of Windows and MS Office so that it would be familiar to lots of users. That was over ten years ago and the program has continued to evolve. Let's take a look at the 2006 RadioControl with all its patches, enhancements and new features.

Supported Radios and Software Choices

Although we only tried three radios with RadioControl, the current list of radios that can be used with RadioControl reads like a *Who's Who* of radio manufacturers. Figure 1 is the list of the currently supported radios as seen on their website.

Go to www.radioctl.com/english/index.html for the latest radio drivers and updates. Drivers for the AOR AR-ONE and Rohde & Schwarz's EB200 Miniport Receiver are also available, but must be purchased separately.

RadioControl version 1.0 from SysLabs comes in four "flavors" – Professional, Standard, Lite, and Trial Edition. All of the following prices are for non-commercial users.

The *Trial Edition* is time limited and also has restricted functionality, but is downloadable free of charge allowing you to get a feel for the program.

The low cost *Lite Edition*, costing \$48, controls only one radio, the Frequency Database is limited to 250 items, and the Memory Files are limited to 50 items. Also, editing of the radio memory banks' description is not possible.

The *Standard Edition* "...allows you to work with RadioControl without any limitations" and comes in at \$120, which is a substantial leap in price. The most important difference with respect to the Lite Edition, beside lifting the limitations described above, is the ability of the software to manage and control multiple radios simultaneously (theoretically up to 65,536 radios).

The *Professional Edition* is not cheap, costing \$252. It includes all the features listed above, plus, for the AR-5000, AR-8200, AR-8600 and AR-ONE radios, it allows the radio's internal (high speed) scanner to be used for all scan and search operations.

The Professional version also has a feature that is intended to make it a "universal platform for radio applications." An interface for "Plug-in" applications is included in this version. In theory, this should enable just about anyone to write a Plug-in, integrated application. One such plug-in is the 4-Devices Monitor, which we will see later.

We'll use the Professional edition. Let's see what \$252 worth of program buys.

What PC?

The *minimum* system requirements for RadioControl are pretty basic by today's standards. All it takes is a Pentium 166 MHz, Windows 95, CD drive, serial port, Internet Explorer 4.0, 640x480 16-color screen, 32 MB of RAM, and 20 MB hard disk space with 15 MB on the Windows' drive. A parallel or free USB port is also required.

I used a PC which almost had the recommended system of a Pentium II 360 MHz, Windows 98SE, 1024x768, 24-bit color depth display, 128 MB of RAM and 40 MB hard disk space, serial port, CD drive and USB

port. This is SysLab's *recommended* system, except they suggest Windows 2000 or higher. All radios tested were controlled via the serial port.

Installation

Since RadioControl has been around for a while, a number of "patches" which fix bugs or improve performance must be installed to bring the program up to date. All are available from the RadioControl website www.radioctl.com/english/index.html. I installed the Professional version from a CD ROM.

For Windows XP users with Windows XP Service Pack 2 installed on your PC, your first installation step is to install a file, `hldr32.exe`. Then install the 18 Megs of files from the supplied CD. It takes less than a minute. After installation the PC needs to be restarted if you are using Windows 98 or older. Then a RadioControl icon will be displayed on the Desktop.

Before we run the program, we need to install RadioControl Service Pack 1 by executing the file `RadioControl-1.0-SP1.exe`. Then install the RadioControl Patch #20040729 by executing the file `RadioControl-1.0-Patch-20040729.exe`.

Finally, install the desired device drivers, import/export filters. When using the Professional Edition, optional plug-ins can be downloaded and installed. All of these files, both the free ones and those requiring purchase, are available from their website.

"Dongle" ?

Clicking the RadioControl icon on the Desktop will result in an error message, in German. The program will not start until the supplied "dongle" is connected. The "dongle" is a small device similar to a USB jump drive or printer cable plug. When ordering the program, the buyer must choose the "dongle" type – either USB or parallel port. Once the patches, radio drivers, and dongle are installed, we're ready to run RadioControl.

Although all this seems complicated it is really quite easy, once you get the operational methodology of the program. A very comprehensive "Help" file is instantly available at any time via the "F1" key.

Supported Radio Devices

Manufacturer	Supported Devices
AOR, Ltd	AR-3000A, AR-5000, AR-5000+3, AR-8000, AR-8200, AR-8200MKII, AR-8200MK3, AR-8600, AR-8600Mark2, AR-ONE ¹⁾
Icom, Inc	IC-PCR100 ²⁾ , IC-PCR1000 ²⁾ , all <i>CLV compatible radios</i> (special support ³⁾ for IC-703, IC-706, IC-706MKII, IC-706MKIIG, IC-746, IC-746PRO, IC-755, IC-756PRO, IC-756PROII, IC-756PROIII, IC-910H, IC-7400, IC-7400, IC-R10, IC-R20, IC-R71, IC-R72, IC-R75, IC-R7000, IC-R7100, IC-R8500, IC-R8000)
Kenwood Corporation	TH-F6A ²⁾ , TH-F7E ²⁾
Rohde & Schwarz	EB200 Miniport Receiver ¹⁾
Vertex Standard Co., Ltd	VR-5000
WINRADIO Communications	all WINRADIO devices except WR-G3xx series, i.e. WR-1000e, WR-1000, WR-1500e, WR-1500, WR-1900e, WR-1900, WR-3000, WR-3100, WR-3100e, WR-3150i-DSP, WR-3500e, WR-3500i-DSP, WR-3700e, WR-3700i-DSP
Yaesu Mosen Co., Ltd	FT-736R, FRG-8600, FRG-9600

¹⁾ This device driver is not part of RadioControl and must be purchased separately

²⁾ This device driver can be downloaded from the [Download Area](#)

³⁾ An updated version of this driver is available for download in the [Download Area](#)

Giving it a Try

Our first choice of radio to try with RadioControl was the ICOM PCR-1000. (Yes, we have heard rumors of a replacement for the PCR-1000 and we have been in contact with Icom America. Although the PCR-1500 is being shown on the Icom Japan website, at this writing there was still no firm date for the USA version's availability.)

Once the drivers for the PCR-100 and PCR-1000 are downloaded from the RadioControl website, they must be installed. This is easily performed using the "Device Configuration" choice on "Extra" dropdown menu. You can see the "Extra" on the top right of the RadioControl Main screen in Figure 2. The Device Driver approach makes changing radio a very simple manner.

Once the Device Driver for your radio is in place, it has to be configured for your computer. This is done using the "Extra" menu on the Command line at the top of Figure 2. Then using the sub-menu, "Device Configure," the control port where the radio is connected to the PC is set. Other parameters can be customized in this menu; for example, the default setting for the radio's bandwidth filters.

To use the radio with RadioControl, we have to open the Frontpanel window by clicking on the respective toolbar symbol and choosing "Open" for the Receiver Frontpanel. The radio's name will appear on the screen and the Figure 2 will result. We are now ready to use RadioControl.

Virtual Front Panel

The top half of Figure 2 displays the program's rendition of an Icom PCR-1000 front panel. All receiver front panels look the same. However, the controls which pertain to the installed radio are "lit" on the display. The non-functional controls are shaded. Some controls may only be enabled under certain circumstances. For example, the noise blanker control is enabled when mode is AM, but disabled when mode is set to FM.

The Front Panel is where the user controls the receiver's functions. Here frequency, step, mode, filter choice, CTCSS, BFO, AGC

and other radio functions can be controlled. Most, but not all, device drivers allow control of all radio functions. All the PCR-1000 functions displayed worked very well.

Basic RadioControl

Clicking on large rotary knob on the top right in Figure 2 changes the radio's frequency. Tuning up or down is achieved using the left and right mouse buttons. In addition, you can use the mouse wheel to tune the radio. Clicking the frequency display in Figure 2 allows manual keyboard entry of a frequency. The radio's S-Meter's reading is shown below the frequency, both graphically as a bar graph and as number, in "S" and decibel units, respectively.

How Does It Work?

I'm sure you're asking this and other such questions as how faithful to the actual radio are the displays, and did we find any software, radio or system glitches? Next time we'll try out the unique and useful features of RadioControl, such as frequency searching methods, a very nice database with lots of applications, and the Four-Device option which allows control of up to four radios...very sharp. Also, we'll use the ICOM universal driver for other ICOM radios, a receiver and a transceiver, and see how they work. Answers to these questions and more next month.

❖ FTP NOT HTTP

For those of us who spend hours on the Internet looking for radio or other programs to download, I found a program that does a great job with FTP servers.

What's an FTP server? Well, let's just say that most direct downloads from the Internet are from HTTP servers. Take a

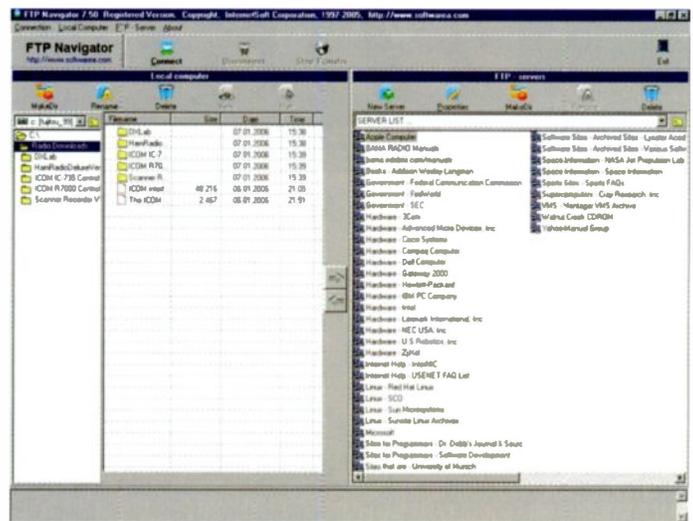


Figure 3

by any browser at <http://bama.sbc.edu/>.

Enter FTP Navigator

This is a really great program that needs little to no explanation. Download it and install it. When you run FTP Navigator from the resulting icon on your desktop Figure 3 results. Using it is simple.

The right side is the FTP side. Using the "New Server" icon, enter the name and address of an FTP server that you are trying to access. If it is a valid FTP site, it will appear in the list on the right of Figure 3. Here you can see a list of many other FTP servers. Just click on the site of interest and you're in!

The left side of the screen shows where you can store the download. Here I have chosen a directory on the "C:" drive, appropriately named Radio Downloads. The program does a lot more, but now you've got the basics. A User's Guide is available from the website.

FTP Navigator version 7.50 works great. What more can I say? You can download a trial version of FTP Navigator for free at www.software.com. It's fully functional, but will only work for (I think) 30 days. For only \$20 you can download the unlock key and then it's all yours!

Till next time, when we'll finish RadioControl, get out and enjoy the spring weather.

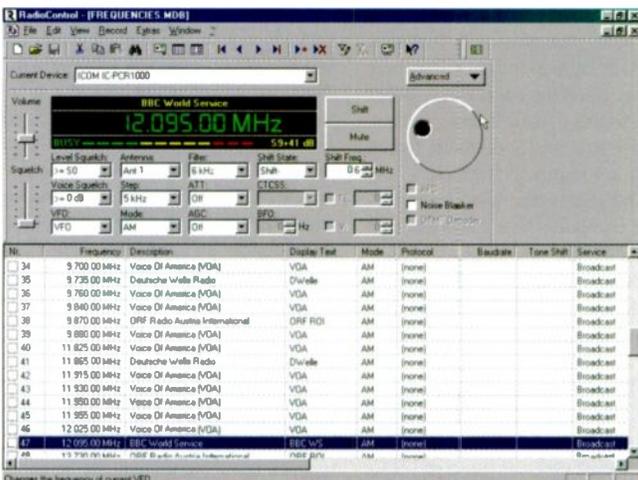


Figure 2: RadioControl's main screen displaying the Icom PCR-1000 front panel.

look at the address line on your Internet browser. See the "http://www"? Your browser, as mine does, may need a special program to download from an FTP. Internet Explorer users for sure need this program. A specialized FTP program can make downloading faster and easier for almost any browser.

I needed an FTP program to download files from BAMA, the Boat Anchor Manual Archive server. This is a repository of many, many radio and electronic equipment manuals, all on their FTP server. However, their Homepage is readable

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What's NEW

Tell them you saw it in *Monitoring Times*

Icom IC-PCR1500

Icom is developing a new computer-hosted wideband set, to be sold in two versions. The **IC-PCR1500** is a "black box" that operates when connected to a computer. The **IC-R1500** is the same black box, but this version includes a control head with an LCD display that will allow operation without being connected to a personal computer.

Coverage is reported to be from 10 kHz (all modes) up to 3299.99 MHz in the AM, FM and WFM modes; CW and SSB modes up to 1300 MHz. Watch Dave Zantow's Radio Receiver Page www.ticon.net/~n9ewo and *Monitoring Times* for new developments.

Grove Flex-Tenna

In this month's "On the Bench" column on page 66, Bob Grove takes us along as he conducts an antenna experiment – an experiment which resulted in the Grove Flex-Tenna™. But, if you don't want to build it yourself, you can buy one ready made.

Flex-Tenna™ is conveniently rolled up for easy transport and is an ideal monitoring antenna for camping, motels, emergency deployment, and fixed installations. Its clear vinyl-protected wire elements allow the Flex-Tenna™ to be casually hung from a tree branch or under the roofline outdoors, across ceiling molding, upper window casing, doorway, or attic roof truss indoors. No ground or radials are required. An F connector is provided for attachment to coaxial cable.



The 24-foot Model HVU Flex-Tenna™ is designed to provide continuous 10 kHz-2500 MHz reception on shortwave receivers, wide-frequency-coverage receivers and scanners with only one antenna connector (\$14.95+s/h). The 48-inch Model VU Flex-Tenna™ is designed to provide continuous 25-2500 MHz reception on scanners (\$9.95+s/h). Grove Enterprises, 7540 Hwy 64 West, Brasstown, NC 28902; 800-438-8155; www.grove-ent.com

World Radio TV Handbook 2006

World Radio TV Handbook (WRTH) 2006 celebrates with its 60th Anniversary edition! WRTH remains the world's best-selling and most comprehensive directory to guide the listener through medium wave, long-wave, FM and shortwave.

This year's special edition begins with a couple of interesting features: "A Brief History of WRTH" from WWII and into the future, and hobbyist Jerry Berg's personal nostalgic journey of "50 Years DXing." An overview of receiver history and technology and "60 Years of Technology" will remind you how far the hobby has progressed during the 60 years of WRTH.

To celebrate the 60th anniversary, four respected figures in the world of broadcasting delve into "The Future of Radio." "Digital Radio Update" examines the happenings in the world of digital radio, followed by the annual focus on "HF Broadcasting Reception Conditions Expected for 2006" and the most suitable frequencies for the year.

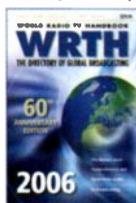
The National and International radio sections, as in past editions, appear to be as accurate as the respected and dedicated worldwide contributing staff can make it. Information on seasonal frequency adjustments may be viewed at www.wrth.com. This online method of updating information between issues has proven successful for most listeners.

For the medium wave hobbyist, "MW by Region" is a by-frequency aid for station identification. The excellent "SW Stations of the World," "TV by Country," and extensive reference sections will guide you through your listening and viewing sessions.

World Radio TV Handbook 2006 remains the authoritative source for every serious listener – one that should be present at every listening post. Congratulations to Publisher Nicholas Hardyman and his dedicated staff on a job well done on the 60th Anniversary Edition.

WRTH 2006 (BOK-03-06) is available from Grove Enterprises www.grove-ent.com for \$26.95 plus S/H, or call 1-800-438-8155

– Gayle Van Horn



Klingenfuss SW References

If you are interested in monitoring the shortwave radio spectrum, there are two new publications you should consider purchasing that will enhance your enjoyment of monitoring the world of radio below 30 MHz. Now in his 37th year of publishing, Joerg Klingenfuss has recently released his 2006 editions of the *Klingenfuss Shortwave Frequency Guide* and *Super Frequency List on CD*. These two products are the only HF (9 kHz to 30 MHz) radio guides in the radio hobby to include both broadcast and utility stations in one printed edition or CD-ROM.

Digging inside the 2006 *Shortwave Frequency Guide*, after getting past the traditional introductory material in most Klingenfuss publications, the first section of the book is a by-frequency listing of Utility (nonbroadcast) frequency assignments and stations. There are over 10,000 voice and digital entries in this portion of the book. The basic listings in this section give the call sign/ALE addresses, station location/country, and basic mode (digital, CW, SSB, etc) being transmitted. In the detail column, you will find amplifying information on the particular digital mode (ALE, SITOR, etc), if applicable for that particular entry.

We should point out (as we do every year) that you will **not** find listings for tactical military, numbers stations, amateur radio, and other transmissions of an unknown nature. Nor will you find a detailed list of civilian aeronautical stations.

The shortwave broadcast portion of the book has a section that introduces the worldwide broadcast scene and the future of DRM (Digital Radio Mondiale), including a separate by-hour list of DRM broadcast activity.

The bulk of the broadcast portion of the book is a by-frequency list of shortwave broadcasters that includes start and end times in UTC, transmitter locations, target areas and language used during the broadcast. A remarks field further assists

the listener in identifying the station broadcasting on that frequency and time. Finally, if you want to focus on a particular country, there is an easy to use by-country list at the end of this section.

Frequency information (including parallel frequencies) appears to be accurate, even accounting for seasonal frequency adjustments. Like other radio hobby publications, these two Klingenfuss guides use a staff of contributors from all over the world that provide the latest in information on the broadcast and utility radio stations.

If you are of a more modern bent, the *Super Frequency List on CD* provides the same frequency information as the *SW Frequency Guide* in a database format. If you use a computer in your listening post, this is an extremely useful reference to have running while tuning the HF radio spectrum. We were particularly impressed with its ease of use, and its search and sort capability. Given the bright future of e-book publishing, it is nice to see Klingenfuss support both print and electronic formats for some of his more popular publications.

The *Klingenfuss Shortwave Frequency Guide* and *Super Frequency List on CD* are two of our favorite annual reference publications that we use in our radio listening post. Regardless of what portion of the HF radio spectrum you prowl, these two publications will provide a lot of listening information at your fingertips. Either or both deserve a place next to your radio.

The 2006 *Super Frequency List on CD* (STF26-06) is available from Grove Enterprises (www.grove-ent.com) for \$25.95 plus S/H at 1-800-438-8155 (7540 Highway 64 West, Brasstown, NC 28902). You can order the 2006 *Shortwave Frequency Guide* (#2772) from Universal Radio (www.universal-radio.com) for \$34.95 plus S/H at 1-800-431-3939 (6830 Americana Pkwy., Reynoldsburg, OH 43068-4113).

– Larry and Gayle Van Horn

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- _ Dimensions: 13"W x 7-1/2"H x 2-1/2"D
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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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