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

25th Anniversary

Monitoring Times

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Monitoring the UFOs

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- NY/NJ's Big Three Airports
- Radio Propagation Outlook Spring-Summer 2007
- An interview with Harry Helms
- MT Reviews the All-Purpose, All-Band, Kaito 1103

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AR-ALPHA

Communications Receiver

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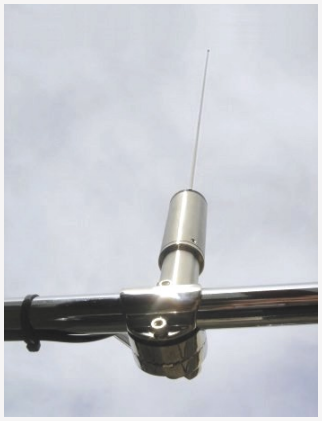

WR-AX-81S
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WR-AX-37E
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Monitoring Times

Vol. 26 No. 4 April 2007

Lead Story

The NY/NJ Big Three Airports

By Jean Baker Hubbard

Anyone who travels will, sooner or later, find himself in one of the "Big Three" airports in the New York/New Jersey neighborhood. This month's lead feature goes beyond the frequencies to monitor these major hubs, to details on the runway system at each airport, what airlines are served, infrastructure, and more.

So, if you're ready, turn to page 8 and let's take a look at JFK International Airport, Newark's Liberty International, and LaGuardia Airport, and see what makes them tick.

On the Cover

This UFO is no figment of our imagination. It's the Navy's newest satellite series supporting global communications – the Ultra High Frequency Follow-On Program. See the *Milcom* column on page 52 for full details.

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Reviews

The KA1103 is small, easy to use, feature packed, tunes SSB, and even charges its own batteries. It's a great first radio for anyone interested in getting started in shortwave and amateur radio monitoring, says reviewer Ken Reitz (page 68).

When David Zantow had a noise problem, he thought it was time to give the MFJ 1026 Noise Canceling Signal Enhancer a try. Even though this accessory has been reviewed before in MT, this is a real-world battle against real-world interference. Is it a miracle cure for noise? Check out page 66.

Multipsk, reviewed this month in Computers & Radio, decodes 91 different modes and sub-modes of digital signals. That should keep you busy for a while! And it's free! (See page 70.)

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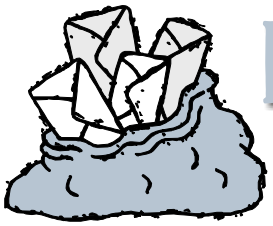


LETTERS TO THE EDITOR

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

Happy monitoring!

- Rachel Baughn, KE4OPD, Editor

Low, but not that low!

First, a correction to the archival "Radio in Labrador" article in the February issue of *Monitoring Times*.

"You did an excellent job of editing the original two-part article into one, and I really enjoyed reading it. In the section titled 'Northern Lights Galore,' some readers might wonder about the frequency of our radiobeacon, because the article erroneously states that it was 'in the 2 kHz band.' It should have read 'in the 200 kHz band.' As a matter of fact, I remember that our big beacon transmitter at Knob Lake airport was on a frequency of 203 kHz, with Morse ident KL.

"Congratulations to you, Bob and the crew on 25 years of publishing *MT*. As they say in some circles, 'You've come a long way, Baby!'"

– Bert Huneault

Future of Shortwave?

"There is something that I have wanted to know for a long time, but I still can't find a good and, especially, realistic answer. I imagine there must be an enormous number of keen shortwave listeners around the world, who would also like to know the same thing...

"The difficult question is, how much longer can we 'reliably' expect shortwave broadcasting (in AM or SSB) to continue to be used as a cheap means of long distance communication, particularly with the increasing use of satellites and the internet? ...

"... I am toying with the idea of purchasing the Sangean ATS-818ACS shortwave receiver ... Do you think it would be worth investing a relatively small amount ($185) by purchasing the Sangean receiver, given the fact that shortwave is gradually being used less and less, in favour of satellites and the internet, etc? Unfortunately, satellite radio is not yet available in South America and there is as yet no indication as to when this radio service might become available in S.A..."

– Ian Moir

"Regarding the future of shortwave: In spite of the substantial progress made in other wireless communications modes, including satellites, they still have shortcomings and vulnerabilities, as notably displayed a couple of weeks ago when the Chinese shot one down!

"Even though the shortwave bands are currently suffering the minimum of the 11 year sunspot cycle, they always recover, and in a couple of years we'll see remarkable improvement – we always do.

"Worldwide interests have a substantial investment in HF facilities, and they continue to provide reliable backup. I suspect we will see shortwave active for the indefinite future, and that you are safe to get that Sangean!"

– Bob Grove

For more SW discussion, (1) see Harold Cones' response to the same type of question in *Letters* in the February issue, (2) see Harry Helms' opinion of the future of shortwave in this month's feature section, and (3) note this month's feature article which forecasts better than usual shortwave propagation coming soon!

Glad I Read it in *MT*

"In the January *MT* was a short article about the new 2007 *Passport to World Band Radio*. So, I'd like to share with you my 'happy accident' with *Passport*.

"At the end of each year, along with resubscribing to *MT*, I also order the *World Radio TV Handbook*. I have found *WRTH* to be a very thorough and useful reference source. However, this year, I ordered *Passport* by mistake.

"What a good mistake this was! In recent years, my interest in SWLing has waned, except for the stations from China, Taiwan, and the lady from Cuba (!Atencion!). Thanks to *Passport*, my interest in world band radio has been rekindled. HF is certainly not dead; there's a whole wide world out there just waiting to be tuned in."

– Bill Seamans KE5AAF

"Without computer/internet, radio *Monitoring Times* has become a true-blue blessing in disguise! (Read on.)

"At Joe Cuhaj's suggestion (page 8 of the September 2006 edition, *Around the World in 48 Hours*) I dashed to near-by Radio Shack, having in stock their close-out stock #278-1374 SW Listening Antenna. *Voila!* Suddenly my Grundig S350 is alive with SW reception. Thank you Joe and *MT* for saving me big $$$; I always was of the mind I truly needed the BIG buck models to faithfully listen to various SW freqs!

"Onward to page 36; during the WWII era, flying over said Balkan countries ... Thanks to new editor Fred Waterer for his writing efforts, 'A Trip to the Balknas,' now I know the details. Thank you, Fred, and *MT*.

"Onward to page 63: over many years I've wondered things like, what were Hertz and Marconi's first names? Why not just consult *MT's 'Radio Riddles'* – Heinrick and Guglielmo. Etc, etc ..."

– Edward Kranch, retired (at 81+) business jet pilot

"Hey, Skip. I thought you might like to know that your January '07 column was, quite literally, an inspiration.

"One of my first rigs (circa 1993) was an IC-730. I bought it right after a move to a new city where the first two QTHs were an apartment and a condo. QRP (so I didn't cause our cordless phone or the neighbors' to ring when I transmitted) with a Slinky in the attic just didn't work well, so I gave the rig to my Dad, who eventually traded it 'up' for something else.

"I honestly hadn't given it any thought since, until reading your 'Something Old ..' column. That prompted me to remember how quiet the receiver was, and gave me much more information about the radio than I ever had when I owned one!

"Being currently 'between HF rigs,' I scooped one up on eBay. I haven't had time to play yet, but am really looking forward to it ... and it's all thanks to you!"

– Dave White W4UVH

More Parts Suppliers

"Your [*Beginners Corner*] article about where to buy electronics parts is very good (*Monitoring Times*, Oct., pp. 30-31). I have open credit at Mouser and Digi-Key among other companies. But let me mention Kelvin. It's a peculiar company, extending credit only to schools, and tough to deal with on the phone. They treat my company check as a personal check and hold the merchandise two weeks for the check to clear.

"Yet, I like what they send. Their prices are low and quality is good. For example, I ordered 100 20-k controls ('potentiometers') at 85 cents plus $7 shipping. These were comparable in quality to controls sold elsewhere for up to $7.50. Those controls have short shafts, meaning you don't need to take a hacksaw to make the shafts shorter, and they come with two washers. Using two washers, instead of one, makes for smoother operation of the control. I also ordered LEDs, knobs and other components, all of which were satisfactory.

"Visit **www.kelvin.com** or Kelvin, 280 Adams Blvd., Farmingdale NY 11735-6615; 1-800-535-8469."

– Bruce F. Elving, FM Atlas Publishing and Electronics, PO Box 336, Esko MN 55733-0336.

MT Reader John Comstock's impressive radio shack in Guthrie, OK

It's so easy a caveman could understand it!

By Larry Van Horn, N5FPW
MT Assistant Editor

I'm not sure what cave the politicians and managers of some of this nation's public safety radio systems have just crawled out of, but let me make this as plain as I can – "Please spend your taxpayers money on communications wisely: purchase radio systems that are P25 compatible."

Shortly after Hurricane Katrina hit the Louisiana/Mississippi Gulf Coast, I wrote an editorial in *Monitoring Times* magazine critical of public safety radio system interoperability in that part of the Gulf Coast region. New Orleans, Slidell, and Biloxi/Gulfport/Harrison County were all using the M/A-COM ProVoice EDACS trunk systems, and it was only a matter of time before this choice was going to cause major problems in a crisis. And that is exactly what happened during Hurricane Katrina.

First, let me make this perfectly clear. I am not against M/A-COM or their public safety trunk systems *per se*. But I am deeply concerned about agencies using non-standard digital protocols such as Open Sky and ProVoice. If a public safety agency wants to use an M/A-COM trunk system or radio, that's fine. Just don't use a proprietary digital protocol on that system.

The M/A-COM Provoice digital standard that the Gulf Coast agencies were using was not compatible with the APCO (Association of Public-safety Communications Officials) Project 25 standard which the Federal Emergency Management Agency (FEMA), all of the Department of Defense, most U.S. federal government agencies, the State of Louisiana, and other parish public safety agencies in the Katrina disaster area were using. When the EDACS ProVoice trunk system failed in New Orleans, it caused major problems for the first responders in that city. They had to resort to 800 MHz mutual aid simplex channels and 800 MHz car-to-car relays of emergency radio traffic in order to respond to calls during the crisis.

New Orleans, Slidell, and the various public safety agencies in Harrison County, Mississippi, were all members of my P25 Hall of Shame List (shame on them for using a system which is NOT interoperable). Those editorials are all on our *Monitoring Times* home page at **www.monitoringtimes.com**.

❖ Lessons Learned - and one Dunce

Incorporating lessons learned in the chaotic aftermath of the September 11 terrorist attacks and Hurricane Katrina, law enforcement agencies in Orleans, Jefferson, St. Bernard and Plaquemines parishes can now communicate with each other using one radio system. On February 5, 2007, the parishes mentioned above brought online a shared 700-megahertz P25 digital radio system paid for with federal disaster funds and grant money from the U.S. Department of Homeland Security.

You can read the complete *Times Picayune* story on this event online at:
www.nola.com/news/t-p/metro/index.ssf?/base/news-19/116962458198400.xml&coll=1

There were a lot of lessons learned in the aftermath of the Katrina disaster. But this is one that every public safety agency in this country using a non-P25 digital standard should read and heed. From the *Picayune* article: ***"The coordinated system also means that if out-of-state first responders come in as they did after Katrina to aid the locals, they'll be able to communicate as well with a bit of reprogramming of their own equipment."*** That just can't happen when you are trying to use your P25 digital radio on a non-standard proprietary system.

Unfortunately, there is still one major problem on the Gulf Coast. Harrison County, Mississippi (including Biloxi and Gulfport) continue to use their ProVoice system, even though almost all of their neighbors and a new statewide trunk system being built will be P25 compatible. This is exactly the same scenario that caused major problems in New Orleans. Hancock County, the county just west of Harrison on the Louisiana border, has now installed a new P25 trunk system. Jackson County, the other Gulf Coast county just east of Harrison, is using a mixed mode (analog/P25) trunk system.

Hey, Harrison County, it's so easy a caveman could understand it – dump the proprietary digital protocol. As a taxpayer, I do not want the federal government to sink one more dime of federal money into that county until their public safety system is 100% interoperable with the rest of the world.

In Jackson, the state capital of Mississippi, the original plan was to upgrade to a ProVoice digital system by M/A-Com. But that was scrapped after issues were raised by the Hinds County E-911 Commission regarding legal concerns (the ghost of Katrina). Plans have now been made to switch Jackson over to the Hinds County Motorola mixed mode system. This will enable true interoperability between Jackson and the surrounding area. At least someone in Mississippi is using some common sense. Are you listening, Harrison County?

There is a new Mississippi statewide trunk radio system being built, known as MWIN (Mississippi Wireless Interoperable Network). This new system will be a Motorola P25 700 MHz trunk radio system. It will be used by all of the state of Mississippi public safety agencies, with county and municipality subscription possible. MWIN will be tied in to the Mississippi Emergency Management Agency (MEMA) and the state Fish and Wildlife satellite radio nets for interoperability. As far as this new statewide system goes, Harrison County will be on the outside looking in.

❖ What are they thinking?!

But Harrison County, Mississippi, is only a small drop in the non-interop bucket. Another shocker can be found just two states east of Mississippi in Florida. The issue here isn't just a county issue; it involves their new statewide law enforcement trunk radio system known as SLERS. This system was bought, installed, and operated by the state of Florida. And the shocking part of this is that they are using the same trunk radio system that New Orleans just scrapped that caused all the problems during Katrina – a M/A-COM ProVoice trunk system.

Imagine a hurricane hitting Florida and the state law enforcement agencies not being able to talk to any of the feds responding to the disaster unless they give them radios for use on their non-interoperable radio system. Same applies to all the county and municipal agencies who aren't on this system, which is 99% of them. There need to be some serious questions asked about public safety by the taxpayers of Florida and the media before the next category five hurricane takes aim at the Florida Gulf or Atlantic coastlines.

Incredibly, Florida is not alone in this stupidity. There are reports of new non-P25 statewide systems being proposed or built in California, New York, and Pennsylvania! So, to all the taxpayers and politicians in these states I have just one thing to say: Make the decision to install an interoperable P25 system or forget it. "It's so easy a caveman could understand it!"

COMMUNICATIONS

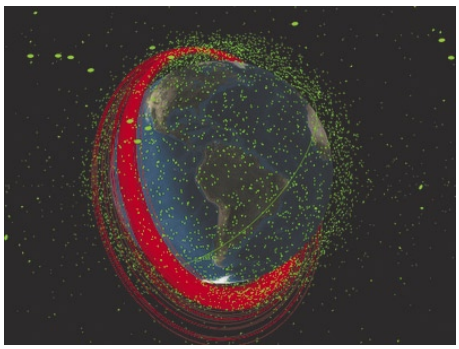
Communications is compiled by editor Rachel Baughn KE4OPD from news submitted by our readers. Thanks to this month's contributors: Anonymous, Mike Cooper, Bob Fraser, Alokesh Gupta, Norman Hill, George Hrycelak, Ken Maltz, Gregory Smith, Robert Thomas II, Larry Van Horn, Ed Yeary.

Satellite Blown into Smithereens

The worst fears of space analysts have been realized. On January 11, the Chinese successfully launched an anti-satellite missile which rammed and destroyed one of their old sun-synchronous orbit weather satellites – Fengyun 1C. The concern is two-fold: The successful test of an anti-satellite missile is an immediate threat to anything in low earth orbit (900 km and below). Equally significant, the impact left in its wake the second-largest debris field in history, posing a threat to more than 125 satellites in sun-synchronous polar orbit – a vital area of space. (For more on this story, see our Milcom blog at **http://mt-milcom.blogspot.com**)

Contrary to one report (stemming from an incorrect translation of a Russian statement), the International Space Station was not threatened by the debris.

For decades, space experts have worried that a speeding bit of orbital debris might one day smash a large spacecraft into hundreds of pieces and start a chain reaction – a slow cascade of collisions that could expand for centuries, spreading chaos through the heavens. There has already been one collision in this portion of orbital space; in January 2005 two pieces of orbiting debris collided, splitting off a third fragment. With the sudden addition of now more that 700 objects, the potential of such a chain reaction has moved substantially closer. There are currently a total of 10,879 objects in orbit being tracked by NORAD: 3,162 of those are satellite payloads.



View of LEO Satellites (green) and Debris Ring (red) from Chinese ASAT Test. (Graphic courtesy of Dr. T.S. Kelso and the Celestrak website, www.celestrak.com/events/asat.asp)

In late-breaking news, on February 19 a derelict rocket booster suddenly ruptured into more than 1,000 pieces. It is not yet known if the fragments will prove a threat, but they have added substantially to the increasingly dangerous debris field.

Space Control Center Moves

The Space Control Center (AFSPC) is transferring its operations from Cheyenne Mountain Air Force Station in Colorado, to the Joint Space Operations Center at Vandenberg Air Force Base, Calif. Although Cheyenne Mountain is headquarters for the North American Aerospace Defense Command (NORAD), the SCC is not part of the Cheyenne Mountain Operations Center, but is operated by the 1st Space Control Squadron and 14th Air Force.

AFSPC Commander Gen. Kevin P. Chilton said, "We need to progress from cataloging what is up there to being able to tell the capabilities and owner's intentions of any new object put into space." Approximately 140 people will move to Vandenberg AFB, including military members, civil servants and contractors, from January through July 2007.

Cycle 24 - Boon or Bane?

The same difficulty of pulling a readable signal out of the static that excites a DXer looking for a challenge is anathema to a listener who is interested in the content of that message. Likewise, the anticipation of potential record-breaking solar activity during the peak of Solar Cycle 24 that has DXers chomping at the bit (see this month's feature), has scientists and engineers working overtime to protect technological infrastructure from potential damage.

The next cycle is expected to peak around 2010 with solar flares and Coronal Mass Ejections (CME) that could affect telecommunications, power grids, navigational systems – indeed, anything which depends upon satellites, which is most modern technology. Geomagnetic storms even speed corrosion in oil pipelines and befuddle sensors that monitor a pipeline's oil flow in the far North.

With sufficient warning, there are some protective measures that can be taken to minimize damage to sensitive satellite instruments, so scientists are racing to increase their understanding of how CMEs are formed, how to predict when and where they will impact the Earth, and how to gauge how damaging the effect may be.

One ambitious project is already underway. In October 2006 the STEREO mission took off with the launch of two satellites aboard the same rocket. They circled the moon and then headed off in opposite directions to begin a series of stereoscopic observations of the sun. By April they'll be far enough apart to provide solar scientists with 3-D images of the sun. All of the prime science for STEREO data will be collected within the first 150 days. There is funding to support the mission for two years, by which time the spacecraft will be separated by almost 90 degrees.

Another multisatellite project, called THEMIS, plans to study the resulting geomagnetic storms in Earth's magnetosphere. Launched February 17, a Delta II rocket will carry an unprecedented payload of five small satellites into orbit. The satellites will fly inside the Earth's magnetic field to study the northern lights and sudden eruptions of cosmic energy known as substorms which can imperil astronauts, short-circuit the nation's power grids and disrupt global communications.

Each satellite must line up precisely – like a strand of beads – so instruments aboard each one can locate and probe every substorm for a period of about two years. Two satellites, plus a spare, will be orbiting the Earth about 20,000 miles up; another will fly at an altitude of 40,000 miles; and the last will orbit at 120,000 miles.

On the ground are 20 ground-based observatories scattered across Alaska and five Canadian provinces. From those locations, all-sky cameras will observe the vivid color changes in the aurora when substorms strike, while magnetometers at each observatory record the changes in the Earth's magnetic field.

To gather data closer to earth, NASA has fired up to ten suborbital sounding rockets into auroral displays from the Poker Flat Research Range north of Fairbanks, Alaska. To test the winds created by an aurora, each rocket released puffs of a harmless substance that glows when exposed to oxygen.

Globalstar Satellite Problems

The American Radio Relay League recently distributed a warning that "Our served agencies are increasingly relying on satellite phones for back up communications and some think it has lessened the need for HF and the other services provided by amateur radio. You should refer your emergency management contacts to a recent SEC filing made by Globalstar. The performance of the S-band power amplifiers in the company's satellites is degrading, likely to due radiation exposure. ... there is apparently a significant chance that the new satellites won't be up in time and that sometime in 2008 substantially all of the Company's currently in-orbit satellites will cease to be able to support two-way communications services!"

Hubble Loses its Workhorse Camera

The Hubble Space Telescope has lost its most popular camera – the one that shot pictures from the early days of the universe – probably for good. Already operating on a back-up electrical system, the back-up blew a fuse in early February. Although two-thirds of the Hubble's scheduled projects made use of the Advanced Camera for Surveys (which had served most of its 5-year design life), Hubble will continue observations with its remaining instruments. The next Hubble servicing mission is scheduled for September 2008, but the five days of spacewalks for that mission are already filled with other critical maintenance.

Kaito KA-1103

NEW! Dual Conversion, Digital Entry, AM/FM-stereo/mono, Shortwave Radio with SSB

Kaito's latest entry into the multiband portable market may look like an analog-dial radio, but it's actually a precision PLL circuit with 1 kHz steps and digital LCD readout! It tunes 76-108 MHz FM and also continuous 522-29900 kHz AM and shortwave—and it has infinite clarifying SSB as well!

This powerful, dual-conversion portable also has 190 memory channels (10 pages of 19 + 1 page for SSB) to store your favorite stations, and runs off 4 Ni-MH AA rechargeable batteries (included) and AC; an automatic charger/adaptor is provided.

Just look at these additional specifications:

- 268 memory presets (Dynamic memory on 19 Pages) with autoscan
- Beeper, radio and sleep clock/alarm
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RX-340

RX-320D

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RX-320D

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TEN-TEC

New York/New Jersey's Big Three Airports

By Jean Baker Hubbard

Did you ever spend some time in a large airport and think to yourself, "Wow, I wonder how many airlines they have here?!" Or perhaps, if you're a dyed-in-the-wool aero comms fan who lives near an airport, you wished you knew the tower and ground frequencies so you could monitor the air traffic.

Well, folks, you're in luck, because here is a feature that will look at the three major airports in the New York/New Jersey neighborhood and will supply all of the interesting information that's hinted at above and more. So if you're ready, let's take a look at JFK International Airport, Newark's Liberty International, and LaGuardia Airport, and see what makes them tick!

JFK INTERNATIONAL

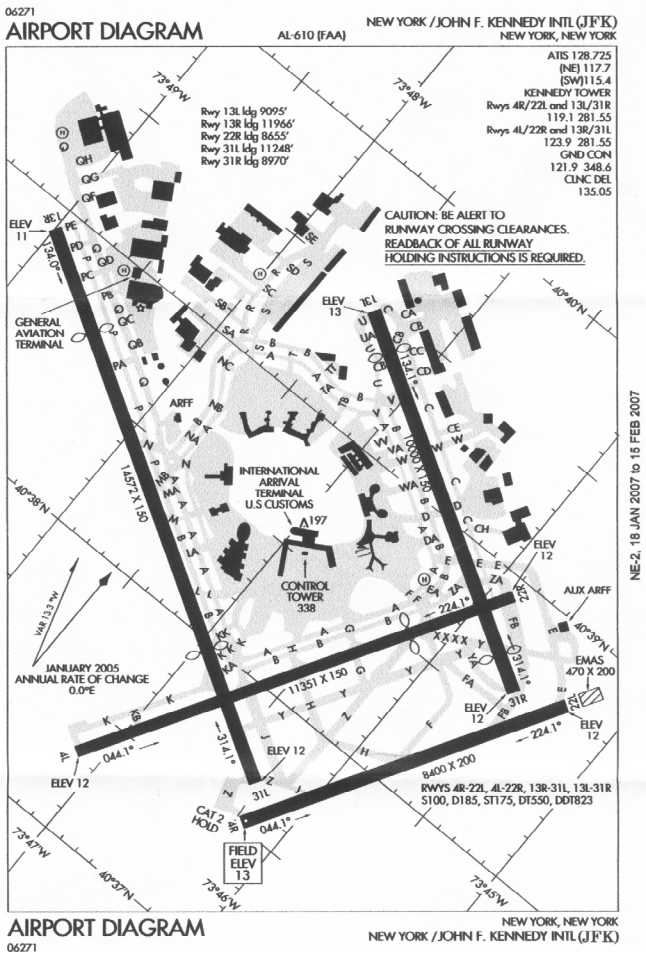
First on our list is New York's John F. Kennedy International Airport, or JFK International, as it is commonly known. This huge facility is operated by The Port Authority of New York and New Jersey and is located in the Queens County on Jamaica Bay; latitude/longitude is 40 38, 28.5 north, 73 46 41.9 west. Originally named Idlewild Airport, it was formally dedicated as New York International Airport on July 31, 1948, and rededicated on December 24, 1963, as John F. Kennedy International Airport. Over 35,000 people are employed at this facility.

The Central Terminal Area (CTA) consists of nine airline passenger terminals numbered 1 to 9, surrounded by a dual ring of peripheral taxiways. (Terminal 5 is temporarily closed; it was formerly occupied by Trans World Airlines.) Initially 655 acres, the CTA was enlarged to 880 acres by relocation of the taxiways to provide space needed for expansion of the passenger terminals.

The Air Traffic Control Tower stands out proudly at 321 feet in height. It was constructed on the ramp side of Terminal 4, and began full Federal Aviation Administration (FAA) operations in October of 1994. The cab and an Airport Surface Detection Equipment (ASDE) radar unit sit atop 1,620 yards of cast-in-place concrete. The control tower provides improved observation of aeronautical areas and includes state-of-the-art electronic equipment to safely and efficiently accommodate air traffic operations.

Airlines Servicing JFK International

Aer Lingus
Aeroflot
Aerolineas Argentinas
Aero Mexico
AeroSvit Ukrainian Airlines
Air Canada
Air China
Air France
Air India
Air Jamaica
Air Tahiti Nui
AirPlus Comet
Alitalia
Allegro (Seasonal)
American
American Eagle
ANA (All Nippon)
Asiana
Austrian Airlines
Avianca
Azteca
Birman Bangladesh
British Airways
BWIA
Cathay Pacific
China Airlines
China Eastern
Comair
Constellation
Continental
Corsair (seasonal)
Copa Air
Czech Airlines
Delta
Delta Connection
Egyptair
El Al
Emirates
EOS
Etihad
Eurofly
Finnair
Harmony
Iberia
Icelandair
Israir
Japan Airlines
JetBlue
KLM
Korean Air
Kuwait Airways
Lacsa
Lan Chile
Lan Ecuador
Lan Peru
LOT
LTU
Lufthansa
Malev Hungarian
MAX Jet
Miami Air (charter)
North American
Northwest
Olympic
Pakistan International Airlines
Qantas
Royal Air Maroc
Royal Jordanian
Saudi Arabian Airlines
Singapore Airlines
South African Airways
SN Brussels Airlines
Swiss International Airlines
TACA International
TAM
Thai Airways International
Travel Spain
Turkish
United Airlines
US Airways
USA 3000
Uzbekistan
VARIG
Virgin Atlantic



Air Cargo Center

Did you know that airlines such as UPS and FedEx who only fly cargo are known as "box haulers?" JFK's Air Cargo Center consists of cargo handling and service buildings, including Vetport (an animal care facility), and a U.S. Post Office Airport Mail facility.

The various airlines who handle cargo at JFK include the following:

Japan Airlines: One of the most advanced cargo facilities at JFK, JAL's 260,000 square-foot $110 million facility is part of the revitalized Hangar 14 complex, which also houses the Port Authority Administrative offices.

Nippon Cargo Airlines Facility: This building consists of 175,000 square feet; NCA's new cargo terminal cost approximately $40 million to build and can accommodate two 747 freighters!

AMB Cargo Center: Opened in June 1992, this 225,000 square foot center provides storage and clearance services. U.S. Customs Service has consolidated all of its JFK office operations into approximately 110,000 square feet of the facility.

Air Express International/Danzas completed its 90,000 square foot building in October 1996.

Northwest Airlines moved into its 90,000 square foot cargo facility in 1999.

Korean Air started operation of its brand new, state-of-the art $105 million, 220,000 square foot cargo facility in October 2000.

Continental Airlines opened its new $20 million, 60,000 square foot cargo facility in May of 2002.

United Airlines opened its 98,500 square foot Cargo Transfer Center in November 1997. An investment of $35 million, it's equipped to handle bulk containerized shipments, as well as provide 2,000 square feet of cooler space, 500 square feet of security area, and 13,500 square feet of office space.

JFK Runways

The runway system consists of two pairs of parallel runways: 4L-22R, 4R-22L, 13L-31R, and 13R-31L, aligned at right angles. Total runway length is nearly nine miles. All of the runways have high intensity runway edge lighting, centerline and taxiway exit lighting, and are grooved to enhance safety. Here's a closer look at the runways themselves:

Runway 4R-22L is 8,400 feet long and was recently widened to 200 feet wide and is equipped at both ends with Instrument Landing Systems (ILS), Approach Lighting Systems (ALS) with sequenced flashers and touchdown zone (TDZ) lighting. Runway 4R is a Category III A/L ILS runway, permitting landings with a visibility of 600 feet or more by qualified air crews. (Runway 22L may also have been commissioned as a Category III runway by the time this feature is published.) Runway 22L ILS allows landings down to a visibility less than 1200 ft. RVR (runway visual range). Takeoffs can be made with visibility of one-eighth of a mile.

Runway 4L-22R is 11,351 feet long by 150 feet wide and is also equipped with ILS at both ends, allowing landings down to three-quarters of a mile visibility. Takeoffs can be conducted with one-eighth of a mile visibility.

Runway 13L-31R is 10,000 feet long by 150 feet wide and is equipped at both ends with ILS and ALS systems. Runway 13L has two additional visual aids for landing aircraft: a Visual Approach Slope Indicator (VASI) and a Lead-in Lighting System (LDIN). The ILS on 13L has Category II capability, and along with TDZ lighting, allows landings down to half a mile visibility. Takeoffs can be made with visibility of one-eighth of a mile.

Runway 13R-31L is 14,572 feet long by 150 feet wide and is the second longest commercial runway in North America. Visual landing aids on 13R, including Visual Approach Slope Indicator (VASI) and Lead-In Light System (LDIN) lighting systems, allow visibility conditions down to three-quarters of a mile. Takeoffs on Runways 13R and 31L can be made with visibility of one-eighth of a mile.

Aircraft Arrestor Bed:

The first Engineered Materials Arresting System (EMAS) in North America was installed at the northeast end of Runway 4R in 1996. The bed is 40 feet long and 200 feet wide ad consists of cellular cement material, which can safely decelerate and stop an aircraft that overruns the runway. The arrestor bed concept was originated and developed by the Port Authority and installed at JFK Airport as a joint research and development project with the FAA and industry.

JFK Frequencies

UNICOM: 122.950
ATIS:
115.100 (DEP)
115.400 (ARR-SW)
117.700 (ARR-NE)
128.725 (ARR-General)
Kennedy Ground:
121.900, 348.600 (North & South); 121.650
Kennedy Tower:
119.100 (RWYS 04R/22L & 13L/31R; 04L/22R & 13R/31L)
281.550 (RWYS 04R/22L & 13L/31R
Clearance Delivery:
135.050/348.6 (North & South)
Pre-Taxi Clearance:
135.050/348.600 (North & South)
Emergency: 121.500/243.000
Gate Hold: 125.050

NEWARK LIBERTY AIRPORT

This airport is also operated by The Port Authority of New York and New Jersey. Built by the City of Newark, Newark Liberty Airport was opened on October 1, 1928, and was the region's first major airport. During World War II, the Army Air Corps operated it; however, The Port Authority assumed responsibility for operation and development in 1948.

In the 1950s, The Port Authority added an instrument runway, a terminal building, a control tower, and an air cargo center.

Runway 4L/22R was commissioned in 1970, and Runway 4R/22L was rebuilt and reopened in 1973.

The 425-acre Central Terminal Area was constructed and opened in 1973.

In November 1999, the FAA started construction on a new $22.4 million control tower. The 325 tower was commissioned in May 2003, the fourth in the airport's history. The former control tower, which was commissioned in January 1960, was demolished in the spring of 2004.

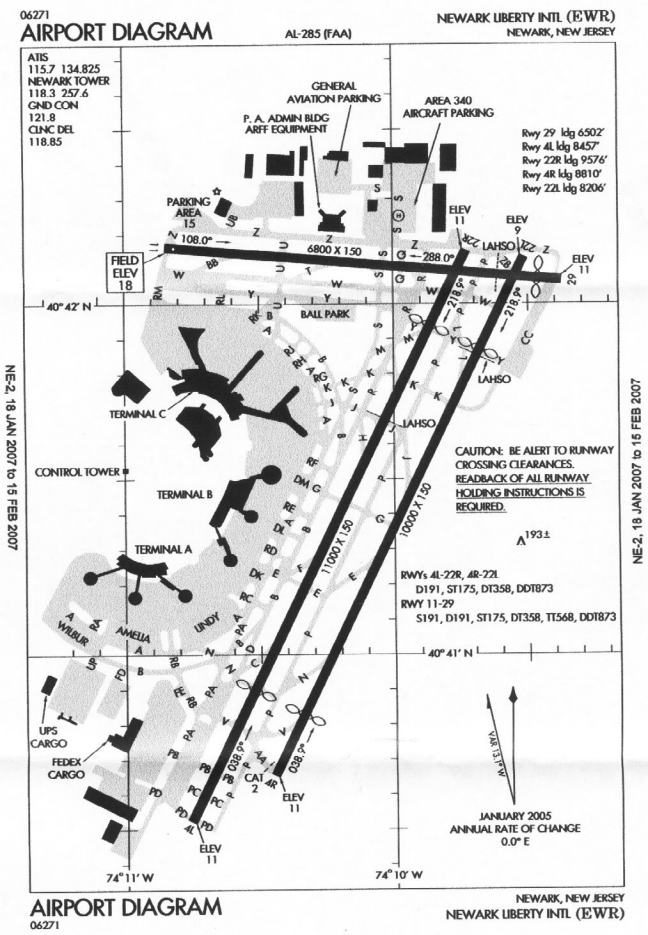
Cargo Buildings

FedEx Cargo Complex– In 1995, FedEx completed a $60 million Expansion of a state-of-the-art automated sort facility at its Newark Regional Hub, which now includes Building s 347, 156, and most of 155.

United Parcel Service (Bldg. 350) – In September of 1987, UPS constructed and opened an $11 million, 28-acre package handling and distribution center in the south area of the airport.

North Area Cargo Center – The original $3.4 million North Area Cargo Center consisted of four buildings, 150-153, including three cargo terminal buildings and a cargo service building, and was completed in December 1959. Two of the four buildings (150 and 153) have been demolished to make way for the new Port Authority Administration Building 1, which was completed in February 2002. Construction of an additional multi-tenant air cargo terminal building (154) was completed on the site of the old fuel farm. A new multi-tenant International Air Cargo Center was build by the Airis Corporation on the site of the former North Terminal.

In March 2001, United Airlines opened a new state-of-the-art cargo handling facility.



Continental Airlines dedicated its state-of-the-art cargo handling faculty. The new cargo building will greatly increase cargo processing with a sophisticated materials handling system to provide Continental and its customers with a highly efficient means of handling air cargo.

Other Structures

Medical Offices (Bldg. 339) – This building is located in the North Cargo area. The medical staff provides a wide range of services.

U.S. Post Office Facility is a 2.6 million, 36,000 square-foot Postal Facility, which opened in October 2003.

Continental Hangar 56 – An 80,000 square-foot wide-body aircraft hangar located in the North Area, opened on November 3, 1997. Continental completed construction on Hangar 54, another wide-body aircraft maintenance facility hangar, which includes a material storage building and an engine build-up shop.

Facility Maintenance Building Complex – Opened in June 1989, the two-building facility, at the northeast end of the airport, consists of a main building combining offices and maintenance shops, a garage complex for snow removal operations, and the repair and storage of specialized maintenance vehicles and equipment.

United Airlines Hangar 14 – A two-bay, $3 million hangar was completed in March 1958. Renovations to this structure began in 1999. The new United Airlines cargo facility has 42,000 square-feet of cargo area and 7,300 square-feet of office space.

Flight Kitchens – Sky Chef, building 95, and Chelsea, building 330.

Airlines Servicing Newark

Air Canada
Air France
Air India
Air Jamaica
Air Plus Comet (Seasonal)
Air Tran Airways
Alaska Airlines
Alitalia
American
British Airways
Casino Express (Charter)
Comair
Continental
Czech Airlines
Delta
Delta Express
El Al
EVA Airways
Flybe British European
Jet Blue
KLM Royal Dutch Airlines
L'Avion
Lot (Polish Airline)
Lufthansa
Malaysia
Mexicana
Miami Air (Charter)
Midwest
Northwest
Qantas
SAS
Singapore Airlines
Swiss
TAP Portugal
United
United Express
USA3000
US Airways
US Airways Express
Virgin Atlantic

Newark Runways

Runway 4R-22L is 9,980 feet long by 150 feet wide and is used primarily as a landing runway. Runway 4R is equipped with a Category II ILS and a full 2,400 foot Category II Approach Lighting System with sequenced flashers (ALSF2). A Category I ILS and Approach Lighting System (MALSR) on Runway 22L is included. There are edge, centerline, and touchdown zone lighting systems on the runway, and centerline lighting on taxiways. The runway is grooved for improved traction in wet weather. Takeoffs are permitted with visibility as low as an eighth of a mile. Runway 4R landings can be conducted with visibility as low as an eighth of a mile, and 22L landings with visibility of one-half mile.

Runway 4L-22R is 11,000 feet long by 150 feet wide, and was originally commissioned in March 1970. This runway is 950 feet west of the parallel Runway 4R-22L. Navigational aids include an ILS and Approach Lighting System (MALSR) on Runway 4L.

Runway 22R is equipped with a Precision Approach Path Indicator (PAPI), a Runway End Identifier Light System (REILS) and an ILS. It is grooved over its full length and width. Takeoffs are permitted with visibility as low as one-eighth of a mile.

Runway 4L landings can be conducted with visibility of one half mile. VOR/DME approaches may also be conducted to 22R. Both runways have displaced thresholds to minimize noise effects. High intensity runway edge and centerline, as well as high-speed exit taxiway centerline lighting complete the visual aids package.

Runway 11-29 is 6,800 feet long and 150 feet wide and is equipped with centerline and edge lighting, VASI on runway 11, PAPI on runway 29 and REIL at both ends. The runway is grooved for added traction in wet weather. An ILS system was installed on Runway 11 in 1995. Land and Hold Short Operation (LAHSO) lighting is also on all runways.

Taxiways: More than 12 miles of 75-foot wide taxiways, entirely equipped with centerline lighting, link the three runways with the central terminal and cargo areas. Taxiways also have erosion control pavement on both sides.

Newark Frequencies

UNICOM: 122.95
ATIS: 115.7 (ARR);
134.825 (South Arrival)
Ground Ctrl: 121.800; 126.150
Tower: 118.300/257.600
Clearance Del: 118.850
Pre-Taxi Clearance: 118.850
Emergency: 121.500/243.000
Gatehold: 132.450
Final Vector: 125.850

LAGUARDIA AIRPORT

Another airport operated by the Port Authority of New York and New Jersey, LaGuardia Airport, sits on land that was once occupied by an amusement park!

The site was turned into a 105 acre private flying field in 1929. In September of 1937, ground was broken for an airport, which was built jointly by the City of New York and the Federal Works Progress Administration. It was dedicated on October 15, 1939, as New York City Municipal Airport. On November 2, of that same year, the name was changed to New York Municipal Airport-LaGuardia Field.

The airport was opened to commercial traffic on December 2, 1939. On June 1, 1947, the airport was leased to the Port Authority and renamed LaGuardia Airport, after one of New York's most celebrated figures, Mayor Fiorello LaGuardia. A new Central Terminal Building was opened in 1964, enlarged in 1967 and again in 1992. The airport celebrated its 65th anniversary of commercial flight on December 2, 2004.

The Central Terminal Building, which was dedicated on April 17, 1964, serves nearly 60% of the airport's scheduled domestic airlines.

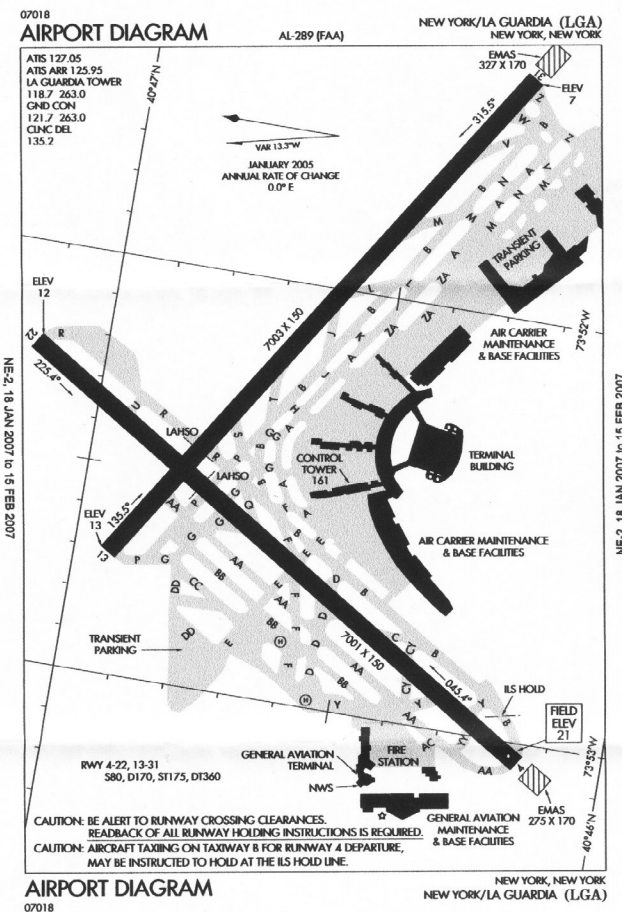
The 150 foot high Air Traffic Control Tower began operation in May 1964.

Cargo Facilities

Five hangars include facilities for air cargo, garaging, maintenance, food preparation, and marine and aircraft simulation equipment. Airlines, including Delta and United, have space in Hangar 2. American Airlines has space in Hangars 1, 3, 4, and Hangar 5, which also houses the Sky Chefs' catering facility. Hangar 7 houses the Port Authority administrative offices.

Airlines Servicing LaGuardia

Air Canada
Air Tran Airways
America
America Eagle
ATA (American Trans Air)
Colgan
Comair
Continental
Continental Express
Delta
Delta Connection
Delta Shuttle
Frontier Airlines
JetBlue Airways
Midwest



Spirit
United
United Express
US Airways
US Airways Express
US Airways Shuttle

LaGuardia Runways

There are two main runways, 4-22 and 13-31. Completed in 1967, both runways were extended over water to 7,000 feet by 150 feet wide. The extensions were built on a 50-acre, L-shaped pile-supported concrete structure ranging in width from 700 to 900 feet. The northerly 2,000-foot (by 150 feet wide) extension to Runway 4-22, complete with a taxiway and holding pad, was built into Rikers Island Channel and opened to air traffic in March 1966. Similarly, the westerly 1,035-foot (by 150 feet wide) extension to runway 13/31, with its parallel taxiway, was extended into the Channel and opened to air traffic in November 1966. Two 3,000 foot piers were constructed beyond the ends of the runway extensions to support an Approach Lighting System with sequenced flashers.

The first 330 foot long section of the safety overrun for Runway 13-31 opened for use before the 1994-95 snow season. As part of a massive engineering effort, the safety overrun is now 460 feet long by 740 feet wide and provides added access to the safety area for emergency equipment and personnel. In 1994, both runways and sections of the taxiways were repaved and new aeronautical signage (distance markers) was installed.

Runway 4-22 is a bi-directional instrument runway and is grooved and equipped with centerline and edge lighting. Takeoffs on Runway 22 are permitted with visibility lower than a quarter of a mile, and landings with visibility less than half a mile. Navigational aids in the 22 approach include an Instrument Landing System (ILS), an Approach Lighting System (ALS), Touchdown Zone Lighting (TDZ), Runway End Indicator Light System (REILS), and Visual Approach Slope Indicator System (VASI).

Runway 4 is equipped with an ILS, an Approach Lighting System and Precision Approach Path Indicator (PAPI).

Runway 13-31 is equipped with REILS at both ends and an ILS and ALS serving Runway 13. A VASI (3 bar for wide-bodied aircraft) system serves Runway 31, and conventional VASI serves Runway 13. The runway is equipped with centerline and edge lighting and, similar to Runway 4-22, is grooved for added traction during wet weather. Takeoffs are permitted with visibility lower than a quarter of a mile, and landings on Runway 13 with half-mile visibility.

All taxiways are equipped with centerline lights except for Taxiways "AC". Nine additional aircraft parking spaces have been constructed at the end of Taxiway "E".

LaGuardia Frequencies

UNICOM: 122.950
ATIS: 125.950-Arrival
127.050-Departure
Ground: 121.700/263.000; 121.850
Tower: 118.700/263.000
Clearance Delivery:
121.875-Helicopter; 135.200
Pre-Taxi Clearance: 135.200
Emergency: 121.500/243.000

Propagation Outlook for April-September Summer SW Broadcast Season 2007

By Tomas Hood

Spring marks a transition from days of long nights to a season with long hours of sunlight in the Northern Hemisphere. This transitional time is known as the Vernal Equinox, and is one of two times a year when the hours of daylight are equal in number to the hours of darkness. These equinoctial transitions are caused by the position of the Sun in relation to the equator. During the Vernal and Autumnal Equinoxes, the Sun is directly over the equator, creating an equal amount of sunlight hours for both the Northern Hemisphere and the Southern Hemisphere. The Vernal Equinox occurs in 2007 on March 21 at 0007 UTC.

Every minute after the Vernal Equinox until the date when the Sun reaches the highest latitude in the summer season, the daylight hours grow longer. These longer hours of sunlight affect the ionosphere by energizing it more than during the winter season. Most of the lower shortwave spectrum and the medium wave spectrum become unusable for most of the day, 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. The period of darkness is short in the summer season, so the 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.

The higher shortwave frequencies come alive, though. The more energized the ionosphere, the higher the radio frequencies that it can refract. Even during this period of low sunspot activity, a great amount of radio propagation in the shortwave spectrum is occurring.

To take advantage of the summer ionospheric conditions, international shortwave broadcasters typically change their transmission schedules and the frequencies they use so they can better reach their audience. This change is made by most broadcasters each year at the end of March. Because 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, many windows of DX opportunity for the shortwave radio listener open up even during the end of the solar cycle.

The VHF/UHF hobbyist also benefits from the changes in season. The summer season holds a lot 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 – we are at the very end of Solar Cycle 23.

A revised forecast for Solar Cycle 24

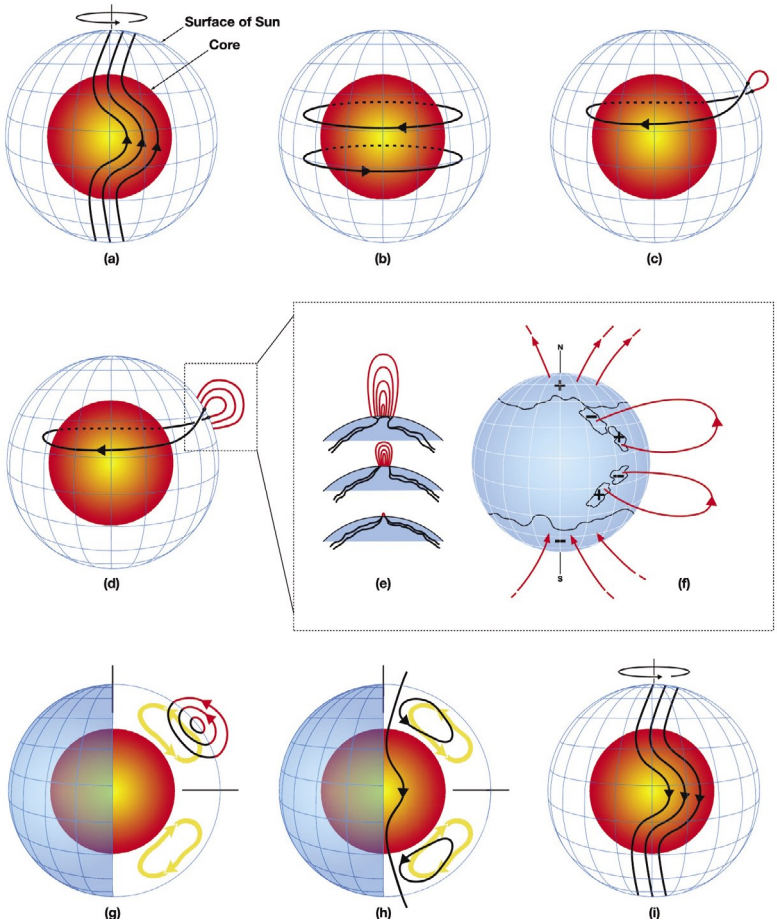
Last spring (2006), I wrote that the "latest solar science research results suggest that the Sun may be less active during the next solar cycle than it has been during the last 100 years." This was based on the research performed by Doctors Leif Svalgaard, Yohsuke Kamide at the Solar-Terrestrial Environment Laboratory, Nagoya University in Japan, and Edward W. Cliver at the Space Vehicles Directorate, Air Force Research Laboratory, Hanscom Air Force Base in Massachusetts.

A vastly different prediction has been offered by other solar scientists. These predictions all agree on one major point: Solar Cycle 24 may be one of the most energetic cycles on record! Sunspots have been counted by solar observers ever since Galileo began to record these solar events. When you take a look at this long record, a pattern is revealed. Solar activity rises and falls approximately every eleven years. It is with great interest that solar scientists have noticed that solar activity records reveal that four of the five biggest cycles on record have come in the past 50 years.

The latest predictions offered by leading solar scientists regarding Solar cycle 24 are supported by the best and most recent scientific research and solar models. Add to these models the evidence of the last big cycles, and you have a strong case that the new cycle, which is due to peak in 2010 or 2011, could be really big.

David Hathaway, a solar physicist of the National Space Science and Technology Center (NSSTC), predicts that the new sunspot cycle will be one of the most intense cycles

Physical processes in the flux-transport dynamo that simulates and predicts solar cycles



"Diagram of the Major Plasma Flows Inside the Sun" Credit: Mausumi Dikpati, High Altitude Observatory Division, NCAR, Boulder, Colo.

The red inner sphere represents the Sun's radiative core and the blue mesh represents the solar surface. In between is the solar convection zone where the dynamo resides.

(a) Shearing of the poloidal field by the Sun's differential rotation near the bottom of the convection zone. The Sun rotates faster at the equator than the pole.

(b) Toroidal field produced due to this shearing by the differential rotation.

(c) When toroidal field is strong enough, buoyant loops rise to the surface, twisting as they rise due to rotational influence. Sunspots (two black dots) are formed from these loops.

(d,e,f) Additional flux emerges (d,e) and spreads (f) in latitude and longitude from decaying spots.

(g) Meridional flow (yellow circulation with arrows) carries surface magnetic flux towards the poles, causing the polar fields to reverse.

(h) Some of this flux is then transported downward to the bottom and toward the equator. These poloidal fields have the opposite to those at the beginning of the sequency, in frame (a).

(i) This reversed poloidal flux is then sheared again near the bottom by the differential rotation to produce the new toroidal field opposite in sign to that shown in (b).

since record-keeping began almost 400 years ago. Other predications are in agreement that Cycle 24 should be highly energetic, producing a high number of sunspot groups, extreme solar flares, and other solar phenomenon. For instance, Mausumi Dikpati and colleagues at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado, prognosticate that Cycle 24 could produce solar activity second only to the exciting and historic Solar Maximum that occurred in 1958.

Amateur Radio Operators who were active during the 1950s enjoyed world-wide VHF radio signal propagation for hours on end, for many days at a time. HF DX was an all-day affair, with incredibly reliable signals between many areas of the world. Imagine an energy level of this intensity during Cycle 24!

Dikpati reports that, "The next sunspot cycle will be thirty to fifty percent stronger than the previous one," she says. This prediction, if fulfilled, would rank Cycle 24 as one of the strongest ever, just as Hathaway suggests.

The prediction by the Dikpati team is unprecedented in terms of the method, accuracy, and the results. In nearly two centuries since the 11-year sunspot cycle was discovered, solar scientists have struggled to predict the size of future solar cycle maxima. Most of those forecasts failed. Solar maxima can be intense, as in 1958, or barely detectable, as in 1805, seemingly obeying no obvious pattern.

The key to the new predictions by Dikpati is the discovery of a "conveyor belt" on the sun. Dikpati, drawing on previous research and the most current models and information gathered by the sophisticated space probes and modern instruments, confirmed that the sun has "conveyor belts" that resemble the Great Ocean Conveyor Belt discovered here on Earth. The Earth's belt is a network of currents that carry water and heat from ocean to ocean.

The sun's conveyor belt is a current, not of water, but of electrically-conducting gas. It flows in a loop from the sun's equator to the poles and back again. Just as the Great Ocean Conveyor Belt controls weather on Earth, this solar conveyor belt controls weather on the sun. Specifically, it controls the sunspot cycle.

David Hathaway explains: "First, remember what sunspots are – tangled knots of magnetism generated by the sun's inner dynamo. A typical sunspot exists for just a few weeks. Then it decays, leaving behind a 'corpse' of weak magnetic fields."

Explaining how the solar conveyor belt works, Hathaway continues: "The top of the conveyor belt skims the surface of the sun, sweeping up the magnetic fields of old, dead sunspots. The 'corpses' are dragged down at the poles to a depth of 200,000 km where the sun's magnetic dynamo can amplify them. Once the corpses (magnetic knots) are reincarnated (amplified), they become buoyant and float back to the surface." This results in new sunspots.

"It takes about 40 years for the belt to complete one loop," says Hathaway. The speed varies "anywhere from a 50-year pace (slow) to a 30-year pace (fast)."

When the belt is turning "fast," it means that lots of magnetic fields are being swept up, and that a future sunspot cycle is going to be intense. This is a basis for forecasting: "The belt was turning fast in 1986-1996," says Hathaway. "Old magnetic fields swept up then should reappear as big sunspots in 2010-2011."

Parallel to the forecast published by the Dikpati research team, David Hathaway and colleague Robert Wilson first presented their prediction at the American Geophysical Union meeting in San Francisco, California. They explained that their forecast is based on historical records of geomagnetic storms: "When a gust of solar wind hits Earth's magnetic field, the impact causes the magnetic field to shake. If it shakes hard enough, we call it a geomagnetic storm," said Hathaway. In the extreme, these storms cause power outages and trigger the Northern and Southern Lights. During moderate to severe geomagnetic storms, the aurora can become energetic enough produce E-region ionospheric patches and curtains. These "clouds and curtains" act as reflectors for HF and VHF radio signals, a phenomenon known as Aurora-mode Propagation (Au).

Looking at records of geomagnetic activity stretching back almost 150 years, Hathaway and Wilson noticed that the trends in the amount of geomagnetic activity actually indicate what the solar cycle is going to be like 6 to 8 years in the future. According to their analysis, the

Caption: NCAR scientists Mausumi Dikpati (left), Peter Gilman, and Giuliana de Toma examine results from a new computer model of solar dynamics. (Photo by Carlye Calvin, UCAR)

next Solar Maximum should peak around 2010 with a sunspot number of 160 plus or minus 25. If this prediction comes true, Solar Cycle 24 will be one of the strongest solar cycles of the past fifty years. It could even become one of the strongest in recorded history.

Like most experts in the field, Hathaway has confidence in the conveyor belt model and agrees with Dikpati that the next solar maximum should be historic. However, he disagrees with Dikpati's forecast regarding when the peak of the cycle will occur. Dikpati predicts the Solar Max at 2012, while Hathaway believes it will arrive sooner, in 2010 or 2011.

"History shows that big sunspot cycles 'ramp up' faster than small ones," he says. "I expect to see the first sunspots of the next cycle appear in late 2006 or 2007 – and Solar Max to be underway by 2010 or 2011."

Who's right? Stay tuned to *Monitoring Times* magazine as well as to your radio, and let's see what the Sun will bring!

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 21, 2007, 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, 2007 at 1806 UTC, 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.

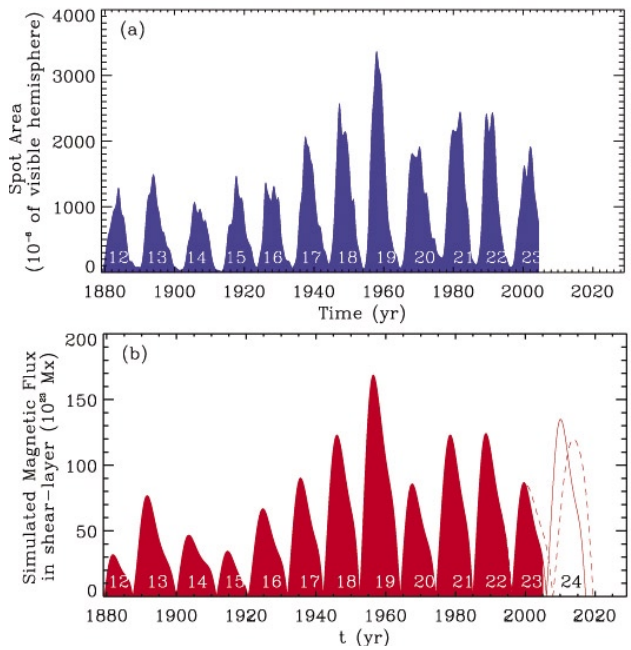
During the early part of the summer season (April through May) propagation is still hot on lower SW frequencies, like 41 meters, with Europe in the evening and Asia in the mornings. Occasional DX openings will occur on the tropical bands around sunrise. However, these bands are quickly being degraded 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 at the very lowest in the current Solar Cycle 23. Cycle 23 may well be over and Cycle 24 may have started. We won't know until we are well into 2007, because we have to smooth out the monthly observed sunspot counts to reveal the lowest point of the cycle. When the activity rises from that lowest point, we know the new cycle has begun.

The low sunspot activity during 2007 will result 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



Caption: NCAR scientists have succeeded in simulating the intensity of the sunspot cycle by developing a new computer model of solar processes. This figure compares observations of the past 12 cycles (above) with model results that closely match the sunspot peaks (below). The intensity level is based on the amount of the Sun's visible hemisphere with sunspot activity. The NCAR team predicts the next cycle will be 30-50% more intense than the current cycle. (Figure by Mausumi Dikpati, Peter Gilman, and Giuliana de Toma, NCAR.)

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 the low geomagnetic activity that I expect this summer (we get less solar storm activity during the years closer to cycle minima), 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 the way 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

On VHF we are expecting Sporadic-E (Es) propagation as we move into June possibly producing 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 to11pm 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 **www.dxinfocentre.com/tropo.html** He also presents 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, since we are at the lowest point of the current cycle. However, because there are recurring coronal holes that spew out massive amounts of solar plasma toward the Earth, we expect occasional periods of moderate geomagnetic storminess. These occasional moments of minor geomagnetic storminess caused by fast solar winds and the passage of plasma released from the Sun's corona may trigger aurora, providing possible E region ionospheric propagation (Au).

February 11 through 16 saw six days of a blank Sun with no sunspots. Have we reached the bottom of Cycle 23? Time will tell! (Credit: SOHO/MDI)

Meteor Showers

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 cell phone 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)
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THE FUTURE OF RADIO
An Interview with Radio Hobby Legend Harry Helms

Harry Helms gets a "high" from one of his other hobbies – He is sitting atop Wheeler Peak, Nevada, at 13,084 feet.

Last summer Jason Gardner conducted an interview over the phone with Harry Helms, who at that time authored a blog on "The Future of Radio." This is that interview (with slight edits for length and clarity) in which Helms talks about his noted "career" in the radio hobby.

Harry Helms' DXing Biography

My interest in DXing began in early 1963. I was 10 years old and started listening to pop and rock and roll music from nearby "Top 40" AM stations. However, those stations would reduce power or change antenna patterns at sunset, and I couldn't receive them well at night.

I turned my radio dial to look for other stations, and was amazed at how well other stations, like WABC-770 in New York and WLS-890 in Chicago, would come in even though they were hundreds of miles away. But I couldn't figure out why I couldn't hear them in the day, and my curiosity eventually drove me to look for books about radio in the library. While most of those books were way over my head, I did learn about this thing called the "ionosphere" and how it made long distance reception possible. I also learned about ham and shortwave radio, and I was intrigued by both.

Shortly after this, I was at a local newsstand and saw copies of May 1963 *Electronics Illustrated* and the spring/summer 1963 issue of *Radio-TV Experimenter*. Both contained articles by C. M. Stanbury II. One of those articles was about AM band DXing, including how to send reception reports to get something called "QSLs," and another was about pirate radio station WUMS and how people called "DXers" tried to hear it.

After reading those two issues, I was immediately hooked and decided to send out my own reception reports to get QSLs. My first two reports were to WABC and WLS, and it was a big thrill a month later when I got QSL cards back from them on consecutive days.

I then decided I had to have a shortwave radio, and I got one in September 1963 for my eleventh birthday. My first shortwave reception report went to HCJB in Ecuador, and my first shortwave QSL was received from them.

Since then, I've dabbled in just about all forms of DXing. My favorites have been AM and FM DXing, pirate radio DXing, and following numbers stations and other clandestine radio networks. I eventually got a Novice ham license (WN4EOX) and I've held the Extra class license since 1978. I also hold the FCC general radiotelephone, GMDSS operator/maintainer, and second-class radiotelegraph licenses, although I've never used any of them professionally.

I've been a member of several clubs over the years, including being a column editor for the National Radio Club (NRC), International Radio Club of America (IRCA), and the Association of Clandestine Radio Enthusiasts (ACE). I was also the bulletin publisher for the latter. In 2003, I was surprised and flattered to be named "DXer of the Year" by the Association of North American Radio Clubs (ANARC). I still belong to several clubs, but now I rely on the internet and e-mail lists for most of my DXing information.

Writing History

My urge (need?) to write manifested itself when I was very young. My mother still has some "books" I created when I was five years old; I wrote my own Superman stories and drew some crude illustrations for them ... I suppose I always knew I wanted to be a writer or some sort of editor or publisher.

The biggest influences on my writing style were H. L. Mencken and, later, Hunter Thompson. For "DX journalism," I was a big fan of C. M. Stanbury II and Tom Kneitel. Stanbury had a very fluid style, and could make any DXing topic seem interesting. I loved Kneitel's irreverent, "wise guy" style – especially in his *Electronics Illustrated* columns – and incorporated a lot of his personal, conversational writing style into my own.

I made my first professional article sale to *73 Magazine* just before the start of my senior year in high school; it was an article about the communications system aboard the Mariner IV Mars spacecraft. In the years ahead, I wrote articles on DXing topics for *Popular Electronics*, the *Communications Handbooks* published by Popular Electronics, *Elementary Electronics*, *Modern Electronics*, *Popular Communications*, and, of course, *Monitoring Times*.

I began writing books in 1978; my first was *How to Tune the Secret Shortwave Spectrum* for TAB Book followed by *Computer Language Reference Guide* for Howard W. Sams. I've actually written more books and articles on non-DXing topics, such as computers and programming, than I have on hobby radio.

After graduating from the University of North Carolina, I became a technical writer/editor for Texas Instruments and then Radio Shack at their national headquarters in Fort Worth; the manual for the Realistic DX-302 shortwave receiver was one of my projects there. I later became an electronics and computing editor for McGraw-Hill, Prentice Hall, and Academic Press, before co-founding HighText Publications (later re-named LLH Technology Publishing) in 1990. LLH was acquired by Elsevier in 2001, and since then I consult for various technical publishers and continue to write.

During my career, I've been lucky enough to work with such authors as Forrest Mims, Joe Carr, Bob Pease, Jim Williams, Andy Yoder, etc… I've learned a great deal from such authors!

What are some of your favorite DXing moments?

It's not so much a particular station or frequency, but instead the experience of listening to a station – weak, fluttery, just barely above the noise level – and trying to figure out what I'm listening to. *That* is my favorite DXing moment; it's one I've been able to repeatedly enjoy, and it keeps drawing me back to DXing.

But if I had to name specific experiences, I'd have to rank hearing KORL-650 in Honolulu and Turkey-1016 while living in South Carolina, and hearing several of the first pirate stations, such as the Voice of the Voyager and Midwest Music Radio, in 1978, among my favorite DXing memories.

What are your favorite ham radio bands?

My favorite is six meters; I love the sheer unpredictability of the band and the different

propagation modes – like sporadic-E, F-layer, and meteor scatter – you can experience. I also enjoy two meters for similar reasons. And, at the height of the sunspot cycle, few bands are as much fun as ten meters. Recently I've been active on 17 meters with five watts, and having a lot of fun – that's a great band for low power operating due to its propagation characteristics and low levels of interference.

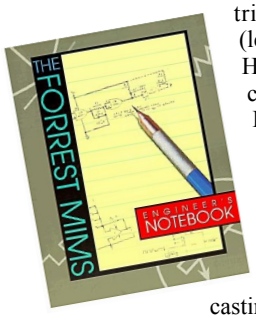
Why did you start the Future of Radio blog?

I started it, because one of the problems – whether you are talking about shortwave, ham radio, or DXing in general – is that a lot of people seem to assume that stasis and continuity is the normal state of the world. Whereas, my viewpoint has always been: no, no it is always changing. There is no constancy here.

I think through the rise of wireless networking, the rise of the internet as an alternative delivery, and the merger of those two, we are now on the cusp of acute changes in the radio hobby. It is almost like in the 1960s when the first integrated circuits were introduced. Suddenly, circuit designs changed from some tubes, transistors, plus other discreet components into, "Here is where you connect the power, here is where you connect the ground, here is where you have the input signal, and here is where you have the output signal."

That sort of revolutionary change is coming toward everybody in the radio hobby – whether you are talking about a commercial broadcaster, ham radio operator, a listener, or a *Monitoring Times* reader. And I wanted to get some sort of dialogue going or bring it to the attention of everyone we knew that everything we thought was normal was about to be turned on its head. That will offer some opportunities and it will also close off some opportunities.

In 1976, when the first personal computers came out, that knocked out two entire industries – mainframe business (led by IBM, Burroughs, and Honeywell) and also the minicomputer business (DEC, Data General, etc…) – two huge multi-billion dollar industries were knocked out in less than two decades. While I don't think that terrestrial radio broadcasting, or shortwave radio broadcasting, or even ham radio will disappear entirely, they are going to be changed and mutated in ways that will be far-reaching. I think a lot of people involved in the radio hobby and the radio industry are simply unaware of this tsunami bearing down on them.



People either say that it is going to be all the same or else they are ready to change and throw out everything. One of the great things that you have managed to say is that we are going through some changes. It is not going to be the end of everything.

Yeah, it is not going to be a zero-sum game. I think you are going to see some big changes and adaptation, but … as long as there is a shortwave spectrum that can be sky-wave propagation, there are going to be people out there getting signals out of it, and people putting signals into it. There are going to be people out there interested in trying to get a signal from point A to B via RF. There will always be that, but there will be some hobby opportunities that we cannot even conceive of today.

Selected Books by Harry Helms

Shortwave Listening Guidebook. 1st and 2nd Edition.
All About Ham Radio.
How to Tune the Secret Shortwave Spectrum.
SWL's Manual of Non Broadcast Stations
Top Secret Tourism

Selected Books by Influences & Contemporaries

The "Top Secret" Registry of US Government Radio Frequencies. Kneitel.
Joe Carr's Receiving Antenna Handbook. 1st Edition. HighText. 1993.
Pirate Radio Stations: Tuning Into Underground Broadcasts in the Air. Yoder.
Pirate Radio Operations. Yoder.
Analog Circuit Designs: Art, Science, and Personalities. Jim Williams
Troubleshooting Analog Circuits. Robert Pease
Books by Forrest Mims

Resources

These books are widely available, some used, at bookstores like **www.amazon.com** Also some are available from places like **www.universal-radio.com** And do not forget about your local hamfest bookseller.

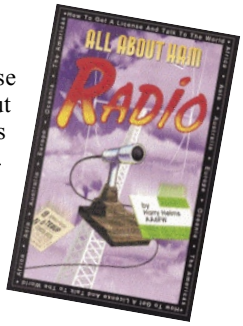
Will there always be places for DXers on their respective bands or will they have to migrate to other spectrums (like keeping logs of Wi-Fi spots)?

Oh yeah, there will always be a place for them, but it is interesting there are forms of DXing now popping up on Wi-Fi bands. You might be familiar with a phenomenon called war-driving. People will drive around with their laptops, adapter, and a high gain antenna. I find myself on business trips doing the same thing. I have Wi-Fi cards in my notebook PCs; I'll be in a conference room somewhere, and I'll turn it on, and I'm always curious about these phantom networks that I keep discovering.

So yes, some DXing is already migrating to other bands. As long as there are people curious about the typical aspects of wireless and RF, they are going to go there. I think there will always be a place for most of what we call traditional DXing today. Maybe not as many DXing opportunities, maybe not as many participants, but the ionosphere is not going to go away, nor is the shortwave frequency spectrum going to go away. It will change, but it will still be there for those who are interested.

I panic when I hear that a shortwave station is going off the air. I've invested a lot of resources into trying to hear these stations. What am I going to do now?

In late 1970s and early 1980s, some DXers managed to hear over "200 countries" on shortwave. Some of these were actual countries, but others were DX entities like Alaska and Hawaii. Some people in NASWA were able to receive and verify over 200 countries. Today, someone starting out in the hobby is not going to be able to do that, because a lot of them are not on the air anymore. A lot of the stations that I remember, when I started listening, are not on the air anymore. When I listen to the tropical bands, I am amazed at how few stations from Latin America can be heard compared to thirty years ago when there were stations every 5 kHz on 60 and 90 meters.



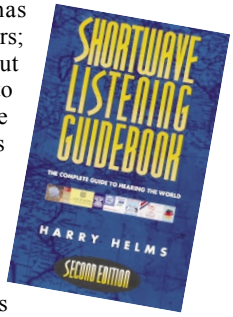
So, there will be fewer DX opportunities, but on the flip side of that, there will be less interference to the stations that remain. Maybe some of the stuff that we read about happening in the 1930s – people from the East Coast hearing stations from Australia, Japan, and China – we might see some similar DX if the amount of interference these stations have to contend with disappears.

So, in a strange sense there might be more opportunities to hear these rare stations? In a similar fashion the internet has kind of strangely helped the hobby by providing people with information about these stations more quickly. What are your thoughts about the internet and the hobby?

Every change presents some opportunity as well as some dangers. I think so often the hobby, especially in the rise of the internet, sees it as something that is going to damage the hobby ... I think as long as shortwave broadcasters, as well as hobbyists, are willing to remain flexible and open-minded about things, there are actually several opportunities ... to make DXing more enjoyable – perhaps different, but no less enjoyable.

One thing I have been wanting to ask you is: "Is your DX-itis – the condition of listening to distant stations – cured?"

My interest in DXing has waxed and waned over the years; sometimes I go months without making any serious attempts to DX. But I think DXing is a bit like malaria: once you're infected, it's always in your blood, waiting to re-emerge.



One thing that has helped me throughout my involvement in DXing is that I rotate interests. There have been periods when I rotate through AM Band DXing. Then I will get tired of that, and I will go into TV and FM DXing, then Shortwave Broadcast DXing, then Pirate DXing, and then ham radio. When I get tired of one, I will rotate to the other.

That's a good idea. Of course, FM presents a challenge because satellite radio exists.

The good thing about FM and TV DXing is that whenever there is a band opening, you can

follow the stations in and out on a frequency that is vacant locally as the Sporadic E clouds move. Which is one reason why six meters is my favorite ham radio band. Just the sheer unpredictability of it; I love it for DXing. You have noticed that I am a big satellite radio fan, which tells you what I listen to for entertainment. I like reliability. I like dependability. However, for DXing, I like to have the dice rolled.

If there is something on the international stations that I want to hear, then I might turn on World Radio Network on Sirius. I hate to admit that, because then these broadcasters will think that "we're there just for DXers."

One thing that I don't understand about broadcasters is why more don't do like the BBC has done: Basically, buy a channel on XM or Sirius to reach their audience. They say they are shortwave broadcasters, but it is almost as if they perceive their mission to operate shortwave transmitters. ... It doesn't matter whether you reach them by satellite radio, via the internet, or shortwave. The point is what works best for your intended audience.

I think the real thing that has held back listening to international stations in America has been the unreliability, the undependability of the shortwave medium. ...It doesn't matter whether you listen to analog or digital, the ionosphere changes day to night. Which means the station will have to change frequencies from day to night. It means you are going to have periods in which the signal fades in and out. It does not matter whether you are talking single-hop or multi-hop propagation: the ionosphere is unreliable. It makes it fun for hobbyists. It makes it less fun for average listeners.

There is also the fact that many broadcasters change their schedules four times per year. Well, imagine your local FM or TV stations changing frequencies or channels day and night, and they change frequencies or channels four times per year, or would fade in and out unexpectedly. Well, that is like the situation we have with shortwave. The very unpredictability that we love as hobbyists, is, has always been, and will always be the biggest barrier to acceptance by the masses.

In the third world, they have to put up with that because they are so media starved, but in North America, Europe, many parts of Asia, and increasingly in other parts of the world, average people are turning to FM, as opposed to shortwave for their listening, and I just think that trend is going to continue and accelerate, and get to the point where I think we are just going to have a fraction of the stations we see on the air now. I just don't see anything, even digital modulation, that will reduce that trend on shortwave.

Do you think that it is a viable option to keep shortwave for emergencies, in case of an emergency, and keep podcasting running in the meantime?

Something is viable in an emergency only if it is used in non-emergency scenarios. People are not going to own shortwave radios, they are not going to tune to shortwave radios unless there is something to keep them listening during a non-emergency. I know that shortwave broadcasters want to justify their continued funding, existence, and employment, and they are now sending all these nightmare scenarios: the internet can be brought down, shortwave is the only thing can get through. It kind of reminds me of the ham radio debate on Morse code, that it is the only thing that it can get through in an emergency.

When is the last time that you have heard Morse code help in an emergency? Maybe the 1950s? The same argument can be made by shortwave broadcasters. Look, if no one in your target audience is listening during a non-emergency situation, they are not going to listen during an emergency situation.

"The very unpredictability that we love as hobbyists, is, has always been, and will always be the biggest barrier to acceptance by the masses."

We got a little peek of that last year when Hurricane Katrina hit. A lot of people were able to keep up with emergency news and what was happening in New Orleans and the affected Gulf Coast area, not by AM broadcast stations which were blown off the air during the height of the storm, but by the XM Emergency Alert channel.

The safest place to put a transmitter is in orbit. A shortwave transmitter on land can be taken out very easily with an air strike or cruise missile. You can't do that with a satellite, yet. [*They can now: See this month's Communications - ed.*] So, if you are saying that you want to have a foolproof communications channel open to somebody, the most foolproof one is above the earth.

I think that is a totally fallacious argument people make. I understand where people are coming from. I feel sad for a lot of shortwave broadcasters and their employees ... but that still does not affect the fundamental realities and changes that are affecting broadcasters.

So, you don't perceive that in the future people will try to jam transponders?

I'll put it this way. It is a heck of lot more difficult to jam a satellite than a terrestrial transmitter. As someone who remembers jamming during the height of the Cold War or some of the Cuban jammers against Radio Americas in the 1960s, it is a lot easier jam a terrestrial signal than one in space.

And, if someone says they can block sites on the internet... it tells me that they don't fundamentally understand what the internet is about. Yeah, they can block one IP address. Then you set up another one, and another one, and another one, and as long as there is something called Google, people will find it.

China, for example, is finding it extremely difficult to censor the internet. You can censor a static list of IP addresses, but if you are using something like dynamic IP addresses or starting a brand new one, you can circumvent that, and they certainly have. I think in these types of arguments people are articulating their fears about their continued employment in international broadcasting, far more than they are articulating reasonable objections to satellite radio or internet streaming.

If you go out and ask a hundred people about shortwave, which I just about have because my enthusiasm about it is so great, you will find that few still realize it exists or even want to know much more about it.

One of my favorite stories was from 1993 or 1994 when one of my employees at the company that I co-founded, HighText Publications, volunteered for the Peace Corps and was assigned in Botswana, and my going away present for her was a Grundig portable shortwave radio with digital readout and memories. In fact, I programmed in all the major African broadcast frequencies on shortwave, the main ones used by the BBC and Voice of America. All of these I programmed in for her and that was her going away present.

In an exchange of letters, I asked her once, how did you enjoy listening to shortwave? Her response was, "Well, I tried it, but it sounds really awful, and there is a lot of fading and static. I find myself listening to the South African AM stations especially at night, and I find myself listening to local stations here on Botswana on FM." That drove home the point to me that a lot of things we as hobbyists love about shortwave are a lot of things that the average public hates.

So, there is not much that can even be done by broadcasters to combat this problem?

The problem with DRM is that any form of digital modulation that depends on the ionosphere can be affected by the ionosphere. Whether DRM, or HD Radio in the AM band being pushed here in the United States, it is just a dumb idea, because the analog signal can still be heard or be understood even if the signal level drops below a certain point. However, in digital mode, if the signal drops out, it is lost forever. Digital modulation is a marvelous idea, especially where skywave propagation is relatively rare, but to have it below 30 MHz is just wrong. It is like saying the Sun rises in the west and sets in the east.

DRM is a solution in search of an appropriate problem. When you look at the DRM advocates, they will tell you people are not listening to shortwave because it is not digital. No, it is a two-fold problem. One is just the nature of the shortwave medium itself, like propagation.

DRM, if anything, will worsen the problem. The other, which has to do with shortwave broadcasters, is that the content – let's just be honest – is extremely boring stuff.

If the shortwave broadcasters would strengthen the content, then that would be half the problem solved?

It is based upon the model that you are going to sit for an hour or so. I would package the content into ten or fifteen minute segments. Make each package available individually as podcasts, and I would also get a channel on something like Sirius or XM, but the state of the current broadcasters is based on the assumption that except for radio there is no other way to find out what is going on in the country you are listening to.

We got the internet, we got blogs, and we got all sorts of ways of finding out stuff. We can even visit sites and newspapers, and can use the Google translations if we can't read French, German, or Spanish. I just feel that so many shortwave broadcasters are operating under the assumption that it is 1966 or 1976, and that this is the only way of finding out real time information about the country we are listening to.

If I was running a broadcast station, I would figure out how people are learning about our country (including the internet), and what can we do differently or better than some of these other sources of information, rather than merely replicating what they are doing.

Yes, a lot of times, they will just have headlines from the newspapers that they find on the internet! However, one of the things that I loved as a hobbyist is listening to far away music, and it seems like broadcasters are getting less and less into music and more and more into the news.

Yeah, you are right if you are thinking, "Why do I need a review of the press when I can find that on Google with just a couple of mouse clicks?"

And I agree with you: Hearing the flute music from the Andes on the 90 meter stations like Ecuador and Peru, early in the morning before the sunrise, are some of the fondest DX-ing memories. How haunting and beautiful that is. Some of the music from regional Chinese stations, also in the morning hours, or some of the African highlife music back when there were numerous broadcasters from Africa that could be heard just around sundown in winter – I love that.

One of the things that I hear is a lot of complaining from newcomers to shortwave that all they are hearing are relay stations. Of course, if more of the relay stations went to internet, we could hear more original sources, probably.

I always wonder about why so many international stations will put so much investment into relay stations on the ground, but not one in the sky or on a server farm that can deliver multiple streams to the target audience. I mean I just don't get it. It is just a means of getting the audio from the studio to the listener. Who cares whether it is a shortwave transmitter, streaming media server farm, or a satellite orbiting above the earth? The question is, what do your listeners want, and what best serves their needs? Not what best preserves your budget or a bureaucratic prerogative.

Maybe one of the best things shortwave stations could do is to embrace the internet and podcasting. So people will still come to the shortwave broadcasters rather than some competitor.

If you are trying to get people to increase shortwave listening, then extensively promote your programming online via internet streaming or satellite radio. Which seem to be an ideal way to do it, because if you become accustomed to listening to satellite radio and decide you don't want to pay the subscription, or if you are away from your computer, then you may look into buying a shortwave radio. I think the whole point is that if you are trying to attract an audience, then you have to find a way to let the audience find you, get to know you, and then like you. You can't just simply say that you are going to do X, Y, or Z because there are multiple options for the potential audience.

What does all this mean for clubs and publications?

I do believe that hobby radio, DXing, and amateur radio publications are going to change substantially over the next decade. I believe that both clubs and publications are going to have to change as the hobby itself changes.

Perhaps, there will be a "Wi-Fi Hotspots around the Globe" type of article?

I believe you will see war-driving types of articles, monitoring Bluetooth, etc… Rather than DIY projects about how to make something out of … parts, you will see wireless networking type of projects.

What do you think amateur exams will look like in a decade?

I think there will be a lot more software defined radio questions. A decade from now ham radio exams are going to consist of questions on software development.

So you are thinking more in terms of digital modes rather than Morse code?

Yes, definitely. One of the sore spots that I have with some of the more vocal members of the ham radio community has been this insistence that Morse code has been this absolutely essential requirement.

Do you think there will be an increase in ham radio after CW is eliminated?

If the question is, will there be a huge influx of millions of people in the public, the answer is no. You will see a lot of Technicians upgrading to General or Extra, but you will not see a lot of public interest. The number of ham radio licenses actually peaked in the late '90s and has been declining since then. It will possibly slow the decline, but there will still probably be fewer ham radio operators in a decade from now.

Another problem with Ham radio today is regulatory. A lot of things that a prospective ham would like to do with ham radio, you can't do on ham radio. A lot of the rules of ham radio are descendant from the 1920s. There are a lot of things that I would love to try today. Hams can use 2.4 GHz, just the same as Wi-Fi. Let's say I wanted to put up some Hi-Gain antennas and use a couple of hundred watts to see what kind of Wi-Fi range I could get – you can't do that with current rules. Let's say I wanted to hold a test at a certain time running 5 watts of power. I will run some audio tones, and I want people to send me reception reports. Well, guess what: I can't do that. A lot of kids today are into RF, which are legal under part 15, but they are not legal for ham radio operators to do. Maybe it should be about experimentation with RF wireless communications, in all its forms, rather than being about just two stations communicating with each other.

There is a minority, but a very vocal minority of ham radio operators that are grumpy and anti-social that seem to go out of their way to make a newcomer feel unwelcome in the hobby. I encountered that when I moved out to Texas, and I got a vanity callsign. Someone said to me, "as a Technician you will learn." I am eligible for a Quarter Century Wireless Association as an Extra! So I have to put them in their place sometimes. However, I don't think it is a majority, but a minority that is negative. All it takes is twenty to thirty percent of a neighborhood, to make it miserable for the rest of the seventy or eighty percent. If anything, we need people to lighten up and be more generous toward newcomers.

Telephone Interview Conducted July 6, 2006, by Jason R. Gardner. Unfortunately, due to health issues, Harry discontinued his blog on the Future of Radio a few months later.

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Stormy Weather, Help from Readers & Tracking Those Elusive IRCs

April, across most of North America, brings with it some of the most violent storms of the year and rouses most radio enthusiasts to a long season of trying to protect their gear.

❖ Luck-Induced Lethargy

Lightning storms are mostly random weather events which pop up, move swiftly across the countryside and dissipate as quickly as they were formed. Their jabs of lightning appear to strike just as randomly. Most of us are just plain lucky. We've never been hit with the fury of a lightning storm, and that builds in a sort of protection lethargy.

Everyone has stories of the crazy things lightning can do. I've had numerous nearby lightning hits which have, over the years, taken out a good quantity of 100 year old oak trees. One struck an old oak, killing it instantly, and threw a ten foot slab of bark over the top of the house. Another strike killed four such trees simultaneously. A friend who lives in an even more lightning prone area had a strike which took out all his major appliances including his AC, the well pump (100 feet from the house) and even took out the computer in his car!

A neighbor, who had never suffered a lightning hit, attributed his luck to some sort of lightning immunization until a storm hit that took out all of his appliances (well pump, AC & TV included).

❖ The Least You Can Do

The National Lightning Safety Institute (NLSI), an industry organization, says, "Lightning effects can be direct and/or indirect... Lightning 'prevention' or 'protection' (in an absolute sense) is impossible." NLSI explains that, according to the insurance industry, there will be an insurance claim for every 57 lightning strikes and that lightning causes 26,000 house fires annually amounting to more than $5 billion in losses.

Most of us radio enthusiasts have an assortment of antennas on our houses which makes us seem more vulnerable to lightning damage than other homes. But, if our antennas and masts are well grounded, this may not be the case. Furthermore, most damage from lightning storms is from power surges coming in through electric lines which feed our houses, not from lightning surges entering through our antennas.

While you can't prevent your home and equipment from ever experiencing lightning damage, there are quite a few things you can do to minimize the damage. When a storm is approaching or when you are away for the day during storm season, the easiest thing to do is to unplug sensitive electronics (radios, satellite receivers, TVs and computers). Disconnect any antennas from all radios, TVs, VCRs, DVRs, and satellite TV receivers. Don't forget to unplug phones and associated electronic devices from the wall, too.

Just unplugging may not be enough. I've seen 3-foot long sparks shoot out of a ceiling fan during a lightning storm. I've also seen similar sparks shooting out from an electrical outlet. Such ambient energy can leap to a nearby electronic part and fry it. I once lost the modem in a computer, despite the fact that it was totally unplugged from every port. But, it was within a few inches of the electrical plug. Now, during a storm I unplug the computer and actually haul it away into a closet with no outlets!

Most "surge suppressor" outlet strips aren't up to the task. The best protection for appliances you can't unplug from the wall (refrigerator, for instance) is to replace the existing outlet with a ground fault interrupter (GFI) outlet, available at any hardware store. You can also replace regular circuit breakers in your breaker box with GFI circuit breakers. GFI outlets and breakers are extremely fast acting and do a good job at isolating the appliance from the power surge.

Reduce lightning damage by using a Ground Fault Interrupter (GFI) wall outlet or circuit breaker or both! (Courtesy: naturalhandyman.com)

For antennas, you can run a heavy gauge copper wire where you bring antenna leads into the house. Attach the end outside to an 8-ft copper ground, and on the other end solder an SO-259 antenna socket. When a storm is approaching, disconnect the antenna from the radio and insert it into the grounded socket. Now, with both the mast and the antenna grounded, there'll be less chance of lightning entering through your antenna.

❖ Readers Write

MT reader Greg Harris, WDX9KHY, wrote regarding my comments in the December issue about U.S. hams not answering SWLers QSL requests: "...I've been a ham band SWL since 1970. My QSL return averages are very good, all things considered....When a ham replies to a SWL card it is good to fill in the date/time/freq and mode... put SWL or such in the callsign space on the return QSL. In my experience most hams do this, [but] some just take a blank card, throw it in the SASE and send it back... Here in the USA ham band SWLing is alive and well..."

I get a good number of European SWL QSL requests and take them seriously. I always fill out the complete card and include the SWL ID (most EU SWLers have them). Some countries require a certain amount of accomplishment as SWLers in order to get an entry level ham license. I've always thought that was a good idea for the FCC to consider.

Robb Leamy, WB8BHU, wrote concerning a feature I did in the December issue of *MT* on digital TV. He was interested in the ProBrand HD3150+ (a stand alone digital off-air TV receiver): "...I have an older Toshiba (cable ready but not HD). It has S-video input which has my DVD player attached. Is this the input for the HD3150+ to be used? If so...will I have to install some kind of switch to switch between the HD3150+ and the DVD player... [also] ...Does the Pioneer AM/FM stereo receiver output to older sets or does it require an HDTV ready set?"

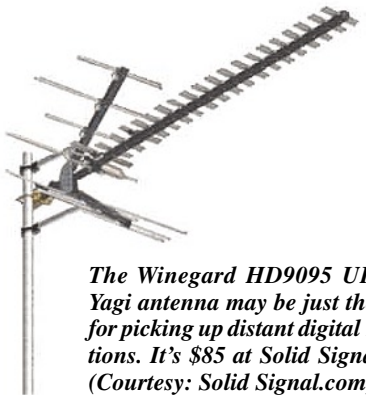
There are two ways to add audio/video inputs. The first is a multi-switch controller such as offered by Radio Shack (catalog #15-1988) which gives you four video/audio inputs and

Radio Shack's auto-sensing 4 way stereo A/V selector and RF manager ($40) could be the solution when you add an off-air digital TV receiver to your current TV. (Courtesy: Radio Shack)

lets you switch among them. This is the cheapest such unit and has the fewest features. I found this similar unit at Circuit City for $41. Now, if you have or buy a modern stereo, it will have inputs for extra video and audio sources including "S" video. It also has the ability to give you surround sound which a digital off-air receiver such as the HD3150+ offers. So, even if you don't have an HDTV set you'll get a great digital picture and surround sound audio!

A reader who wished to remain anonymous was one of the DISH Network subscribers who was cut off from receiving his local CBS affiliate via satellite despite the fact that his nearest CBS affiliate was in another state some 90 miles away. The channel in question is a VHF channel, and the reader wanted to know what type of antenna he would need to be able to receive it.

As it turns out, the VHF channel you want to receive will switch to UHF in two years when the FCC/Congressional digital TV mandate takes place. So, there's little reason to build an elaborate VHF-TV antenna system. Here's what you can do: The cheapest and easiest is to get the best UHF-TV antenna you can buy: the Winegard HD9095P (**www.solidsignal.com**). Add a UHF antenna pre-amp (Winegard AP4800), use RG/6 coax for the down lead and put the antenna up at least 30-ft on a rotatable mast.



The Winegard HD9095 UHF-TV Yagi antenna may be just the ticket for picking up distant digital TV stations. It's $85 at Solid Signal.com. (Courtesy: Solid Signal.com)

Add this Winegard AP4800 UHF-only mast mounted pre-amplifier ($59) to an HD9095 antenna on a rotatable mast at least 30' above the ground and you'll have a great UHF-TV DX antenna. (Courtesy: Solid Signal.com)

If that doesn't do the trick, you can double the dB gain of any antenna by doubling the antenna height. If 60-ft is not possible, then try a "quad-stacked Yagi array." This is a system of four identical Winegard UHF antennas which you will mount on two separate 5-ft masts five feet apart. These two masts will be joined by a wooden 2 x 2 and fixed to a mast on a rotator. All antennas must be lined up facing exactly the same direction. Join all four antennas with identical lengths (+/- 1 inch) of RG/6 coax which are attached to a 4-to-1 antenna feed combiner (Radio Shack #16-2570 $14). This is called a "phasing harness." Now, take the output of this combiner and put it into your TV. You don't use a pre-amp with the quad stacked array.

Antenna combiner/splitter lets you join up to four antennas into one feed. This is the center of the UHF-TV antenna array's "phasing harness." (Courtesy: Radio Shack)

❖ Tracking Those Elusive IRCs

The best way to insure that you'll get a QSL card in the mail is to send a couple of International Reply Coupons with your QSL request. IRCs are issued by the International Postal Union, and all IPU signatory countries (the U.S. is one) issue and honor the IRC. From time to time old IRCs expire and new ones are issued. That happened at the beginning of this year.

What has also happened is that over the years many local post offices stopped carrying IRCs altogether. Recently when I needed to buy IRCs, I knew not to bother with post offices locally, so I went on line. But, there's no mention of IRCs at the USPS web site. So, I called the USPS customer service 800 number to try to buy them. I won't bother giving the number here because they were of no use at all.

Finally, I called the main post office in the capital of the state where I live and spent quite a few minutes talking to several postal employees before I found one who knew what I was talking about. He said if I sent a check for the number of IRCs I wanted to the main post office address in the capital, they would mail back the IRCs.

IRCs are now $1.85 each. Most amateur radio DX stations want two IRCs for their QSL at a cost of $3.70. This is why many hams choose to send $2 (U.S.) in a nested envelope instead. That's a $1.70 savings on each QSL sent to a foreign address. But, there are obvious risks in sending cash. So, for those addresses which are risky, send IRCs; for ones you think you can trust, send cash.

ASK BOB

GENERAL QUESTIONS RELATED TO RADIO

Bob Grove, W8JHD
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Q. *You mention in your "Beginners Guide to Shortwave Listening" (**www.grove-ent.com/guideswlistening.htm**) article that a dipole antenna is hard to beat. How long should the dipole be if I want to use the antenna for AM and shortwave? (Bob Smith, Sequim, WA)*

A. There really is no answer to this for receiving purposes on shortwave and below. The reason is that the frequency (thus, wavelength) tuning range for shortwave alone is at least 10:1, and with AM medium wave thrown in, more than 30:1. A dipole is generally only resonant on or about its central frequency for about 5% of its length.

It's vastly more important for the AM medium-wave and shortwave bands (0.5-30 MHz) for a horizontal antenna to have the following characteristics:

(1) Long enough to capture enough signal above the receiver's own self-generated circuit noise; for modern, sensitive receivers, that's generally around 20-40 feet. Even though a longer antenna makes the S-meter read higher, it is also picking up more noise, so it's a net-zero gain with the added probability of strong-signal overload.
(2) High enough to avoid obstacles in the way of signals, and above the reflective ground surface (at least 15-20 feet – higher is better).
(3) Away from electrical power lines or, if that's not possible, at least at a right angle (perpendicular) to them.
(4) Away from the dwelling so as not to be overwhelmed by radiated electrical interference from household appliances and electronic accessories; again, the wire running perpendicular to the house is better than parallel.
(5) Fed to the receiver with coaxial cable to eliminate electrical interference pickup on the transmission line.
(6) Erected so that the desired signals arrive off the sides (perpendicular to the wire axis), not the ends.

Q. *Why do some satellite communication dishes have a center pole wrapped like a wide-spaced spring? Is the frequency response dependant on how wide the spiral is? (Bill Grove, Murphy, NC)*

A. If the coil were instead a vertical or horizontal set of elements like a beam, that would make it either vertically or horizontally polarized, thus favoring those polarizations of signals; but by wrapping it as a spiral (helix), it offers circular polarization, responsive to any plane (mixed polarization). And yes, the spacing of the helix from the suspending pole does determine the wavelength to which it responds. Such antennas also have the advantage of a wider bandwidth than linear beams like the Yagi.

But there are disadvantages to the helical antenna. For equivalent gain, the helical antenna requires a massive reflector at the back as compared to the simple dipole element of a Yagi. The helical is used primarily to receive stable signals from satellites tumbling in orbit, thus the need for 360 degree polarization. Terrestrial directional beams take advantage of fixed polarization and, therefore, are of simpler design.

Q. *Is it reasonable to use a cellular antenna as a general-coverage, mobile scanner antenna for public safety and aircraft monitoring? (Tandy Brown)*

A. As a matter of fact, I frequently use cellular mobile antennas for general-purpose scanning and they are quite satisfactory. Don't expect the performance that a good, mobile scanner antenna can provide, but for general local reception, they work just fine. The more "pigtail" coils on the whip, the better the low-band response.

Q. *Will rain increase the range of low frequency radio signals that rely on ground wave such as the AM broadcast band and lower? I would think that rain would increase ground conductivity. (Steve Green, Santee, CA)*

A. Although the water can increase surface conductivity, the raindrops/mist can attenuate signals, and if it brings lightning, that adds to the background noise! Not only that, but unless it's a saturating rain, the surface improvement would be rather superficial, because the water itself is actually a very poor conductor; it needs dissolved salts to ionize, increasing the overall conductivity of the first few feet of ground.

So the bottom line is that, just because it has rained, I doubt that you'd see much improvement in LF reception!

Q. *I have a nice 10 amp battery charger that does a great job, but the instructions say not to use it as a power supply. Why not? (Mark Burns, Terre Haute, IN)*

A. Battery chargers have no filter capacitor to smooth out the ripple in the rectified current, so they deliver pulsating DC. Using one as a power supply probably wouldn't hurt anything so long as the voltage is in the proper range, but the 120 Hz hum from the pulsating current would be horrendous!

Q. *As an attorney, I am pursuing a case in which an abuser stole his girlfriend's cell phone and used its recorded voice mail contents to find out whom she had contacted to file charges. Is this a clear violation of cell phone privacy, the basis of the cell-phone frequency deletion on scanners? (Name withheld)*

A. I suspect that his defense would be that he was not intercepting a cellular phone call, but to a recording made by one of the original two parties who was aware of the recording, thus making the recording lawful. The prosecution therefore, in my opinion (I'm not an attorney), should proceed along the line of the theft of the phone and invasion of privacy.

Q. *I have an old multiband portable radio. Lately when I change bands or tune the dial it makes a "fluttering" noise. Would tuner cleaner help and, if so, how do I apply it? (Russ deBrito, email)*

A. Does the "flutter" sound change if you wiggle the band switch? That is a sure sign of dirty contacts and, yes, tuner cleaner is the solution. You need very little of the spray (available from Radio Shack), and it needs to be applied directly to the contacts of the switch. You'll need to take the back off the case to see if you can get the little sprayer tubing to the switch contacts.

If you also get the noise when you turn the main dial, that may be due to debris or condensation on the spacing insulators of the tuning capacitor, or corrosion or debris at the bearing where the rotor shaft meets the stator frame. Try twisting the dial back and forth, over and over, throughout its tuning range to see if that subdues the noise. A tiny bit of tuner spray at the rotor bearing is also recommended.

If that doesn't work, you may need to replace that variable capacitor. But first, if it can be disassembled, you may take it apart and wipe clean all the little insulation sheets between the plates of the capacitor as well as the dab of tuner cleaner at the shaft bearing.

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.)

MT HELP DESK

SPECIFIC FREQUENCY AND EQUIPMENT QUESTIONS

Larry Van Horn, N5FPW
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Q. *I monitored Andrews AFB calling Shark 73 on 8992 and I also heard them on 13971. Could you please help me ID this Shark 73 I heard - Shark 73? (Tom via email)*

A. Unfortunately, there is not enough information from your intercept to try to present a reasonable ID. Without more information, such as the platform type, I would be shooting in the dark.

The Shark callsign has been associated with some DoD aircraft, or it could even be a military maritime vessel. For instance, below are just a few of the aircraft platforms that have been confirmed using the Shark callword.

A-10 23FW/74FS Pope AFB, NC
A-10 103FW/118FS Bradley ANGB, CT
C-130 172 Wing/171AS Selfridge ANGB, MI
C-130 USSOUTHCOM Aircraft
F-15 48FW/492FS RAF Lakenheath, England
F-16 482FW/93FS Homestead ARS, FL
F-16 57 Wing/FWS F-16 Division Nellis AFB, NV
T-45 VT-7/TAW-1 Meridian NAS (McCain Field), MS

Q. *Can you help me identify who is using 360.800 MHz in my area of the country? I have this on my list as McGhee Tyson approach/departure control. I doubt I could hear communications here in Central Alabama from Knoxville. I did catch an unknown check with JAX Center on this frequency. I've tried a couple of sources and can't find a Jacksonville Center listing for this frequency. (Keith Coleman, Central Alabama)*

A. Jacksonville ARTCC has a remote communications site located at Tallahassee, Florida. It is a high altitude sector and well within range of your central Alabama location.

Q. *What do I need to monitor ALE systems on HF? (Brandon Johnson via email)*

A. You will need a stable and sensitive shortwave receiver, such as the Icom R-75 or better, a good outdoor antenna, computer with sound card, and some software to decode ALE signals.

Grove does not sell any software or hardware units that decode ALE. I am only aware of one freeware software package available on the internet. A quick Google search produced the following link to Charles Brain's PCALE program: **www.chbrain.dircon.co.uk/pcale.html**.

Q. *I am hearing stations 30, 40 and 50 with a mention of 60 on 12067 kHz USB. Who is this I am hearing? (Duke Rumley, North Carolina)*

A. These calls are associated with U.S. Army aviation units and the ground station, callword "Wolfman." This is a U.S. Army air support operations center (ASOC) located at Fort Polk JRTC in Louisiana. This frequency is part of an HF network that is used as an immediate air request network by US Army aviation units. It has been heard near this frequency and several others for years now. Other frequencies associated with this Army aviation net include: 4537.5 (USB), 5301.5 <Spare> (USB), 8037.0 <Spare> (USB), and 9143.5 (USB) kHz.

Q. *I heard a Canadian military aircraft working Trenton Military on a SAR mission last night on their 11232 kHz frequency. The aircraft callsign was Atlas 310. Do you know who/what this is? I haven't done much listening to Canadian military aircraft, but since the signals were so strong, I was kinda curious as to who it was. He talked about air speed of 250 so I'm guessing a C-130 or maybe one of the other slow movers the Canadians fly. (Jim Pogue, Tennessee)*

A. Your Atlas 310 is no doubt a CanForce CC-130 from the 14 Wing/413 Squadron located at CFB Greenwood, Nova Scotia.

Q. *What PC based scanner will receive APCO-25 (P-25)? (Glenn Morris via email)*

A. The only PC based scanner that I am familiar with that can decode a P-25 digital stream at presstime is the Icom IC-R2500. You will need to purchase their optional UT-122 P-25 digital voice decoder (list $248.00). Unfortunately the R2500 will only decode the P25 digital stream, it cannot track any of the trunking systems used by public safety agencies.

You can also purchase the AOR AR-5000 wideband receiver and their optional ARD25 P-25 digital decoder to monitor conventional-only APCO-25 digital signals. This unit can be computer controlled using third party software.

Another option is to purchase one of the digital trunk tracking scanners from Uniden, and use your serial or USB port to computer control the radio using Uniden's UASD or third party software.

Q. *The constant RTTY on 9030 kHz – who is it and where? I can't seem to find anything except generally the Air Force nationwide in our old Federal File Directory. (Bob Grove via email)*

A. Best information I have is it is one of the U.S. Navy encrypted (850/75) RTTY streams from Saddleback Key, Florida. It has been round for years, at least back to 1998 that I am aware of.

Q. *I have copied the ALE stations that follow on 15867 kHz. Do you know who or where these stations are? ALE stations: 709 CNT CRB D42 D44 F04 F41 I01 I34 J19 J26 PNR T9F. (Terry Netzley, W8NJR, Ludlow Falls, OH)*

A. These are all ALE addresses that are commonly heard on the Immigration and Customs Enforcement COTHEN HF radio network. Here is a breakdown of the addresses up you monitored.

ALE Addr	*Station/Location*
709	US Coast Guard HC-130H (1709) based at CGAS Sacramento, CA
CNT	ICE Regional Communications Node Central, location unknown
CRB	ICE AMOC Regional Communications Node, Caribbean
D42	ICE P-3B AEW&C (Detector Asset) N142CS/Buno No. 153452
D44	ICE P-3B AEW&C (Detector Asset) N144CS/Buno No. 153446
F04	US Coast Guard HU-25C (2104) based at CGAS Miami, FL
F41	US Coast Guard HU-25C (2141) based at CGAS Cape Cod, MA (Voice call Falcon 41)
I01	ICE Cessna 550 (Interceptor Asset) N37201
I34	ICE Cessna 550 (Interceptor Asset) N2734K
J19	US Coast Guard HH-60J (6019) based at CGAS Clearwater, FL (Voice call 19 Charlie/Juliet 19
J26	US Coast Guard HH-60J (6026) (Voice Call Juliet 26)
PNR	DEA ground station Nassau, Bahamas (possibly PNR 400 aka Panther 400)
T9F	Unknown

Here are some general ALE address categories

5##	USCG HC-130s
7##	USCG HC-130s
A##	CBP UH-60 Blackhawks. At one time was also used by OPBAT Army UH-60Ls, but they have switched to X##
C##	US Army Corps of Engineers ground stations and mobiles.
CS#	COTHEN remote ground stations
D##	CBP P-3/Q200 Detector Units
F##	USCG HU-25 Falcons
FL#	CBP Florida remote ground stations
H##	USCG HITRON MH-68A gunships
I##	BP Interceptor Aircraft
J##	U.S. Coast Guard HH-60J/MH-60J helicopters
M##	CBP C-12M Maritime Surveillance Aircraft
MC#	Remote COTHEN transmitter
MS#	Possible remote or mobile COTHEN transmitters
MV#	CBP Unknown. Possibly marine vessels.
R##	Unid Air Asset voice call "RAIDER".
S##	CBP Aircraft
T##	CBP Tracking Aircraft
TR#	Possible remote COTHEN transmitter
X##	US Army UH-60L helicopters deployed to OPBAT. Also use A## on occasion. There is some evidence that OPBAT helos may no longer be part of 2-3rd AVN, but may now have another unit designation.

You can see the latest list of all observed COTHEN ALE identifiers, compiled by the dean of COTHEN monitors, on my personal blog - *The Btown Monitoring Post* at **http://monitor-post.blogspot.com/2006/12/cleary-counter-druglaw.html**

Dan Veeneman
danveeneman@monitoringtimes.com

Smart Nets, Hang Time, and Squelch Tails

Like any hobby, scanning has its own set of jargon and technical terms that can cause confusion. This month we take a look at some Motorola marketing terms and follow up with explanations of "hang time" and "squelch tails."

❖ Smart Zone, Smart Net

Dan,

I found your article on the Pro-97 in the February issue of Monitoring Times interesting. The Pro-97 handles Motorola Type II Smart Net; is Smart Net the same as Smart Zone, which is the trunking system here in Morris County, New Jersey? I have the Pro-97 and have yet to listen to trunked communications.

Thanks in advance for your answer.
Bob

SmartNet and SmartZone are marketing names used by Motorola to refer to configurations of their trunked radio system products. A brief overview of the evolution of Motorola's trunking technology may help to put these terms into perspective.

The original Motorola trunked radio systems are called Type I. The mobile radios in a system are organized into "Fleets" and "Subfleets." The number of fleets in a system and the number of subfleets in each fleet are typically set when the system is first installed. In order for radios to communicate with each other, they usually have to be programmed to be in the same fleet and subfleet. This limits the number of radios that can communicate with each other and makes expansion of the system rather complicated. Type I systems operate only in the 800 MHz band.

Scanning a Type I system requires the use of a "Fleet Map," which allows the scanner to understand the control messages sent by the system controller. These control messages assume each radio already knows how many fleets and subfleets are in use, so the scanner must also be given that information. A system may have anywhere from 1 to 128 fleets and anywhere from four to sixteen subfleets.

Motorola Type II systems replaced the Fleet and Subfleet organization with two separate identifiers: radio IDs and talkgroup numbers. Each radio in the system has a unique identifier and is also programmed to be part of one or more talkgroups. Because the talkgroup numbering scheme is completely separate from the radio identifier, any radio may be a member of any talkgroup. There is also no limit to the number of radios in a talkgroup. A Type II system is much easier to change or expand than the Type I.

Type II systems can operate in the 800 and 900 MHz bands as well as VHF and UHF frequencies.

A Hybrid system, sometimes referred to as Type IIi, have both Type I Fleet/Subfleet radios and Type II radio ID/talkgroups. Hybrid systems are typically run by organizations that want to use older radios on newer, more capable equipment.

A SmartNet system refers to a trunked radio system carrying Type II traffic. It includes repeater equipment and central *system controller* that ties everything together.

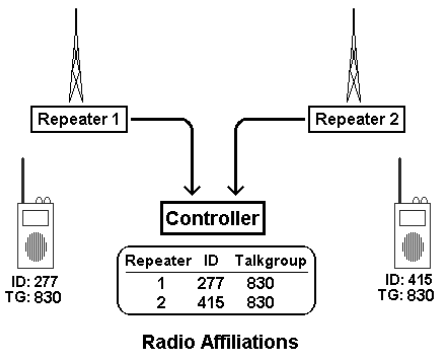
SmartNet systems are capable of operating on as many as 28 radio channels and can support up to 65,535 unique radio identifiers and as many as 4,000 talkgroups. These systems may have more than one repeater site.

SmartZone is a wide area network of two or more SmartNets connected together. The connection is done via a zone controller, which passes voice and control traffic between the individual SmartNets. As many as 48 sites may be connected together in a SmartZone system, linked via microwave or leased landlines.

❖ Radio Affiliation

When a radio enters a SmartZone system, it listens for a control channel. When it finds one, the radio confirms that the channel is part of its assigned system and then automatically sends an *affiliation* message. The message includes the unique radio identifier and the talkgroups for which the radio is programmed.

The SmartZone system controller keeps track of each radio, along with its associated talkgroups and the repeater that received the affiliation message. When a talkgroup becomes active on the system, the controller sends the conversation to each repeater site that has at least one affiliated radio. In this way, no matter where a radio might be located within the coverage area of a SmartZone system, it will be able to participate in talkgroup activity.



Radio Affiliations

For example, imagine a SmartZone system with two repeaters. A mobile radio with an identifier of 277 is located in the coverage area of Repeater 1, and Radio 415 is located in the coverage area of Repeater 2. Both radios are programmed to be members of the same talkgroup, number 830.

When the user of Radio 277 presses the transmit button, the radio first sends a channel request message, including the talkgroup number 830, on the control channel to the system controller via Repeater 1. The controller finds an unused voice channel on Repeater 1, assigns the talkgroup to that channel, and sends a "Go Ahead" message back to Radio 277. The user hears the familiar double-beep and begins talking.

Meanwhile, the controller checks to see if any other radios are affiliated with talkgroup 830 anywhere in the system. It finds that Radio 415 has affiliated via Repeater 2, so it finds an unused voice channel on Repeater 2 and begins sending a continuous "Talkgroup 830 is Active" message on the Repeater 2 control channel. Radio 415, listening to the Repeater 2 control channel, hears that message and tunes to the assigned voice channel. This allows the user of Radio 415 to hear the conversation in talkgroup 830.

❖ Morris County, New Jersey

Morris County is located in northern New Jersey and is part of the New York metropolitan area. It is home to nearly half a million residents as well as more than fifty Fortune 500 business headquarters or facilities. It is one of the ten wealthiest counties in the United States.

Morris County operates a Motorola Type II trunked radio system. This is a SmartZone system carrying voice traffic in both analog form and in a digital format specified by the APCO Project 25 Common Air Interface (CAI) standard. So, in order to hear everything, you'll need a digital-capable trunk-tracking scanner. Unfortunately,

the PRO-97 is not capable of monitoring digital transmissions, so you will miss the CAI voice traffic.

❖ UHF Trunked Radio

You may not have heard trunked radio traffic in Morris County because the system operates outside of the common 800 MHz band. Frequencies licensed to Morris County are in the UHF band, between 470 and 480 MHz. Because this is a "non-standard" band for trunked operation, scanners need to use a "custom frequency table" in order to automatically tune to the proper frequencies.

Instead of sending the actual radio frequency, Motorola system controllers send channel assignment messages with codes representing the frequency. In the 800 MHz band, a code will always represent a specific frequency. However, in the UHF band, a code may represent different radio frequencies depending upon the configuration of the trunked system. The custom frequency table provides three additional pieces of information needed by the scanner to compute the actual radio frequency: a base frequency, a step value, and an offset number.

The "Base" frequency is the radio frequency from which the system channels are built. Channel numbers begin at the "Offset" value and go up according to the "Step" value. If you're of a mathematical bent, the voice channel frequency can be computed by the following formula:

Voice channel frequency = Base + (Channel - Offset) * Step

where Base is the base frequency, Channel is the Motorola channel code, Offset is the channel offset number, and Step is the channel spacing in MHz, typically either 0.0125 (12.5 kHz) or 0.0250 (25.0 kHz).

For the Morris County system, you'll need two entries in the custom frequency table:

Entry:	**1**	**2**
Base:	471.0000	476.0000
Spacing:	12.5	12.5
Offset:	380	520

The county system itself is divided into four zones. Each of the first two zones operates *simulcast*, meaning the same information is transmitted from each repeater at the same time. The remaining two zones operate from a single repeater site.

Zone 1 has four repeater locations in the county, specifically in the towns of Dover, Ledgewood, Morristown and Randolph. Each of these repeaters transmits on 476.4000, 476.4250, 476.5250, 476.5500, 476.6250, 477.0000 and 477.8750 MHz.

Zone 2 has three repeater locations in the county, in Boonton, Kinnelon, and Weldon, transmitting on these frequencies: 477.9250, 478.1500, 478.4500, 478.4750, 478.6250 and 478.6750 MHz.

Zone 3 has a single repeater site in Long Valley, transmitting on 472.5250, 472.6000, 476.7500 and 477.8250 MHz.

Zone 4 has a single repeater site in Long Hill and is licensed for five frequencies: 477.0500, 477.0750, 477.7000, 478.0000 and 478.6500 MHz.

Talkgroups on the system include the following:

Decimal	Hex	Description
16	001	Communications Center
48	003	County Law Enforcement (Common)
144	009	County Park Maintenance
176	00B	County Public Works
240	00F	Municipal Utilities Authority (MUA)
272	011	Morris Area Paratransit (MAPS)
32784	801	Sheriff and Park Police Dispatch
32816	803	Sheriff
32848	805	Sheriff (Car-to-Car)
32880	807	Search and Rescue
32944	80B	Prosecutor's Office
33040	811	Park Police
33072	813	Park Police (Car-to-Car)
33104	815	Municipal Government Law Enforcement 1
33136	817	Municipal Government Law Enforcement 2
33168	819	Municipal Government Law Enforcement 3
33264	81F	Office of Emergency Management
33328	823	Morris Integrated Radio System (MIRS)
33344	824	Morris Integrated Radio System (MIRS)
33424	829	County Fire 1
33536	830	County Fire 2
33600	834	County Fire Operations 1
33616	835	County Fire Operations 2

Besides the county trunked system, there are a number of conventional frequencies that are worth programming into your scanner.

Frequency	Description
151.0550	Regional Emergency Deployment System
153.7400	Juvenile Detention Center
154.6800	Statewide Police Emergency Network 1
155.4750	Statewide Police Emergency Network 2
453.8125	Sheriff Jail
453.9375	Morris County Fire (simulcast on 46.42 MHz)
458.6500	County Jail
462.1250	County College Security
472.2500	Sheriff Courts

Picatinny Arsenal is a U.S. Army facility in Morris County, about 45 miles west of New York City. It is home to the Armament Research, Development and Engineering Center (ARDEC), which performs work related to ammunition and explosives. The 2005 Base Realignment and Closure (BRAC) recommendations included plans to consolidate ammunition research at Picatinny.

If you're close enough to the base, you may be able to hear activity on the following frequencies:

Frequency	Description
165.1875	Police
163.5125	Fire
163.5375	Public Works
150.6500	Ordinance Disposal

❖ Hang Time and Squelch Tails

Subject: Motorola Trunked system with stuck repeater

Hi Dan,

I have (still have!) a BC-245 that I have been using to monitor local Motorola and EDACS systems. Works great. Lately, the San Francisco Motorola system has a channel that is always on the air (voice, not control). The scanner works fine until a group is assigned to this channel. When the conversation is finished, the scanner stays on that channel and still displays the group as though it was still active. If I let it sit there, I can hear different groups assigned to that channel, but the displayed ID does not update. The only way to get moving again is to hit Scan or Search, but the next time that channel pops up it's stuck again. If Motorola changed the hang time on trunking repeaters to 30 or 60 seconds, they could make them all unscannable by most existing scanners. It's like a magic bullet.

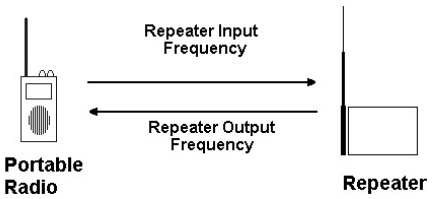
Is there any trick to deal with this problem on my old scanner, or do I have to upgrade to a unit with end code detection?

Appreciate all your columns and work.

Will in San Francisco

Will is describing a problem with "hang time" on a repeater. Hang time is the amount of time a repeater will continue to transmit after a mobile radio stops transmitting.

Remember that a repeater is a receiver connected to a transmitter. The receiver listens for transmissions on the *input frequency*. When it detects a transmission from a mobile radio, it instructs the transmitter turn on and start sending the transmission on the *output frequency*. In this way it "repeats" the transmission on a different frequency.



When the receiver detects the end of a transmission, it instructs the transmitter to stop transmitting and turn off. However, the system controller may keep the transmitter on for some additional period of time. This period is known as "hang time" or "drop out delay." The transmitter may send no audio at all, or there may a tone, or even a pre-recorded message (for instance, the General Electric jingle "We bring good things to light" was often heard on some older GE trunked repeaters).

This additional hang time can confuse scanners. The simplest way for scanners to detect the end of a transmission is to monitor the incoming signal strength. When a signal is above the squelch setting threshold, the scanner will unmute the audio and the user can hear the signal. When the signal falls below the squelch threshold, the scanner mutes the audio and goes back to scanning. There is a very short period of time between the drop in signal strength and the audio muting during which you can hear a quick burst of noise. This noise is called the "squelch tail" and is very familiar to most scanner listeners.

Although common, the simple squelch method is not always successful. If the original transmission ends but the repeater continues to transmit, keeping the signal strength above the squelch threshold, the scanner will think the transmission is continuing and will not resume scanning. This is the condition that Will is describing.

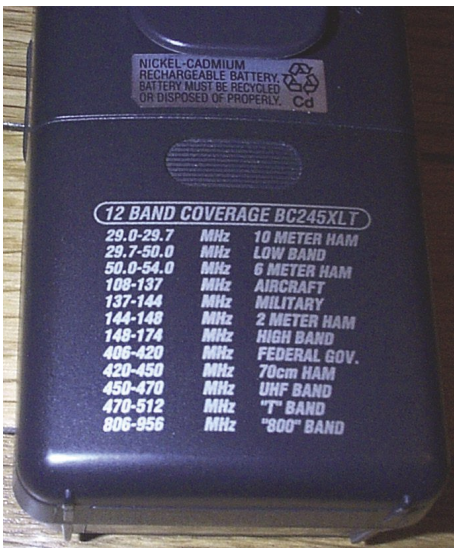
During an analog transmission on a Motorola trunked system, when the mobile radio user releases the push-to-talk button, the radio sends a subaudible disconnect tone to the system controller. This provides a positive confirmation that the user has stopped talking and serves as the start of the repeater hang time. When the hang time is complete, the controller sends out a message on the assigned voice channel informing all other radios that the conversation is complete. When a mobile radio receives this message, it stops listening to the voice channel and goes back to monitoring the control channel.

❖ Uniden BC245XLT

The Uniden Bearcat BC245XLT is a handheld scanner introduced in 1999. It has 300 memory channels in 10 banks and covers common frequency bands in four segments, including 29 to 54 MHz, 108 to 174 MHz, 406 to 512 MHz, and 806 to 956 MHz. It is able to track activity on Motorola and EDACS (Enhanced Digital Access Communications System) trunked radio systems. The 245 introduced the concept of Multi-Track, allowing you to track more than one system at time as well as combine conventional and trunked frequencies. Although innovative when it was introduced, it was finally replaced in 2004 by the BC246T.

Although not mentioned in the manual, the BC245XLT has the ability to detect the disconnect tones sent by Motorola radios when they're finished transmitting. This ability can be turned on and off via the keypad.

When Disconnect Tone Detect is active, the scanner will listen for the subaudible signal indicating the end of a transmission. The current squelch setting is ignored when this is active.



If Disconnect Tone Detect is off, the common squelch threshold process will attempt to determine the end of a transmission. The radio will use the squelch knob setting to determine when the signal strength has dropped enough to be the end of a transmission.

Disconnect Tone Detect can be turned on and off by pressing the [SVC] key while monitoring a Motorola trunked system. When the radio beeps twice, the detection ability will be turned off. The DATA icon (with a slash through it) should be flashing. Repeat this process again to re-activate the feature.

❖ McMinnville, Oregon, update

A reader from Oregon writes in with some additional information about the McMinnville system that we discussed in the December 2006 column. Apparently the squelch tail is causing difficulties there as well.

Hi Dan,

I just read your blurb about our trunking system here in McMinnville, and yes they have been trying for about two years to get it to work. It can be monitored but you can't follow the trunking. One of the problems is the 12-second squelch tail. Besides the frequencies you listed (460.0375, 460.2625, 460.3375, and 460.6375) there are also 460.050, 460.100, 460.2750, 460.3250, 460.4125, 460.5625, 460.5875, and 460.6250. I listen to this system daily on several scanners from a Radio Shack PRO-2044 to a Uniden BC796D with no decoder. I enjoy your column and all of Monitoring Times. Keep up the good work and thank you for your time.

Steve in McMinnville, Oregon

That's all for this month. Please continue to send questions, comments, and frequency lists to me at *danveeneman@monitoringtimes.com*. You can find more radio-related information on my web site at **www.signalharbor.com**. Until next month, happy monitoring!

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Bearcat® BCD396T Trunk Tracker IV

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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 birdies. 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.

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Bearcat 246T up to 2,500 ch. Trunktracker III handheld scanner	$214.95
Bearcat Sportcat 230 alpha display handheld sports scanner	$184.95
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Bearcat 92XLT 200 channel handheld scanner	$109.95
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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** - 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 birdies. **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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G11: A Numbers Station Returns

Again this month, we have an example of why "numbers" stations are very seldom dropped from the lists kept by hobby groups, even if they have been off-air for years. G11, a mysterious, German-language broadcast not heard since 1998, is back. As is usually the case with numbers broadcasts, it just started back up as if nothing had happened in the intervening nine years.

This station is also known as "Strich" ("Stroke" or "Line"). The name comes from an older classification system in which stations were described, often in a certain dark humor, from prominent elements in the broadcasts. This one had the same format in four different languages, each one making heavy use of that language's spoken description of the slash bar character (/). Therefore, it became forever known as Strich (German), Oblique (English), Presta (Slavic languages), and Cherta (also Slavic). These are referred to as G11, E11, S11, and S11a in the newer "Enigma" system now in use.

Very little is known about the source or target audience of the Strich family. Presumably, it's an intelligence organization broadcasting to low-level spies recruited from deep inside the populations of target nations. However, no one knows which one it might be.

Simon Mason, a well-known numbers expert from Europe, once said that the Strich family "may be the most pointless waste of time in the history of radio." Readers who can find Disk 2 of the old Conet numbers recordings will find some vintage tracks, including one notorious transmission of a voice with a machine-spliced female barking like a dog.

The callup on all these stations is always three figures, the famous slash bar, and two figures. On rare occasion, a message follows. Much more often, it simply repeats the callup, with mechanical precision, for five minutes or until the listener gives up with a bad headache.

The last documented intercept of this station had been in 1998 by "Gert," a listener who is still active in ENIGMA 2000 (the current online incarnation of the very dedicated European Numbers Gathering and Monitoring Association). This changed on January 31 of this year, when several E2K members and radio bloggers heard a schedule on 5782 kilohertz (kHz) upper sideband (USB) at 1800 Coordinated Universal Time (UTC). This was soon followed by another USB transmission on 5779 kHz, also at 1800. In both cases, the signal was loud and clear over a wide area of the world.

The callup on both of these was "121/21."

The official city seal of Koenigs Wusterhausen still depicts an antenna farm. (See "Other Fun Places")

For various historical reasons, "121" from this station is of special interest. Let's hope we get more surprises from G11.

❖ Visual DX?

DXing, of course, refers to the logging of signals from distant transmitters, often with the aim of hearing new ones. It's one of those old radio slang terms of disputed origin, though it might have come from a phone company abbreviation for Distant eXchange.

Computers aren't going to replace DX anytime soon. There just isn't the same buzz when your web site downloads from China instead of the server farm up the street. It especially won't replace those all-too-rare instants when the ionosphere suddenly allows a strange new radio signal to pop in briefly, before it sinks back into the noise forever.

One thing the Internet's good for, though, is to *see* the places you hear. Computers allow the public to do recon that would have challenged even military expertise a generation ago. For the wide view, it's easy to zoom in on distant sites with Google Earth. Then it's possible, if a bit harder, to poke around with the search engines and see if there are any closer views online. This closer look is usually called "ground truth" when dealing with validation of conclusions reached from space or aerial photography.

I suspect most DXers are already hard-core Google Earth users. Those who haven't used this amazing program are in for some real fun, as long as their computers have the processing power, display memory, and fast net connections required to crunch its huge data loads. It has versions for Windows, Mac, and Linux, all downloadable for free at **earth.google.com**. Somewhere in the program's documentation, there at least used to be a warning that new users who found the program taking over their lives should seek addiction counseling. They weren't kidding, either. Google Earth, and its various supporting web sites, can eat up your time like nothing since the first role playing games.

Google Earth, among its other features, lets you enter just about any pair of latitude/longitude coordinates on the planet's surface, click on a magnifying glass icon, and fly there at dizzying speed. These can be entered in degrees, minutes, and seconds, or by degrees with many decimal places. For this column, we'll do the first one, because it's easier to read and remember.

Google Earth likes some data entry formats better than others. One format that works for me goes exactly like this: 38 22' 45.85" N by 121 45' 29.47" W. Notice the degree sign is missing, but the designators for minutes (') and seconds (") are not.

I got this particular set of coordinates from the Google Earth Community. This is a vast discussion site on the World Wide Web, with many thousands of place markers from users. These are locations already coded into Keyhole Markup Language and distributed in files with the extensions .kml or .kmz. Many of them link from inside Google Earth and will show up by themselves when Google Earth runs with the "Community" box checked. Others appear, ready for download, in messages from various enthusiasts. Radio sites have been pretty well documented.

So, the coordinates are entered into the top box on the left, and the magnifying glass is clicked. Stand by to get dizzy. You have just flown, like Superman, to a point looking straight down on the closed Voice Of America site outside Dixon, CA. Google just added high-resolution imagery for this area. Now, the previously hazy, brown square is revealed as a gigantic antenna farm from the Cold War era, with its huge Sterba curtains ready to again speak to the world if anyone wants them to.

Zoom out a bit, drop down, and examine the field just to the southwest. There's another obvious transmitter building, and a lot of circles in the ground with star-shaped designs. In aerial imagery, these are a sure signature of one type of high-frequency (HF) transmitting antenna. It's obvious we've found the Dixon Supersite used by Aeronautical Radio, Inc. (ARINC) and

Logo of LZW, Varna Maritime Radio, Bulgaria

Globe Wireless for communication with aircraft and ships, respectively. We've mentioned signals from this site many times in this column.

One can spend hours finding places they've heard. Numbers fans have combed every square foot of the Havana, Cuba, area. One interesting place is at 22 56' 55.10" N by 82 32' 42.22" W. Now, you're just south of another transmitter building, with many vent stacks and little roads leading out to antennas and/or places where there used to be antennas. Antennas show up badly on Google Earth, but any building with a lot of little roads fanning out into a large field is of potential interest.

Since this is near Bauta, a Havana suburb known to have a Radio Havana Cuba transmitting site, we've probably found one source for our Cuban signals. Since my discovery, someone else has publicly labeled this as a likely "onda-corta" station (Spanish for short wave).

As long as you're poking around Havana, try 22 59' 1.90" N by 82 27' 48.43" W. You will now be looking right at some really nice, Soviet-era dishes used for satellite intercepts when this area was the notorious Lourdes signal intelligence base. Most of this base looks to be in serious disrepair since the Russians packed up and went home. However, this particular area (the space section) looks very well maintained indeed.

❖ Other Fun Places:

Working vaguely eastward from California:

37 54' 52.32" N by 122 43' 30.26" W:
Dead center of the transmitter hall of historic KPH, the old Radio Corporation of America flame thrower. The commercial remnants of this station moved to Dixon when they were combined into the Globe Wireless network, but these transmitters live on as a maritime radio museum. The square structure down the road leading southwest is the venerable Marconi "Power House," once housing huge spark and alternator transmitters. Thanks to Dick Dillman for this one.

37 55' 26.44" N by 122 43' 55.78" W:
Transmit site for NMC, the US Coast Guard Communications Area Master Station, Pacific (CAMSPAC), a fixture on utility bands any time of the day. Yes, this is right next to KPH. The various geometric shapes in the ground are for antennas, a few of which are visible. Both of these stations are controlled from their receive sites. KPH's is at 38 5' 44.22" N by 122 56' 51.28" W. CAMSPAC, a fully-staffed facility with additional remotes at several other Coast Guard communication stations, is at 38 6' 6.95" N by 122 56' 12.98" W.

38 8' 39.00" N by 122 52' 40.00" W:
This is the original Marconi site, near Marshall, CA. It was later used by KPH, then a series of non-radio owners including the controversial Synanon organization. The large building with the red roof is a hotel built for station staff. It is now the Marconi Conference Center State Historical Park. (MT printed a short article by Leon Fletcher on Marconi's California stations back in November 1997.)

30 35' 39.70" N by 88 13' 15.85" W:
Primary site for WLO, Mobile Radio, AL. It looks like a residential neighborhood, but zoom in and look closely for some really nice yagis, log periodics, and other HF antennas.

40 52' 55.16" N by 72 38' 12.81" W:
An oddly-shaped clearing in the woods outside Riverhead, NY, with many antenna towers visible. This is most likely another major ARINC facility, with possible other users as well.

22 49' 31.32" S by 43 10' 56.06" W:
PWZ33, Brazilian Navy. Another woodsy clearing near Rio De Janeiro, with at least one tower visible.

51 10' 58.44" N by 2 48' 26.68" E:
OST/OSU, Ostend Radio, Belgium, now operated by the Ministry of Defence. It's impossible to miss the 65-meter towers, or the big signals from the powerful transmitters in the building.

53 40' 24.56" N by 9 48' 31.29" E:
Hamburg Meteorological, Germany, operated by the Deutscher Wetterdienst (German Weather Service) in Pinneberg. Again, the tall medium wave towers are easily visible, with HF antennas spreading out from there.

52 18' 19.23" N by 13 37' 2.41" E:
This woodsy antenna farm is the Koenigs Wusterhausen "Funkerburg" (literally "Radio Operator Hill"), oldest broadcast and utility transmitting site in Germany. Most visible is the 700-foot "Mast 17," currently used by an FM station. This historic site and its radio museum are now city property, finally saving them from demolition.

43 4' 1.13" N by 27 47' 9.58" E:
LZW, Varna Radio, Bulgaria. Maritime coastal station with interesting shapes in the woods that some Google Earth users have mistaken for Pagan crop circles.

Logo used by the radio museum.

46 25' 58.36" N by 30 30' 11.01" E:
This Stonehenge-like structure is a Krug Antenna, the Russian version of the giant circular arrays used worldwide by various countries for HF direction finding and communication intelligence. One of several American versions is visible at 61 15' 54.33" N by 149 51' 10.11" W, near the Elmendorf Air Force Base communication station in Alaska. Most other US antennas have been dismantled, leaving distinctive, circular clearings easily spotted worldwide. I wonder if future civilizations will think these were some sort of religious sites?

34 36' 48.95" N by 32 56' 43.86" E:
This odd-looking salt marsh is a gigantic antenna farm used by several very secret activities in the British Sovereign Area of Akrotiri, Cyprus, in the Mediterranean. Ground truth suggests that the branching structure at the north may be the feed for two large curtain arrays. There are many other antennas here, often aimed at the Middle East. It's likely that the Lincolnshire Poacher comes from here.

MT READERS ONLY

To access the restricted website for the month starting April 1, go to www.monitoringtimes.com, click on the key, and when prompted, enter "mtreader" under the user name. Your password for April is "cycle24" – Check in each month for new material!

UTILITY WORLD

UTILITY LOGS

Hugh Stegman

ABBREVIATIONS USED IN THIS COLUMN

AFB.....Air Force Base
ALE.....Automatic Link Establishment
AM.....Amplitude Modulation
ARQ.....Automatic Repeat Request
CAMSLANT...Communication Area Master Station, Atlantic
CW.....On-off keyed "Continuous Wave" Morse telegraphy
E3.....UK MI6/SIS Poacher tune, female, 5-number groups
E3a.....UK MI6/SIS Cherry Ripe tune, same format as E3
E10.....Israeli phonetic alphabet, female with 5-letter groups
EAM.....Emergency Action Message
FAX.....Radiofacsimile
FEMA.....US Federal Emergency Management Agency
HFDL.....High-Frequency Data Link
HF-GCS.....High-Frequency Global Communication System
JSTARS.....Joint Surveillance Target Attack Radar System
LORAN-C.....LOng RAnge Navigation, mode C
M8a.....Cuban 3-msg CW/MCW, ANDUWRIGMT = 1-0
MARS.....Military Affiliate Radio System
Meteo.....Meteorological
MCW.....Modulated CW or AM tone Morse telegraphy
RSA.....Republic of South Africa
RTTY.....Radio Teletype
Selcal.....Selective Calling
SITOR-A.....Simplex Telex Over Radio, ARQ mode
Unid.....Unidentified
US.....United States
USCG.....United States Coast Guard
UK.....United Kingdom
V2a.....“Atencion” Spanish numbers, 3-msg format

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 ().

100.0 “9940”-Group Repetition Interval of Western US LORAN-C chain, several stations plotted in pulse mode, at 0325. (Chris Smolinski-MD)

2320.0 “4ITS”-CW identifier from possible drift net beacon, at 0528. (Tom Sevart-Caribbean Maritime Mobile)

2643.0 A9M-Bahrain Radio, CW Identifier in SITOR-A phasing marker, at 0339. (Sevart-Caribbean)

2899.0 Gander-North Atlantic oceanic air control, working Continental 82 at 0541. (Sevart-Caribbean) N717DX-Gulfstream G-1V business jet, working Gander Radio, NFD, at 0645. (Allan Stern-FL)

3016.0 Santa Maria-Oceanic air control working Martin Air 602 at 0524. (Sevart-Caribbean)

3476.0 Ethiopia 500-Flight checking selcal GL-CQ with Gander, at 0811. (Stern-FL)

4018.0 Cuban AM Spanish “numbers” (V2a), abnormal callup, with M8a CW numbers going simultaneously, at 0300. (Bill Seamans-LA)

4329.0 Cuban AM Spanish “numbers” (V2a), callup 21435 83906 87863, bad carrier, at 0400. (Sevart-IN)

4442.0 KFD905-US Department of Agriculture, Washington, DC, working unknown FEMA station WGY9030, in ALE on the National Public Health Radio Network, at 2025. (Jack Metcalfe-KY) KFD905 is the US Ag Dept HQ station in Washington DC (Larry VH-NC)

4446.5 R01671-US Army, calling T2Z3 (2-3rd Aviation), ALE at 1339. (Mark Cleary-SC)

5634.0 Mauritius-Indian Ocean air traffic control, selcal BJ-FS and working Malaysian 201, a Boeing 747 with registration 9M-MPG, at 2142. (Patrice Privat-France)

5696.0 Coast Guard 2140-USCG helicopter, passing message for Sector Key West via CAMSLANT, at 2339. (Cleary-SC)

5732.0 J36-USCG helicopter, ALE with LNT, CAMSLANT, then voice as Juliet 36 to pass position, at 1732. (Cleary-SC)

5820.0 NCS106-Unknown National Communications System / FEMA auxiliary station, passing weather observations to WGY9030 in ALE, then voice as WGY 9470, at 1642. (Metcalfe-KY)

6586.0 Jet Blue 731-Flight in selcal check with New York Radio, at 0651. (Stern-FL)

6640.0 USAir 1495-Aircraft checking selcal BP-JK with New York, at 0016. (Sevart-IN) Air Transat 322-Airliner in patch via New York to Medlink, went to 3494 kHz, then back to 6640, at 0307. (Stern-FL)

6840.0 EZI-Israeli Intelligence “numbers” (E10), callup and message at 2200. (Mike L-West Sussex, UK)

6842.0 EZI2-Israeli Intelligence (E10), callup only at 0130. (Mike L-UK)

6855.0 Cuban AM Spanish “numbers” (V2a), interference from WYFR broadcast, at 0300. (Seamans-LA) V2a, interference with WYFR, at 2101. (Cam Castillo-Panama)

6900.0 Lincolnshire Poacher-UK Intelligence, Cyprus (E3), in progress at 2028. (Ary Boender-Netherlands)

6959.0 Lincolnshire Poacher (E3), identifier 69826, started late at 2202. (Boender-Netherlands)

7337.0 Lincolnshire Poacher (E3), also on 9251 and 12603, in progress at 1828. (Boender-Netherlands)

7396.8 Unid-Bangkok Meteo, text weather forecast FAX at 1700. (Privat-France)

7527.0 Juliet 03-USCG helicopter, position for CAMSLANT at 1729. (Cleary-SC)

7759.0 IZOM-Nigerian National Petroleum Corporation, Izom Distribution Station, ALE sounding at 1736 and 1755. (Privat-France)

7887.0 Cuban AM Spanish “numbers” (V2a), incrementing callups 61141 57191 7433, 61142 57192 74332, and 61143 57193 74333, three successive days at 2001. (Castillo-Panama)

7975.0 Cuban AM Spanish “numbers” (V2a), three days at 1600. (Castillo-Panama)

8009.0 Cuban MCW cut numbers (M8a), callup 71432 97131 03912, at 2301. (Sevart-Caribbean)

8010.0 Cuban AM Spanish “numbers” (V2a), callup 13392 27362 35542, at 1701. (Sevart-Caribbean)

8023.0 087CDCS51-VA State Department of Health, Richmond, calling unknown FEMA station WGY9030, ALE at 1807. (Metcalfe-KY)

8096.0 Cuban MCW cut numbers (M8a), incrementing callups 22882 75902 64612 and 22883 75903 64613, two successive days at 1801. (Castillo-Panama)

8097.0 Cuban AM Spanish “numbers” (V2a), callup 83353 36163 63693, at 1900. (Sevart-Caribbean)

8425.0 SVO-Olympia Radio, Greece, CW identifier in SITOR-A marker, at 0222. (Castillo-Panama)

8933.0 Continental 1887-Continental Airlines Boeing 737, registration N23707, patch via New York to Medlink regarding a sick passenger, at 2302. (Stern-FL)

8971.0 Goldenhawk-US Navy, Brunswick, ME, clear and secure with “45” (possibly P-3C Trident 45), at 1648. (Stern-FL)

8983.0 Coast Guard 2105-USCG helicopter, told by CAMSLANT to contact Sector Key West for a search and rescue mission, at 2132. (Cleary-SC)

9025.0 OFF-US Air Force, Offutt AFB, NE, calling E31407, an E-3, at 2210. (Cleary-SC)

9040.0 Cuban AM Spanish “numbers” with the old voice (V2a), callup 55340 87720 16267, at 0900. (Sevart-IN)

9295.0 R23943-US Army helicopter, calling EAATS (Eastern Army Aviation Training Site, Muir Army Air Field), in ALE at 1946. (Cleary-SC)

10993.6 Coast Guard 2105-USCG, working Sector Key West on the search and rescue, at 2213. (Cleary-SC)

11175.0 Doom 93-US Air Force B-52H, sent to 11220 by Ascension HF-GCS, at 0110. (Stern-FL) Doom 01-US Air Force B-52H, all-stations call with no joy, at 1500. (Jeff Haverlah-TX)

11220.0 Doom 93-US Air Force B-52H, came from 11175 for a patch to Barksdale AFB ops via Ascension HF-GCS, at 0112. (Stern-FL)

11232.0 Stargate-Back end of US Air Force E-8C JSTARS, patch via Trenton at 1837. Peach 33-Probable front end of same E-8C, patch to Peachtree Ops, GA, at 1840. (Stern-FL)

11485.0 WGY9030-Unknown FEMA, working WGY9470, voice and ALE at 1646. (Metcalfe-KY)

11545.0 Lincolnshire Poacher (E3), also on 13375 and 15682, identifier 84020 at 1500. (Boender-Netherlands)

13510.0 CFH-Canadian Forces, Halifax, NS, FAX weather chart at 1714. (Privat-France)

13927.1 Dawg 74-Georgia Air National Guard C-130, patch via MARS AFA1QW to notify Savannah they were returning with a bad #3 engine, at 1710. (Stern-FL)

13993.1 AFA2FC-US Air Force MARS net control, calling roll at 2031. (Sevart-IN)

14015.0 “PUN”-Unknown [and probably illegal -Hugh] ham band beacon, with a MCW identifier and strange voice loop, also reported on 3505.0 and 7008.7, at 2029. (Castillo-Panama)

14484.0 AAA9USA-US Army MARS, working AAR3MC at 2045. (Sevart-IN)

14487.0 Lincolnshire Poacher (E3), also on 15682 and 16084, identifier 82691, at 1300. (Boender-Netherlands)

15016.0 G2A6-Unknown military, voice and RTTY checks at 1026. (Boender-Netherlands)

18238.0 ZSJ-South African Navy, Capetown, weak weather FAX at 1530. (Privat-France)

18864.0 Cherry Ripe-UK Intelligence, Guam (E3a), identifier 28136, at 1100. (Boender-Netherlands)

20474.0 Cherry Ripe (E3a), in progress at 1036. (Boender-Netherlands)

21934.0 UP0902-United Parcel Service Boeing 767 freighter, (N323UP), HFDL position for “01,” San Francisco/Dixon, CA, at 2206. CO0319-Continental Airlines B757-224, (N14118), HFDL position for San Francisco at 2221. (Hugh Stegman-CA)

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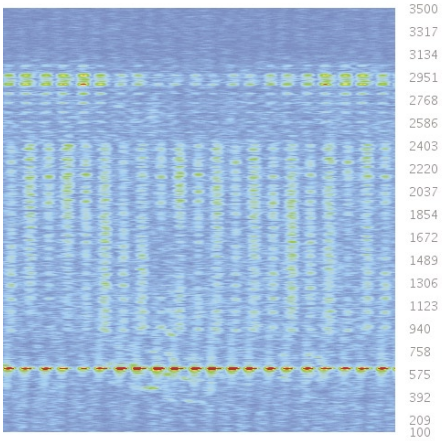
Czechs, Russians, Moroccans and Algerians

This month brings a mixed bag as we take a look at some recent catches on the air.

❖ RFSM2400 MIL-188-110A Decoder Software

But, before we do, a word about a new software modem for decoding MIL-188-110A modems using a Windows-based PC with a soundcard. This Russian software (see Resources below) is stable, does a nice job, and is free. The program is designed for both sending and receiving high-speed data using the MIL-188-110A waveform, plus another experimental mode. It features a real-time tuning scope, phase spectrum display, and received data window, which you can see in the accompanying screenshot.



RFSM2400 is probably the best solution for anyone wanting to decode high speed modem activity with a Windows PC with minimal outlay.

❖ Czech Diplomatic Service

Like many other diplomatic services, MFA Prague retains a presence on shortwave radio that has changed nature with the advent of high speed modems. Once active with a variety of RTTY systems, usually with Soviet-style 500Hz shift, including a proprietary ASCII-based system, you can now find Prague and its embassies using the 2400bd MIL-188-110a modem.

Recently, 18270 kHz USB seems to be a favorite frequency during the early morning and very audible here in eastern US. Most of the activity consists of word processor files, but there is usually enough header information to determine the sender and recipient. Like many other organizations, the Czech modems produce a signature lead-in to data, as you can see from the example below, where the MFA is sending to the embassy in Brasilia.

```
BCDEFGHIJKLMNOPQRSTUVWXYZ[\] ^ _ `abcdefghijklmn
   opqrstuvwxyz{|}~ ÄÅÇÉÑÖÜáŒ˘˘˘˘\P

Message:
From: Xoperator at POSTA01
Date: 1/2/07 5:05AM
To: BRASILIA at RPOSTA01
Subject: ctk020107
Contents:
Text item:
File item: tisk0201.doc 1/2/07 5:07AM
RPTISK0201.DOCPWOSTA01ë˘`Í,ii)"6i)"6TISK02ŒŒvq
   ˘˘˘˘P¸é 01.DOC%

˝%ÄÔ¢i‡0"6ÕVRO•Ö KS98/TEMP/WORK-
   BACK/TISK0201.DOCŒŒ˘˘˘˘P nP+_
   Ÿ1&oö£<Õƒ ®ï@¸ÛÊ
```

When conditions get difficult, the operators often coordinate with voice and CW. ALE is not used often, though. When it is, identifiers are two digits: "88" being the MFA and "67" etc. being the outstations. Other frequencies to try are 14480, 16180, 16270, 19320 and 20924 kHz USB.

❖ Russians on 16023

Tuning around on New Year's Day, we happened across a very strong and unusual 500Hz shift signal on 16023 kHz. The system sounded like fast CW, but on closer examination was a 29.4bd FSK mode. After a while, traffic switched to CW, keying the high tone of the modem. That is, one "leg" of the signal stays constantly on, while the other leg is used to key the Morse code. The CW traffic consisted of many requests for the remote end to switch frequency (the Q Code for which is "QSY"), like this:

```
uag uag uag qsy 17411 ch1 kkk
```

The callsign UAG certainly looks Russian, though is not listed in any publication we had to hand. Both 16023 and 17411 were at one time used by CMU967, the Russian Naval station on the island of Cuba, which makes this catch even more interesting. The propagation and signal strength certainly supports Cuba as the origin of this signal.

❖ Algerian Diplomatic Service

A quick reminder for you to check frequencies operated by MFA Algiers, which remain busy today using the distinctive Coquelet 8 tone MFSK signal. Signals are good throughout the day this winter, and you can easily hear the MFA and many of the embassies, especially those in Africa.

The Algerians use split frequency operations, that is, the MFA sends on one frequencies with the embassies responding on different ones. Most often, you can hear Algiers on 16278.38 or 18183.38 kHz. Long messages are sent in French, and the embassies then acknowledge traffic on a number of discrete frequencies; for example, 18529.38 or 19036.38kHz. Algiers will then ask each embassy in turn to send their messages, using a three letter code to call each embassy. For example:

```
bag bag qtc 1 mon frere kkkkk
```

where the embassy in Baghdad is requesting to send one message to Algiers. You can tell sender ("exp:") and recipient ("dest:") in message headers. Encryption is rarely used and don't expect any activity on Fridays, the Moslem holy day.

During the late evenings EST, you can catch the embassy in Havana most days on 9081.83 kHz (center of data) with some very strong signals to the MFA which usually responds on 11428.36 kHz.

❖ Moroccan ALE Networks

Two large and very active Moroccan ALE networks make interesting listening most of the day and night right now.

Network 1, rumored to be operated by Civil Defense, uses the frequencies 3155, 3805, 4855, 5792, 6500, 8600, 9200, 10390, 13499, 16240, 17435 and 18765kHz USB.

The net control stations, depending on channel used, are 2001, 2011, 1001 and 1011 with outstations using similar four-letter calls: 2205, 1305, etc. Another network using five-digit 11xxx and 13xxx-series calls also exists on all these frequencies, but does not appear to interact with any of the four-digit identifiers. ALE calls trigger voice activity using Codan radios.

Network 2, rumored to be operated by the Army, uses a similarly wide range of frequencies: 5430, 5755, 5855, 6770, 7500, 7512, 7650, 7786, 7830, 8046, 8096, 8165, 8875, 9212, 11130, 12160, 14550 and 25120 kHz.

Identifiers here are a mix of tactical calls like C3, E4, F3, X5 with others like C3ALE2. There are occasionally more descriptive location-based calls like GERJAALE2.

RESOURCES:

RFSM2400 Software - **slil.ru/23710757**
or this reflector site:
http://home.broadpark.no/~saanes/rfsm2400/rfsm2400.htm

GLOBAL FORUM

THE WORLD OF SHORTWAVE BROADCASTING

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India Commits to Domestic DRM on Shortwave

It started in late January, when Alokesh Gupta informed us that All India Radio was starting a DRM test at 0330-1230 on 6100 from the Khampur site near Delhi. A Thalès 250 kW transmitter had been "upgraded" for Digital Radio Mondiale, but he later found out that the DRM power was only 150 kW – which is as much as any other current DRM broadcasts on SW. The 6100 test, possibly at times also on 7270, only lasted a few days for the benefit of a Broadcast Engineering Society meeting Feb 1-3.

The only DX report of this we saw was in *HCDX* at 1215-1220* from Craig Seager in NSW, who could not get any audio due to interference, but did pull an on-screen ID as AIR Delhi Khampur.

From the blog of Alokesh Gupta: "As the AIR officials also admit, the success of DRM depends on the availability of DRM-capable radios in India at an affordable price. Hope this does not meet the fate of DAB which was tested by AIR R&D for the last six years, being demonstrated in the broadcast exhibitions year after year, but was never launched. Last time when I was at AIR HQ, officials were talking about big plans to roll out DRM in phased way in India. Let's hope for the best."

After the BES, Alokesh Gupta reported: "All India Radio has adopted DRM standard for digital radio broadcasting in MW & SW bands. Future DRM plans of AIR include: 22 regional shortwave transmitters to be replaced by 50 kW shortwave DRM transmitters. 10 new regional DRM SW transmitters expected to be installed. 154 DRM + FM transmitters to be installed."

That's quite a commitment, so eventually to DX AIR DS on SW, DRM will be required; will any analog be left? And think of all the DRM receivers which will have to be sold to the Indian masses!

A story in the *Hindustan Times*, via *Media Network* blog, put the emphasis on the text-data capabilities of DRM, rather than audio.

An interview with A. S. Guin, engineer-in chief at AIR, from Indian Television via Gupta, *DSWCI DX Window*, and *Media Network*, explained more of their reasoning. DRM will be useful in disaster management, and with a new network of such SW transmitters, people from one region of the country will be able to hear broadcasts in their language from other regions. Popular programming will have to be developed especially for DRM SW, in order to encourage receiver sales. Converting SW to DRM should be done by 2015, but it will take longer for MW.

Anker Petersen of DSWCI added: "Within a certain timeframe, our regular listening to AIR regional SW-stations using analogue technology is going to cease. For us DXers in Europe it is a big question if future DRM transmitters will be audible here on DRM receivers. Time will show. But it is high time to report the stations!"

Radio New Zealand International, which began regular DRM transmissions last year on one frequency, along with parallel analog on another, had to suspend DRM in February for at least two weeks as its AM transmitter failed and the DRM transmitter replaced it, switched into analogue. It's nice to see AM still takes priority.

Interested individuals are invited to participate as observers at the next meeting of the USA DRM Group, May 10-11 at HCJB's tech center in Elkhart, IN, says Jeff White, NASB President. No cost, but pre-register; info at **www.shortwave.org/meeting.htm**

Meanwhile, not a single US SW station, private or governmental has tried DRM, although the FCC has okayed it, and there remain only a few DRM transmissions for North America from Sackville, French Guiana, Vatican. Christopher Rumbaugh in remote Oregon, moderator of the DRMNA yahoogroup, is impressed with the signal quality from French Guiana, which was testing intermittently on 17870-17880, not concerned about what programming or language was being used.

Kai Ludwig points out the DRM bit-rate is often a mere 14.5 kbps, not the praised "FM-like quality" but instead just AM quality.

On *DXers Unlimited* from the home of another digital mode, jamming, Arnie Coro says, "DRM noise continues to create lots of problems to adjacent channels operating with standard AM double side band plus carrier. Wide DRM transmissions have to do with poorly adjusted final amplifier stages of the transmitters, because DRM requires extremely linear amplification and a very difficult-to-meet peak-to-average power ratio handling capacity of the transmitter driver and final amplifier stages."

In the *NASWA Journal*, Al Quaglieri editorializes: "DRM is pure folly, a failed technology, with no significant user base and no future. A revolution in press release only, DRM exists not to serve listeners or broadcasters, but to boost the fortunes of the for-profit DRM consortium that's promoting it. Wideband DRM signals are a pox on the shortwave broadcast bands, and I sincerely wish the technology a swift demise. It is disappointing to see yet another hopeful broadcaster [AIR] buying the snake oil."

AFGHANISTAN The 6700 kHz station reported last month continued to be heard around 1440-1530, and then a second one appeared on 6800, similar music but not parallel. These could be from two of at least three known sites for US psyops' Radio Peace: Bagram, Kandahar and Orgun (Jari Savolainen, Finland, *DX LISTENING DIGEST*) 6700-LSB at 1455-1518+ with 5 or 10-minute pauses between music, utility station (Anker Petersen, Denmark, *playdx yg*) 6700 heard at 0135 with reports, 0148 folk music (Giampiero Bernardini, Italy, *DXLD*) A few days later, the 6800 station had also moved onto 6700, the two with different programming. Both are AM, carrier and both sidebands. These fade up and down (rapid and deep fades) with similar pattern to former 9345. And fade-ins and -outs are different with each program feed. The two 6700 stations are 8 Hz apart, measured by Mauno Ritola in Finland (Jari Savolainen, *ibid*.) On 6700 at 1530 and 1615 heard Afghan music; 1628 talks, 1641 mentioned Bagram and ID for R. Ulumati Information Radio (Stuart Austin, England, Feb 10, *ibid*.)

ALASKA KNLS published already in late January its A-07 schedule effective March 25, including English: 0800-0900, 1000-1100, 1200-1300, and 1400-1500 on 7355; at 1200-1300 also on 9920 (gh)

ANTARCTICA LRA-36, 15476v, was last reported in early October; apparently took the entire summer off, but will they come back? (gh) Confirmed inactive in early Feb (Horacio Nigro, Uruguay, *DXLD*) Finally heard again Feb 13 at 2000, very strong on AM (Maurits van Driessche, Belgium, *ibid*.)

ARGENTINA Yet another Buenos Aires MW station relayed on 15820 LSB is Concepto AM, heard at 1132-1150 with news and commentary (Manuel Méndez, Spain, *DXLD*) Originally on 1050 kHz (Dario Monferini, *ibid*.)

6214.2, R. Baluarte, Puerto Iguazú, was reactivated in late Jan, heard at 1531-1600 and 2150-0118 with religious songs in Portuguese, announcements in Portuguese and Spanish (Samuel Cássio, Brasil; John Herkimer, NY and Arnaldo Slaen, Argentina, *DSWCI DX Window*) See also:

BOLIVIA R. Amor de Dios, El Alto, La Paz, heard on 6214 at 2240 in Quechua (Alfredo Cañote, Perú, *Conexión Digital*) New station also heard at 2346 heterodyning the Argentinian *[q.v.]* R Baluarte (Horacio Nigro, Uruguay, *DSWCI DX Window*) El Alto is a slum on a mountain ridge east of La Paz, population 800,000, where they mostly speak Aymara, not Quechua (Anker Petersen, Denmark, *ibid*.)

R. Logos is on both 4865 and 6165. 4865 is a 1 kW HCJB solid state transmitter on a lazy H fed with open wire, an antenna that I installed in about 1988. Original frequency was approx. 4855 until about 1991 when I installed a 5 kW transmitter. In about year 2000

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-06=winter season; A-07=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

the government moved them to 4865. The 5 kW transmitter was used on 4865 until they got the 1 kW solid state, retiring the 5 kW tube because electric cost was a big factor. Then in December 2005 we resurrected the 5 kW tube transmitter, moved it to 6165 for their new frequency and fed the new phased dipole antenna installed at that time. The original station was RCN [meaning R. Centenario la Nueva] and they call the new station R. Logos, but the transmitter location is still the same, dating back to 1988. The station is now broadcasting in 7 languages spoken in Bolivia including Plautdietsch, the German dialect used by the Mennonites in the area (Wayne Borthwick, VA7GF, *DXLD*)

Rocco Cotroneo found this link that may explain this: **http://www.latcom.org/swradio.htm** (Renato Bruni, Italy, *DXLD*) One article there from Outreach News says R. Logos and R. Centenario are both operating; another article says they are using only one, having retired the "old one" and the old name R. Centenario. It's unclear which is which, but it's been reported on 4865 where there is Brazilian interference. Chuck Bolland in Florida has also been looking for it on 6165, and possibly heard it between 0858 and 0940 with religious music, Spanish announcements (gh) Tentative reports on 4865: at 2237 (Jan Edh, Sweden, *SW Bulletin*) and at 2350-0109+ (Rich D'Angelo, PA, *NASWA Flashsheet*)

BRAZIL R. Clube de Marília (SP), is currently active on 3235 thanks to one person, the director of Rádio Guarujá Paulista, Orivaldo Rampazo, who leased time on the station. Although that contract has expired, it remains on the air.

If you haven't heard Rádio Difusora de Poços de Caldas (MG), on 4945, you never will. Sadly, at the end of 2006, the station turned off its tube transmitter after 35 years and turned in its license to the Ministry of Communications. It was one of the few tropical band stations which really brought the flavor of the interior to the world. Read its history here: **www.difusorapocos.com.br/transmis_sw.php** (Célio Romais, Panorama)

CANADA Harold Sellers of ODXA says CFRX 6070, Toronto, has been off the air for several months due to a transmitter fault and a damaged antenna. It will be springtime, at least, before they are back on. They are having trouble fixing the transmitter and need to replace the antenna feedline, and possibly the antenna itself (Saul Chernos, Ont., *amfmtvdx@qth.net*)

CHILE 6010, R. Parinacota, Putre, ads for local carnaval, "Parinacota, la emisora altiplánica," SINPO 44444 at 0230, and the next night at 0250, 54444 (Rogildo Aragão, Bolivia, *HCDX*) Seldom makes it to North America, Sweden via Canada in the way at this hour; and also Mexico, Colombia: (gh)

COLOMBIA Weak signal in Spanish on 6108.9 around 1120-1200, seemed to match talk on 5910v, Marfil Estéreo, mixing with music from LV de tu Conciencia, 6009.5. Audible after WYFR closes 6105 at 1045, and before R. Nederland comes on 6110 just before 1200 (Alex Vranes, Jr., WV, *DXLD*) Yes, mixing product between two transmitters at same site. One can also hear the het on 6109v at other times when there is not too much signal on 6110; a matching spur is on 5810v, blocked much of the time in B-06 by WEWN. The two Colombian outlets offer a minidisc about the stations to those sending useful reception reports (gh)

CUBA From Jan 22, RHC at 11-15 in Spanish to ESAm moves from 15230 to 15190 (Arnie Coro, *HCDX*) Because for past several B-seasons, 15230 collided at 13-15 with China-via-Canada. It's about time someone noticed and fixed this. We also heard RHC on 15190 before and after 22, avoiding collision with Australia after 22 (gh)

RHC in Spanish on 6300 at 0231 (John Davis, OH, *DXLD*) RHC on 5700, at *0459-0524+, in English // 6000, 6300, and 6420 (Harold Frodge, MI, *MARE Tipsheet*) 6300 is produced by 6060 leapfrogging over 6180, 120 kHz further. 6420 would be a second leap a further 120 kHz up the band, not the way mixing products usually work. 5700 would result from 6300, itself a mixing product, leapfrogging over 6000, 300 kHz further down (gh)

The 6300 mix is not a rare thing to happen when high power transmitters are operated at the same site and the antennas are close to each other. BBC engineers call it "transmitter trough," as radio frequency from one transmitter gets into the resonant tank circuit of the other because of close coupling between the antennas, and it usually requires a lot of analysis to solve the problem, as conventional output filters will not help. So I will continue to work on this mixing product problem (Arnie Coro, CO2KK, Host of *DXers Unlimited, ODXA*)

Radio Rebelde's 17-19 UT broadcast, sometimes until 1830, expanded to five frequencies: 17735, 17555, 15570, 15370, 11655 (Bernie O'Shea, Ont., *DXLD*) Plus 24-hour 5025, also audible at midday (Harold Frodge, MI, *MARE Tipsheet*)

[non] Radio República heard on 6140, Jan 23 at 1157-1244, silly morning program with banter and English pop, IDs at 1227-1230, not // WRMI 9555 and not on schedule. A new relay? No jamming audible (Mark Taylor, WI, *WORLD OF RADIO*) BBCWS in Spanish had been running on 6140 via Greenville until 1230 (gh) Might be another Merlin relay (Jeff White, RMI, *DXLD*) But not reported since; test? (gh)

R. República at 0300-0400 Tue-Sat on 6100 is via Sackville, 250 kW, 176 degrees, same as 9630 at 0200-0500 Tue-Sat (*DX Mix News*, Bulgaria) But 9630 is on behalf of RMI, M-F, while 6100 was really the 7-day-a-week service via Merlin; apparently 6100 replaced 6185 Rampisham UK for the final hour at 0300-0400 (gh)

CZECH REPUBLIC Two new voices on Radio Prague are Ilya Marritz with an American accent and Coilin O'Connor with an Irish accent, who were both interviewed on January 14 (Jonathan Murphy, *World DX Club Contact*)

ECUADOR R. Quito, La Voz de La Capital, is irregular but heard in mid-Jan at 2255 on 4919 with very distorted audio (Raúl Saavedra, Costa Rica, *DXLD*) I heard it 3 or 4 times over a month around 1130 (David Goren, NY, *ibid.*) 4918.99 at 0337-0352, phone-in discussion mentioning Quito (Anker Petersen, Denmark, via Dario Monferini, *DXLD*) 4918.99, at 1033 Spanish ballads, 1043 ID. Strong but somewhat distorted audio (Brian Alexander, PA, *DXLD*)

EGYPT R. Cairo, English to ENAm as of Jan 22 at 2300-0030 on 11950, 500 kW, 330 degrees from Abu Zabaal site (*DX Mix News*, Bulgaria) Had started B-06 on 11885 as it did B-05, buried under WYFR, and China, too, but not propagating anyway if really on clear 11950 now (gh, OK) Cairo is indeed active from 2300 on 11950 in English and 12050 Arabic. 11950 had Qur'an recitation with English translation before news at 2315. Reception quite variable and most days do not get through due to propagation (Olle Alm, Sweden, *DXLD*)

ERITREA On new 5100 at 1500-1530 weekdays, Radio Bana, educational program in English. Announced address: Adult Education and Media, Ministry of Education, P. O. Box 609, Asmara, Eritrea (Jari Savolainen, Finland, *DXLD*) "Bana" means dawn (Bernd Trutenau, Lithuania, *ibid.*) A postcard in reply to my report says: "We are very pleased to know you can hear us in Finland. Thank you too for the postcard and internet references. With best wishes, The English panel, Saada Ahmedin." English educational programs changed to 1600-1630*, decent signal, but heavy ute-QRM (Jari Savolainen, *DXLD*) At 0410-0430, poor in vernacular talks (Dario Monferini & Giampiero Bernardini, Italy, *playdx yg*) Also heard at 0400-0432+ with English ID, then vernacular (Finn Krone, Denmark, *BC-DX*) The two other SW channels of Dimtsi Hafash (VOBME), 7100 and 7175 seem to be carrying their regular programming, so this is an additional transmitter (Anker Petersen, *DSWCI DX Window*)

[non] The Voice of Delina (produced by Tesfa Delina Foundation, Inc.) appeared with a new website: **http://vodm.asmarino.com** and a new name: Voice of Meselna Delina (Bernd Trutenau, Lithuania, *DXLD*) Gives sked as M-F 1700-1730 on 7335, with address for contributions in Cerritos, CA (gh)

ETHIOPIA On 9650, unID with Horn of Africa vernacular and a lot of regional music, from *0400 and closing between 1730 and 2000, lots of QRM (Vlad Titarev, Ukraine, *DSWCI DX Window*) On 9650 at 1500-1730, I can confirm that this is Voice of the Tigray Revolution, also on new 5980, ex-5500 and 6350. Presumably, like Radio Fana (now 6110/7210, ex-6210/6940), it has been forced to go in-band by the new licensing arrangements in Ethiopia (Chris Greenway, UK, *WORLD OF RADIO*) Irregular and signing on & off times highly variable (Mauno Ritola, Finland, *ibid.*) One day from *1457 with tuning melody; 5980 will have a lot of DRM QRM (Jari Savolainen, Finland, *DXLD*)

[non] 9820 Radio Xoriyo, 1641-1643, tuning signal, but very bad modulation on speech makes it incomprehensible (José Miguel Romero, Spain, *DXLD*)

11900, Tensae Ethiopia V. of Unity, *1500-1510, two days in a row, Amharic, 1500 sign on with opening music, announcement, Ethiopian pop music and talk (Kouji Hashimoto, Japan, *Japan Premium*)

GABON The Afro-pop music station continued to be heard in Jan & Feb, trying to block Sawt al-Amal, the Libyan clandestine between 12 and 14 UT as Sawt moved around to various frequencies in the 17620-17695 range; but the Afro-pop station always stayed on until 1531* jamming nothing, just music and never any announcements. On rare occasions, such as Feb 2, its music was duplicated instead of Africa Numéro Un programming on 17630, as noted by José Miguel Romero, Spain, at 1320-1330, so surely they come from the same site, Moyabi, Gabon.

Later that same day at 1500, Afropop had shifted to 17640, but was again // ANU transmitter on 17630, reports Bernie O'Shea, Ontario, both in *DXLD*. However, on other occasions, such as Feb 12, when there was a propagation disturbance, around 1500, 17630 was steady, while 17660 Afropop was very fluttery, normally associated with high-latitude paths. How could this be explained if they come from the same site? Our theory: different azimuths; 17630 is NW toward us, while 17660 is northward toward Libya where the signal hits an unstable part of the ionosphere and then scatters on toward us. Other Central African signals aimed north had the same flutter, 15275 Rwanda and 17895 Botswana (gh)

GERMANY The DX Boys tell me that the DW World DX Meeting will only be aired till March (Hari Madugula, Young Stars Radio Club, India) Had been a program-within-a-program, last ten minutes of Mailbag on last Sunday of months, formerly on RBI. On the January show, Wolfram and Uwe implied the last one would be in February. Then on Feb. 9, Wolfram Hess died of a stroke, Wolfgang Bueschel reports. We'll miss their friendly, quirky, style (gh)

DW English will be reformatted by the end of March, more or less like was done with German before, *i.e.* into a kind of rolling news format. All long programs, including *Mailbag*, will be eliminated, although new format will include a slot for listener response. And probably even more changes at DW Radio will follow (Aaron Zawitzky, *DXLD*) Oh no, another station which makes itself into an amorphous magazine, not worth listening to for specific topics. Goodbye, *A World of Music*, too (gh)

Deutsche Welle's English service to Europe on 6140 was well heard through January, then vanished; was 0600-1000 and 1300-1600 via Woofferton. All 7 hours per day of DW's English to Europe have gone, apparently without any announcement (Edwin Southwell and Dave Kenny, *BDXC-UK*) Those transmissions covered about 20 European countries and their English speaking audience (Wolfgang Büschel, Germany, *DXLD*) Reply from DW PR person Margot Forbes confirms 6140 is gone and

refers listeners to DRM, online and satellite (Erik Køie, Denmark, *ibid*.) Premature (Dave Kenny, *BDXC-UK*)

GREECE Since VOA abruptly closed down the Kavalla site last spring, V. of Greece had to make do with only three SW transmitters at its Avlis site. But starting in Feb another transmitter began testing, on 5865 at 2000-0700, 11645 at 0700-1100, and 15630 at 1100-1545, times approx. VOG would only tell John Babbis that it was not from Avlis, causing great speculation about where it could be coming from. Finally, another source revealed that it was a spare transmitter at the Olympia Radio (SVO) maritime communications station near Pyrgos, later confirmed to Jari Savolainen by SVO itself, to be only 10 kW at 310 degrees with 14 dBi gain on a log periodic. That explained why the broadcasts on these frequencies would start out in USB, and then try to tune up into DSB/AM, but with frequent dropouts in modulation and/or carrier, as monitored by Noel Green, UK, Wolfgang Büschel, Germany, and gh in OK. It remained to be heard whether the transmitter could be persuaded to operate properly in the AM mode and thus serve as a much-needed fourth outlet for Voice of Greece (gh)

VOG was also heard on a fourth frequency at 0600-0800, 6210 // 9420, 12105 and 15630 including the *Radio Filia* programs in English at 0700-0800 (Rumen Pankov, Sofia, Bulgaria, *Australian DX News*) But this was unintentional! A mixing product, 15630 minus 9420 = 6210 (gh)

Hellenes Around the World, still the name of the Sat 14-15 UT program in English on 9420, 15630, 17525, regained a repeat UT Sundays at 0300 on 5865, 7475, 9420. There was no UT shift for the first broadcast between the A and B seasons last year, but there could be for the repeat; check one hour earlier if not heard at 0300 (gh)

INDIA On *Faithfully Yours*, the AIR mailbag, Mondays at 1430 on 9690, the ongoing theme by the M&W presenters is that they wish people would comment more on the programming, and send reports covering longer listening periods. I suspect they are dealing mainly with QSL-hunters who aren't really interested in programming or listening any longer than absolutely necessary (gh)

KOREA NORTH [non] Shiokaze International Communications plans to add broadcast in local morning via Yamata, Japan site from A-07, sometime between 20 and 22 on 6045, 6080, 6085 or 6185 aimed 280 degrees (Takahito Akabayashi, Wolfgang Büschel, *BCDX*) Same site as R. Japan. There was a big controversy over whether the Japanese government should get involved in this program about Japanese abducted by North Korea. So will the 1300 on 9955 via Taiwan also continue? (gh) Yes (S. Aoki via S. Hasegawa, *NDXC*) but might seasonally shift frequency (gh)

KURDISTAN 4850, Voice of Iranian Kurdistan, via Al-Sulaymaniyah, Northern Iraq, heard at 0255-0410, Kurdish talk and Middle East songs, audible through jamming which first was on 4860. Iranian jammer also heard on 3970 (Anker Petersen, Denmark, *DSWCI DX Window*)

LATVIA Radio City - The Station of the Cars, relays Saturdays on 100 kW Ulbroka 9290: April 8 at 1100-1300, May 12 at 0900-1100 (Radio Strike, *bclnews.it*) See also SCOTLAND [non]

LIBERIA Chinese President Hu Jintao visited Liberia. A major package of economic and technical assistance was announced, including building modern FM and SW services for the Liberian Broadcasting System (*The Analyst*, Monrovia, via Andy Sennitt, *Media Network* blog)

LITHUANIA Mighty KBC Radio, music announced in English, every Sat 22-23 via Sitkunai 1386 kHz added SW 6255; address: KBC, Argonstraat 6, 6718 WT Ede, Netherlands. E-mail info@k-po.com (Ullmar Qvick, Sweden, *DXLD*) 100 kW, 259 degrees, frequency may change depending on propagation (Bernd Trutenau, Lithuania, *ibid*.) It's a former pirate from the '80s, **www.kbcradio.eu** (Ydun Ritz, Denmark, *ibid*.) Good signal with program of mostly '80's era pop and many KBC promos, some mentioning 6255. Also apparently sells communications gear with several ads for a KBC Radio, **http://www.k-po.com** (John Herkimer, NY, *NASWA Flashsheet*) Excellent signal, also IDs in Dutch (Rafael Rodríguez, Colombia, *playdx yg*) New e-mail address: kbc@planet.nl "Rocking over Europe - Rocking over the Ocean" (via Hugo Matten, *BDX*)

MÉXICO From late January to mid-February, XEYU, R. Universidad Nacional, remained on the air but the frequency drifted downwards to 9599.2. Apparently 24 hours, but audible best here in the daytime when there was nothing on 9600.0 such as at 1500. Mostly classical music and talk shows in Spanish (gh) 9599.3 heard at 0936 and 1049 (Maurits Van Driessche, Belgium, *DXLD*) Tentative on 9599.257 between 2208 and 0100 (Giampiero Bernardini, Italy, *WORLD OF RADIO*) Very weak but clear at 2205-2245 on 9599.25 (Renato Bruni, Italy, *DXLD*)

PERÚ 4790.13, Radio Visión, 0037 with pop music, huaynos, and at 0100 into religious discussion (Chuck Bolland, FL, *DXLD*)

R. La Hora, Cusco, will be off SW 4855 for two or three months due to damage from an electrical discharge which burned up the transmitter (Carlos Gamarra Moscoso, early Feb, via Dario Monferini, *DXLD*)

R. Victoria, Lima, heard on 18060 = 3 x 6020v at 1716 with pentecostal preaching (Adan Mur, Ñemby, Paraguay, *Conexión Digital*) Should be possible in NAm, when Chile 17680 is booming in; R. Victoria's other frequency, 9720v, might also produce harmonic on 19440v (gh)

SCOTLAND [non] Radio Six International, Glasgow, Scotland, resumed weekly live broadcasts to Europe and the Pacific from Feb 3, Saturdays at 0700-0800 on 9290 with 100 kW from Ulbroka, Latvia. More details at **www.radiosix.com** (Tony Currie, rsi, *WORLD OF RADIO*) Pacific? Because azimuth is 250 degrees per HFCC (gh)

SOMALIA [non] Radio Waaberi, cancelled from Feb. 2: was Fri 1330-1400 on 17550 via Jülich 100 kw, 160 degrees in Somali (*DX Mix News,* Bulgaria) Waaberi says they hope to return soon (Jeff White, RMI, *DXLD*)

SUDAN 4750, Radio Peace, 0416-0436, surprised to find this with African vocals, talk in Arabic, English IDs. Poor to fair with CODAR splatter (Rich D'Angelo, PA, *NASWA Flashsheet*)

UKRAINE RUI replaced 5820 with 7440 to NAm as of Jan 26, including English 01-02 and 04-05 (Edwin Southwell, UK, *WDXC*) Due to bad reception on 5820, QRM from WEWN 5810, made early change to spring frequency (Olex Yegorov, RUI *Whole World on the Radio Dial*) I told them 5820 was a loser when they changed to it last Sept. 7440 will probably continue in A-07 with usual timeshift one hour earlier, though several alternatives have also been registered (gh) You may now read scripts in English of the monthly DX show; look for WWORD on **www.dxing.ru/content/view/509/60/** January edition also revealed that a higher-quality webcast of RUI (labeled RUI2) is available at **http://media.wnet.ua/lists** so their music is now tolerable (gh)

U S A The president's budget request for FY 2008 was sent to Congress in early Feb, reaffirming 2007 plans to abolish or reduce VOA and other USG broadcasts in several languages, notably eliminating 14 hours a day of VOA *News Now* in English! Each of these changes was still pending approval, and 2006 funding levels have been temporarily maintained in 2007. Summary of changes: **www.kimandrewelliott.com/bbg_2008_reorg.html** (gh)

We will need to inform appropriations members of the ill advised cuts proposed by the BBG (AFGE Local 1812)

Starting 12 February, VOA began a new daily broadcast in Somali, funded by a grant from the Department of State. VOA previously broadcast in Somali between 1992 and 1994. 1600-1630 and 1700-1730 on 13580, 15620 (VOA via *Media Network* blog) Unusual for DOS to fund (gh) It fills a rather glaring gap in US external radio targets (Chris Greenway, UK, *DXLD*) 13580 Sri Lankia; 15620 Botswana at 16, Sri Lanka at 17 (*DX Mix News*, Bulgaria) Which may change for A-07

The Board of Directors of Radio Free Europe/Radio Liberty has named Dr. Jeffrey Gedmin as new president of RFE/RL. Since 2001, Dr. Gedmin has served as Director of the Aspen Institute in Berlin (RFE/RL press release) In a 2001 *Weekly Standard* article, Gedmin criticized Secretary of State Colin Powell as "sounding more European than the Europeans themselves." In another article he called the Fulbright program "one of the more foolish errors of our time" in public diplomacy (*kimandrewelliott.com*)

KAIJ Dallas' website **www.kaij.us** shows that its studio and office are actually in Murfreesboro, TN, near Nashville, its GM George McClintock, PD John McClintock, and several other staffers formerly with WWCR. KAIJ added *WORLD OF RADIO* to its schedule, Fri 1130 on 5755 and 2000 on 9480, both aimed NW, but by now times should be one UT hour earlier, and perhaps different frequencies for A-07. George McClintock tells me that there is room in the building near Dallas for two more transmitters, and the first one may be installed in the forseeable future, to go with existing extra antennas, the better one of which is aimed south (gh) Very good reception of 9480 at 2000 here (George Poppin, San Francisco, *DXLD*)

WESTERN SAHARA [non] Following its stay on 6458, R. Nacional de la República Árabe Saharahui Democrática, via Algeria, was on the move again, in mid-January to 6484.15 at 1950-2010 (Alexander Koutamanis, Netherlands, *HCDX*) Varied around 6485, such as 6485.89 the next day at 1940 (Wolfgang Büschel, *DXLD*) Then alternated 6458 and 6485 for a while, per numerous reports (gh) By Jan 23 was on 6480v at 1900, from 6478 to 6481 (José Miguel Romero, Spain, *DXLD*) From Jan 27 moved again to 6300 (Francesco Cecconi, Italy, *bclnews.it yg*) Not to be confused with the Cuban spur *[q.v.]* on 6300 between 0000 and 0700, then widely reported at 0700-0900, and 1700-2400, the final hour in Spanish. Continued to be heard there, varying to 6302, almost every day through Feb 11, then missing again. (gh)

ZIMBABWE [and non] On 17730 at 1815-1827, jammer, not the Chinese crash & bang but an orchestra continuously tuning up (Harold Frodge, MI, *MARE Tipsheet*) Aha, VOA *Studio 7* service to Zimbabwe was on 17730 at 1700-1830 M-F via Morocco, so that could be a Zimbabwean jammer (gh) Yes, jamming VOA, monitored here since mid-January; similar to "bagpipes accompanied by a music box," extremely effective. The other two VOA Studio 7 SW frequencies of 11815 and 4930 are not jammed. Similar jammer on MW 909 for several months (David Pringle-Wood, Harare, Zimbabwe, *DXLD*)

Question remains whether such jamming on 17730 comes from inside the country (groundwave, limited range unless multiple sites), or outside (skywave, at suitable distance) such as Gabon, capable of covering entire Zimbabwe (gh) 17730 replaced by 15775 (*WRTH* Update) no jamming audible here. At 1730 in English they said if 909 is jammed, tune to the three SW frequencies (gh, OK) At 1705, 15775 is jammed by the musicbox/bagpipe jammer that was on 17730 (David Pringle-Wood, Zimbabwe, *DXLD*)

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

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com
http://mt-shortwave.blogspot.com

0030 UTC on 11780
BRAZIL: Radio Nacional da Amazonia. Portuguese. Brazilian vocals and "Nacional" promos. (Stewart MacKenzie, Huntington Beach, CA) Brazil's Nacional via Macapá 4915, 0531. (Joe Wood, Greenback, TN)

0040 UTC on 7325
AUSTRIA: Radio Austria International. Very good signal for report on domestic politics. (Bob Fraser, Belfast, ME)

0125 UTC on 7570
TAJIKISTAN: Voice of Russia relay. Spanish regional news at tune-in to international news, following by commentaries and pop music. Fair-poor signal quality. (Frank Hillton, Charleston, SC) Tentative on **Tajik Radio** 4635, 2121-2150, (Scott Barbor, Intervale, NH)

0137 UTC on 4409.81
BOLIVIA: Radio Eco (tentative) Station coming in at 0137 check, and recheck at 0204 with ranchera and Latin pops. Announcer's time check and long announcement. Back to music at 0212. Unfortunately left the air abruptly at 0217. Bolivia's **Radio Yura** 4716.76, 0150-0203. Rustic music and canned identification and freqs over flute, music. Shorter ID version followed by instrumental national anthem. (Dave Valko, PA/Cumbre DX)

0327 UTC on 4950
ANGOLA: Radio Nacional (Mulenvos) Portuguese. Pop music to occasional announcements. Time pips at 0400 amid very poor signal, at threshold to 0400, then just above noise level. Station very difficult catch in recent years. (Jim Evans, Germantown, TN)

0330 UTC on 4780
DJIBOUTI: RTV Djibouti. Arabic. Announcer's text to enjoyable pop music to Horn of Africa style selections. Moderate signal improving to solid SINPO 34333. (Evans)

0405 UTC on 4965
ZAMBIA: Christian Voice/The Voice Africa. Religious programming to station jingle Getting On Up. "Radio Christian Voice" ID to news headlines and resumption of religious programming for fair signal quality. (Ron Howard, Monterey, CA)

0418 UTC on 7100
ERITREA: Voice of the Broad Masses. Tigrinya. Male/female host talk to 0424 Horn of Africa music. Good signal SINPO 34333. Noted on 7175 at same time but not parallel, with similar signal quality. (Evans)

0426 UTC on 4770
NIGERIA: Radio Nigeria. Open carrier to drum interval signal at 0429. Opening identification and announcement. Prayer to regional music. Poor-fair signal quality. (Rich D'Angelo, PA/NASWA Flash Sheet) Audible 0559-0606 on frequency in English and regional language. (Wood)

0456 UTC on 4777
GABON: RTV Gabonaise. French. Open carrier to orchestral anthem at 0459. Station identification and opening announcements. Poor-fair signal quality. (Rich D'Angelo, PA) *0457-0516 mostly fair, clear audio. (Howard, CA) 0545-0558 Afro pops, IDs and news; 17630, 1537 French/English. (Wood)

0502 UTC on 7240
PORTUGAL: Deutsche Welle relay. Station ID and item on Archbishop of Warsaw, Radio Portugal Int'l 15560, 1540. **Deutsche Welle**-Sri Lanka relay 9885, 2149 Spanish with middle-of-the-road music with fair signal. (Wood; Duane Hadley, Bristol TN)

0555 UTC on 7160
ASCENSION ISLANDS: BBC World Service relay. Excellent reception for BBC's Business Review. (Wood) BBCWS 17830, 2010 // 12095; 15400, 2159. (MacKenzie) BBCWS (via Greenville) 6140 Spanish, 1032-1105. (Howard)

0705 UTC on 9370
USA: WTJC. Good signal for religious teachings and reference to book of Isaiah. **WWCR** 3215, 0011-0045. (Wood, TN) **KAIJ** 9480, 1900 identification with frequency quote and religious sermon. (Hillton) **KWHR**-Hawaii 9930, 0834-0906. "KWHR" identification and Onward Christian Soldiers theme music amid poor signal. (D'Angelo)

0706 UTC on 11530
CLANDESTINE: Denge Mezopotamya/Voice of Mesapotamia. Kurdish programming by male host. SINPO 24432. (Arnaldo Slaen, Buenos Aires, Argentina) Station transmits via Grigoriopol, Maiac (Moldova/Pridnestrovye). GVH. **Radio Voice of the People** via Madagascar, 11695. Audible almost daily from 1700 opening to closing 1757-1759. ID and address included in African language and brief English news. (Wendel Craighead, Prairie View, KS) **Radio Republica** 6185, 0002-0030. (Slaen) **Echo of Hope** 3985, 1356-1415 //6348. (John Wilkins, Wheat Ridge, CO)

0726 UTC on 9575
MOROCCO: Radio Medi Un. French service via male/female host. Pop music (French/English) to newscast of good signal quality. (Wood)

0712 UTC on 9420
GREECE: Foni Tis Helladas. Greek service for lady's previews to piano concerto music. Newscast at 0718 during faint signal. (Wood)

1004 UTC on 9680
INDONESIA: RRI-Jakarta. Kang Guru singing jingle. KGRE program with item on school shirts. C&W tune Blue Jeans On by Keith Urban, followed by interview with young Indonesian actor Sammy Rizal. More pops to address (P.O. Box 3095, Denpasar, Bali) for free magazine. Fair signal, WYFR not heard until about 1019. (Howard)

1046 UTC on 4790
PERU: Radio Atlantida. Spanish. Announcer's chatter to Peruvian music program. Station identification and ads at 1055 to news at 1101. Poor-fair signal. (D'Angelo) Peruvians audible in Spanish: **Radio Reina de Selva** 5486.68, 0005-0010; **Radio Melodia** 5939.31, 0720-0725; **Radio Difusora Comercial** 6535.98, 2355-0000 (Slaen) **Radio La Voz de los Andes** 56-2.54, 0047; **Radio Frecuencia VH** 4485.94, 0129-0143. **Radio Frecuencia San Ignacio** (tentative) 5700, 0055. (Valko) **Radio Santa Rosa** (tentative) 6047.19, 1138 with presumed religious service. (Howard)

1052 UTC on 6049.65
MALAYSIA: Asyik FM (RTM). Segment of indigenous chanting/singing "Asyik FM." Station jingles, pop and music ballads. Islamic Call to Prayers at 1126 (maghrib - sunset prayer), their fourth of the day - Kuala Lumpur sunset at 1125 UTC. Fair signal quality. (Howard)

1250 UTC on 15700
BULGARIA: Radio Bulgaria. Bulgarian folk music program of fair signal quality // 11700 poor signal. (Fraser) 7400, 0023. (MacKenzie)

1901 UTC on 11735
ZANZIBAR: Voice of Tanzania Zanzibar. Swahili news to 1914. Afro music to male/female talk segment. Arabic style vocals. Station regularly audible even in mediocre conditions. (Wilkins)

1945 UTC on 17895
BOTSWANA: VOA relay. Announcer comments on International Education via VOA News program //11975 (Greenville). **VOA Philippine** relay 15150, 2313 //15185, 15150, 13640, 11655.

2018 UTC on 11655
MADAGASCAR: Radio Netherlands relay. Report on situation in Lebanon. (Fraser)

2047 UTC on 6165
CHAD: Radiodiffusion Nationale Tchadienne. French conversation to high-life music under dominate Croatian Radio on frequency. (Barbour)

2312 UTC on 7285
GERMANY: Voice of Croatia relay, Pop music followed by Croatia Today featuring national politics. Station programming, target areas and frequencies for poor signal. (Wood) **Polish Radio** via Wertachtal, Germany 9525, 1331-1400*. ID, snailmail and email addresses, interviews and pop music to program close. First reception since Jan 2006. (Howard) See Ron's station verification in this month's QSL Report. GVH

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?

Fred Waterer
fredwaterer@monitoringtimes.com
www.doghousecharlie.com/radio

DX Programs (Part 1)

Over the years many wonderful DX programs have gone by the wayside … from *Sweden Calling DXers*, to *Media Network* and the *Two Bobs* from Switzerland ... at least they are no longer on shortwave. Some still exist as online websites, but increasingly DX segments get stuck on the end of mailbag shows. Just this past February, the DX segment on Deutsche Welle's *Mailbag* show was apparently axed. Other shows are but a shadow of their former selves.

Yet there are still many options out there for the DXer to hear programs dedicated to the hobby and get the latest listening tips and news.

When I started this particular column, I asked a few friends for their opinions on the current crop of 21st century DX programs and got some interesting answers, not surprising, really, in the internet age.

"I haven't listened to DX programs for several years... There are several reasons: my favorites are gone; my listening environment and habits mean I do more bandscanning sessions than program listening on shortwave; and I use the internet for various sources of DX news."

"As for me, I mainly rely on Glenn Hauser's DXLD website for news."

I have to admit, it's been ages since I listened to some of the DX shows/segments that are out there. In a sense this column is the beginning of a voyage of re-discovery for me.

Note: I have attempted to verify the times and frequencies of the various programs mentioned. This column is being written while North America is on Standard Time, but you will be reading it during Daylight Saving Time. Times and frequencies may vary. For the most part, for times and frequencies, I have relied on the excellent web page maintained by John Norfolk on Glenn Hauser's World of Radio website. You can access the latest edition at:
www.worldofradio.com/dxpgms.html

❖ Glenn Hauser's World of Radio

Obviously one starts with the best. Unless you've been hiding in a bomb shelter for the last three decades, you will know Glenn Hauser not only writes for *Monitoring Times*, but he appears in other media as well.

While other programs have disappeared over the years, Glenn Hauser's *World of Radio* program just keeps rolling along and is THE source (along with his website) for DX news. This reporter checks Glenn's site religiously for the latest news and information and I listen to his show as often as I can either via the radio or, yes, via the internet.

Glenn is scrupulous about accuracy, which helps the listener immensely to find the programs and frequencies discussed on his show/website. *World of Radio* is an indispensable source for the radio listener/hobbyist.

In a recent edition of *World of Radio* Glenn mentioned he might be cutting back a bit, missing the occasional week with his show. Considering he's been at it for 27 years, I think he's entitled, don't you?

WBCQ Wed 2300; Mon 0515; 7415 kHz
WWCR Fri 2130 7465; Sat 1730 12160; Sun 0330 5070; Sun 0730 3215
More options at: **www.worldofradio.com/radioskd.html**
Audio at: **www.worldofradio.com/audiomid.html**

❖ DX Partyline

"I wish I had more time in my schedule for *DX Partyline* but I find it has, at times, become a shadow of its former self. It really was a 'cannot miss this one' back when Clayton Howard, then Rich McVicar, and Ken McHarg did the show. I also miss the ANDEX DX club HCJB had back in the '80s." (Mark Coady, ODXA)

I, too, go back to the 1970s with HCJB and the *DX Partyline*, Clayton Howard was a wonderful host (founder of the program *IIRC*), as was John Beck. The 9745 kHz frequency from Quito, Ecuador, was always solid. I rather miss all the regular programs from HCJB that I would listen to during local evenings.

Allen Graham, current host of DX Partyline.

DX Partyline can be heard:

Saturday:
HCJB Australia :0730-0745 11750; 1030-1045 15400; 1100-1115 15430
WRMI: 1030-1100 9955
Sunday:
WWCR: 0215-0230 5070
WRMI: 0400-0430, 1445-1500 7385
Also:
WRMI: (Mon)1300-1315 (Tue)1230-1245 (Wed)1430-1445 (Thur)1200-1215 (Fri) 1330-1345 7385

❖ Ask WWCR

From the WWCR website...

"Read about the fifteen plus year history of WWCR which was in the March 2006 edition of *Monitoring Times*! (*Hey, I've heard of them-fw*) Click here to read the article. It's an Adobe .pdf.

"Now in its 10th year, this bi-weekly show on WWCR is hosted by Jerry Plummer, a tenured Professor of Economics and MIS/IT in Tennessee. He is also a part time Board Operator at WWCR; and is truly a hardcore shortwave enthusiast.

"*Ask WWCR* is based (a lot) on your questions. And, you can hear the inside scoop on what's up with the station's operations; meet employees and hear about other things at WWCR-along with many other interesting topics, mostly about the wonderful world of shortwave radio.

"Do you have a question? We really want to hear from you. There are two ways to submit questions for the show:

"P-Mail: Send your question via postal mail to Ask WWCR, 1300 WWCR Ave., Nashville, TN 37218, USA.

"E-Mail: Direct your questions for the show to AskWWCR@wwcr.com. Please note; this e-mail address is used only for the show itself and not for general correspondence or business. Due to the sheer volume of mail we receive, there may be no e-mail reply to your questions-but we request your input on the show, and any type of questions you may have. We read every piece of correspondence that you send us, and will do our best to respond to it on the show! "

The show can be heard at the following times:

Friday
0845 9.985;
Monday (1/5)
1130 15.825;
Tuesday
1845 15.825;
Saturday
0045 5.070;
Sunday
0845 9.985

Or you can hear the latest few editions of the show at:
www.wwcr.com/wwcr_ask_wwcr_program.html

❖ DXers Unlimited, Radio Habana Cuba

DXers Unlimited is a biweekly program of Arnie Coro's DX reports from Havana. Transcripts are available at: **www.dxers-unlimited.dxer.info/** and via some DX groups. Arnie seems

to concentrate on antenna projects, propagation forecasts and the like. He has a very likeable style.

"I try to listen more often to Arnie Coro on Saturday afternoons...mainly for his antenna talk." (Mark Coady, ODXA)

You can hear him via Radio Habana Cuba on

Saturday
2107-2122v 9505, 11760; 2337-2352v 9550
Sunday
0137-0152v 6180, 6060, 6000; 0337-0352v 6180, 6060, 6000; 0537-0552v 11760, 9550, 6180, 6060, 6000
Tuesday
2107-2122v 9505,11760; 2337-2352v 9550
Wednesday
0137-0152v 6180, 6060, 6000; 0337-0352v 6180, 6060, 6000; 0537-0552v 11760, 9550, 6180, 6060, 6000

❖ Mailbox, RNZI

"…my favorite would have to be Radio New Zealand International's *Mailbox*.

"I have been a listener since 2001 as well as an occasional contributor. I have always enjoyed the program's look at local music, letters and emails from listeners, DX information, special programs on NZ life, culture and history as well as a look the technical side of things. It is amazing what can be done in 25 minutes and they have always done it well. And you can now listen to their podcast if you miss the show for any reason.

"Over the years the show always had Arthur T. Cushen as a regular contributor. It was worth the wait just to hear this great shortwave legend every two weeks. Host Tony King would always answer any questions I had (before we had email) and current host Myra Oh and Frequency Manager Adrian Sainsbury are no different.

"The show packs a lot of information in and I highly recommend it. I know that the station has had a limited budget over the years yet the staff has always created top-notch shows. *Mailbox* is definitely one of those." (Brian Smith, ODXA)

www.rnzi.com/pages/audio.php
www.rnzi.com/audio/mailbox.mp3

Monday
0830-0855 (Biweekly from February 19) or RNZI Talk (Biweekly from February 12) 9765
1130-1155 (") or RNZI Talk (") 13840
1330-1355 (") or RNZI Talk (") 5950
1530-1555 (") or RNZI Talk (") 5950 (changes to 9870 at 1551?)
Tuesday
0330-0355 (Biweekly from February 20) or RNZI Talk (Biweekly from February 13) 15720
Friday
2030-2100 (Biweekly from February 9) or RNZI Talk (Biweekly from February 16) 17675

❖ Media Report, Radio Australia

"The weekly half-hour program takes a critical look at the latest developments in the communications industry, including media ownership, industry regulation and new technology. *The Media Report* explores the issues and provides critical analysis, offering an insight into how the changing media environment affects our lives and the world in which we live, and regularly puts the spotlight on media people and their activities."

While not a "DX" program *per se*, it's a fascinating look at the media in Australia. One recent episode looked at the situation at ABC Brisbane. The staff had an unusually high rate of cancer, so the building was completely shut down and the ABC had to create temporary facilities from scratch. Quite an adaptable bunch.

Thursday
0330-0400 21725 15415
0630-0700 17750 15415
1030-1100 15415 9590 9580
1530-1600 11660 9590 9475 7240 6080 5995

❖ Radio Waves, REE Madrid

"*Radio waves*…For DX lovers…DXing is the hobby of tuning in and identifying distant radio signals. Radio. This description fits you? You are a DXer and this is your program. Directed and Presented by Justin Coe."

The website description sounds interesting; however, during a recent listen, the entire segment was taken up with the "radio song" Telegraph Road by Dire Straits. Good song, but still. I could listen to the song on CD if I really wanted.

Listen over the air or listen online.

Saturday UTC
2225-2234v 6120

❖ DXing with Cumbre

DXing with Cumbre is available on demand in streaming audio format at: **http://cs3.ralabs.com/streams/**

The RA links below carry the show on the days and times indicated.

WHRI Angel 1 (To: America/Caribbean)
Sat 1930 15285
Sun 1530 11785
Mon 0330 7315
KWHR Angel 3 (To: Asia/Pacific)
Sun 0330 17525
Sun 1500 9930
KWHR Angel 4 (To: South Pacific)
Sat 0700 11565
Sun 0500 11565
WHRA Angel 5 (To: Africa/Middle East)
Sun 0230 5850
Mon 0230 5850

DXing with Cumbre is available in Real Audio whenever it is on shortwave at the World Harvest Radio website: **www.whr.org (**Source: **www.cumbredx.org/**)

These are just a few of the options out there. In a future column I'll examine some of the other DX programs one can hear. Have a favorite? Let me know.

❖ Language Lessons by Radio

Updating a past column, The Voice of Russia has started posting a Russian-language course online (as of Jan 23). It's not clear to me if this is part of the *Russian by Radio* program on the air, or in addition to it. But it looks quite interesting.

From the VoR website:

Russian For You

We are starting a new series of lessons. We do hope they'll be of much help to all those who are interested in Russian, who want to read and speak Russian and also understand what Russian speakers say.

Those of you who are already in some command of conversational Russian will have a chance to improve their skills.

Will our lessons be of any help to those absolutely ignorant of Russian yet eager to study the language?

Certainly, they will. If our listener is quite unfamiliar with Russian, he or she will certainly master It to a degree as the series goes on. The pages of our radio journal are well adapted to any sort of listener's background.

A few words on the contents now.

Imagine you've made up your mind to go to Russia to have a glimpse of the country you've so much heard about. Our first page will instruct you on how to ask and answer situational questions in Russian, how to keep up a conversation and share your impressions with other people. The title of the part is "The Russians say So" "ТАК ГОВОРЯТ РУССКИЕ".

If you happen to be inquisitive as to the history of the Russian language, you'11 find what you want in our second page. It will also elaborate on the meaning of Russian words, expresions and personal names. Moreover, it will comment on the most widely used Russian proverbs and sayings and a number of historic catchwords and phrases.

In the third part you'll enjoy the melodic beauty of Russian poetry and prose in a number of excerpts from the most popular pieces of Russian classical literature. The title will depend on the author, for example, "Reading Pushkin" — ЧИТАЕМ ПУШКИНА, or "Reading Tolstoy" — ЧИТАЕМ ТОЛСТОГО. The readings will probably encourage a closer acquaintance with the original works, thereby spurring the desire to improve your Russian. We would be happy to help you in such a case.

The fourth part, a musical one, will appear under four alternating titles: "Listening to a Song" — СЛУШАЕМ ПЕСНЮ, "Listening to a Romance" — СЛУШАЕМ РОМАНС, "Memorizing a Song" — РАЗУЧИВАЕМ ПЕСНЮ or "Let's Sing Together" — ДАВАЙТЕ СПОЕМ.

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com

Higher International Mail Rates

The latest word from the *United States Postal Service* is a projected rate increase on international mail rates. Increases are due in May, with plans to rename the categories to make them similar to those used for domestic mail.

International *airmail letter post* and *economy letter post* would be combined into a single category to be known as *first class mail international*. International rates will increase by an average of 13 percent. The price for first class international mail will rise an average of nine percent. The cost to mail a letter to Mexico or Canada will rise to 69 cents from 63 cents.

SRI celebrates 70 years

Swiss Radio International has released a DVD, *Switzerland -70 Years of Quality Reporting*, to celebrate their 70th Anniversary. Contents include video footage, interval signals, photos, and radio broadcast archives of 70 years history of SRI. The DVD is available in English, French, German and Italian. For more information contact Swiss Radio International at: Swiss Info/Swiss Radio International, Marketing-Communication, Giacomettistrsse 1, CH-3000 Berne 15, Switzerland. Email: **swissinfo@swissinfo.ch** Web: **www.swissinfo.org**

AMATEUR RADIO

Nicaragua, YN2EJ, 10/40 meters. CQ Zone 7. Full data color DXpedition card initialed by QSL Manager. Received in 34 days via: QSL Manager K5LBU, Charles Frost "Frosty". 3311 Hilton Head Ct., Missouri City, TX 77459 USA. County Count # 45 on ten meters. (Larry Van Horn, NC)

CLANDESTINE

Radio Hoa Mai via WHRI 12130 kHz. Full data card (except program name). Received in five months. QSL address: World Harvest Radio, P.O. Box 12, South Bend, IN 46624 USA. (Wendel Craighead, Prairie Village, KS)

Voice of Oromia Independence 15650 kHz, via Jülich, Germany, by WRMI broker. Full data MSC Cruise QSL card signed by Walter Brodowsky. Received in ten days for email report to walter.brodowsky@t-systems.com Correspondence may also be directed to: T-Systems International Sales Office Shortwave, T-Systems Business Services GmbH , Media & Broadcast, Bastionstrasse 11-19 D-52438 Jülich, Germany. (Edward Kusalik, Alberta, Canada)

CROATIA

Hrvatske Radio relay 7285 kHz via Wertachtal, Germany. Received in nine month for email to: walter.brodowsky@t-systems.com Correspondence may also be directed to: T-Systems International Sales Office Shortwave, T-Systems Business Services GmbH , Media & Broadcast, Bastionstrasse 11-19 D-52438 Jülich, Germany. (Kusalik)

FRENCH GUIANA

Polish Radio relay via Montsinery 11940 kHz. Full data card (except transmitter site). Received in two months for an English report. QSL address: Radio Polonia (prior to name change to Polish Radio) P.O. Box 46, 00-977 Warsaw, Poland. (Craighead, KS) Radio Netherlands via Montsinery 17705 kHz. Full data Winter of the Lakes card. Received in seven months for CD follow up report. (Kusalik)

GERMANY

Polish Radio relay 9525 kHz. Friendly e-QSL letter confirming Wertachtal, Germany 100 kW site. Received in two days from Walter Brodowsky-Account & Product Manager at walter.brodowsky@t-systems.com . Correspondence may also be directed to: T-Systems International Sales Office Shortwave (see Clandestines and Croatia) (Ron Howard, Monterrey, CA; Craighead, KS)

Radio Farda relay 9755 kHz Full data Radio Free Europe/Radio Liberty-Prague building card confirming Wertachtal, Germany site. Received in seven months for English report. QSL address: 1201 Connecticut Avenue NW, Washington, DC 20036. (Craighead)

MEDIUM WAVE

KKGR Helena, MT, 680 kHz AM. Beautiful full data color map/flag card signed by Les Rayburn, NRC/IRCA Broadcast Test Coordinator. Received in 29 days for an AM report, SASE (used for reply) and taped report of DX Test. QSL address: Les Rayburn N1LF, High Noon Fimn, 100 Centerview Dr., Suite 111, Birmingham, AL 35216 (or) les@highnoonfilm.com (William R Wilkins, Springfield, MO)

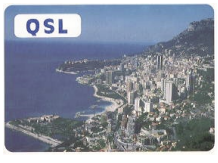
KYOL Littleton, CO, 1510 kHz AM. Nice surprise to receive box from veri signer Patrick Griffith-Certified Broadcast Technician. Enclosed with verification letter, mug, pen, stickers and an assortment of station goodies. Station address: 1201 18th Street, Suite 250, Denver, CO 80202. This made my day! AM QSL 2,943. (Patrick Martin, Oceanside, OR) Patrick Griffith is also one of this column's regular contributors. - GVH

WMRO 1560 kHz AM. Verification letter on station letterhead, signed by Scott Bailey-General Manager/Chief Engineer, plus business card. Received in 41 days for a CD report. Station address: 701 North Blythe Street, P.O. Box 1445, Gallatin, TN 37066 USA. (Martin)

WNTP Philadelphia, PA, 990 kHz AM. Partial data card signed by Les Rayburn, NRC/IRCA Broadcast Test Coordinator and Rene Tetro-Chief Engineer. Received in seven days for a SASE (used for reply) and taped report of DX Test. QSL address: (see KKGR). (Wilkins)

MONACO

Trans World Radio Europe 9800 kHz. Full data card signed by Beth Click, plus personal note. Received in 110 days for an English report, one IRC and one US dollar, addressed to: P.O. Box 8700, Cary, NC 27512-8700 USA. Reply from TWR Europe, P.O. Box 141, A-1235 Vienna, Austria. (Joe Wood, Greenback, TN)



MYANMAR

Radio Myanmar 9730 kHz. Full data QSL folder card. Received in three months. Previous reply was via a verification letter. Received for a report to: Myanmar Radio & TV, Atten: Ko Ko Htway-Director of Radio Broadcasting, 426, Pyay Road, Kamayut-11041, Yangon, Myanmar. (Alokesh Gupta, India)

PIRATE

Altered States Radio 6925 kHz. Blue verification sheet signed by The Sharman, with mention of this being their first broadcast since returning to the air. Pirate maildrop: P.O. Box 1, Belfast, NY 14895. (Kusalik)

Northwoods Radio, 6925 kHz AM. Full data Deer Camp 2006 (QSL # 53) plus excellent quality CD of broadcast. Received in 41 days from posting at Free Radio Network website **www.frn.net/** (Dan Srebnick, Aberdeen, NJ)

Radio Bonofox (Dutch Euro pirate) 6306 kHz. Full data e-QSL. Received in 55 days for PDF file sent to: radiobonofox@hotmail.com (Martin Schoech, Eisenach, Germany, HCDX)

USA

American Forces Network via Pearl Harbor, HI 10320 kHz USB/ 12133 kHz USB Key West, FL. Full data AFRTS logo cards signed by Robert Winkler. Received cards in ten days. QSL address: American Forces Network, Department of Defense, NMC Det AFRTS - DMC, 23755 Z Street, Bldg. 2730 Riverside, CA 92518-2017. (John Wilkins, Wheat Ridge, CO) Website: **www.afrts.ods.mil/** Received in five days for email reports confirming Key West, Hawaii and Guam (5765) to: qsl@dodmedia.osd.mil (Kusalik)

How to Use the Shortwave Guide

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

① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

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

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

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. 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:

Codes	
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
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
ca:	Central America
do:	domestic broadcast
eu:	Europe
me:	Middle East
na:	North America
oc:	Oceania
pa:	Pacific
sa:	South America
va:	various

MT Monitoring Team

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Thank You ...

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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
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

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

0000	0015		Japan, Radio Japan/NHK World			13650as
			17810as			
0000	0030		Australia, Radio	9660as	12080as	13670as
			15240pa	17715as	17750va	17775va
			17795va			
0000	0030		Burma, Dem Voice of Burma		5955eu	
0000	0030		Egypt, Radio Cairo	11950na		
0000	0030		Thailand, Radio	9680af		
0000	0030		UK, BBC World Service		3915as	11945as
			17615as			
0000	0030		USA, Voice of America		7405as	
0000	0045		India, All India Radio		9705as	9950as
			11620as	11645as	13605as	
0000	0057		Canada, Radio Canada Intl		9880as	
0000	0057		Netherlands, Radio		6165na	
0000	0059		Spain, Radio Exterior Espana		6055am	
0000	0100		Anguilla, University Network		6090am	
0000	0100		Australia, ABC NT Alice Springs			2310do
			4835do			
0000	0100		Australia, ABC NT Katherine		5025do	
0000	0100		Australia, ABC NT Tennant Creek			4910do
0000	0100		Bulgaria, Radio	7400na	9700na	
0000	0100		Canada, CFRX Toronto ON		6070na	
0000	0100		Canada, CFVP Calgary AB		6030na	
0000	0100		Canada, CKZN St John's NF		6160na	
0000	0100		Canada, CKZU Vancouver BC		6160na	
0000	0100		China, China Radio Intl		6020na	6075as
			7130as	7180as	9425na	9570as
			11650as	11885as		
0000	0100		Costa Rica, University Network		5030va	6150va
			7375va	9725va		
0000	0100		Germany, Deutsche Welle		7265as	15320as
0000	0100		Guyana, Voice of	3291do		
0000	0100		Japan, Radio Japan/NHK World			6145na
0000	0100		Malaysia, RTM/Trax FM		7295as	
0000	0100	vl	Namibia, Namibian BC Corp		3270do	3290do
			6060do	6175do		
0000	0100		New Zealand, Radio NZ Intl		15720pa	
0000	0100	DRM	New Zealand, Radio NZ Intl		17675pa	
0000	0100	vl	Papua New Guinea, Wantok R. Light			7120va
0000	0100		Singapore, MediaCorp Radio		6150do	
0000	0100		UK, BBC World Service		5970as	6195as
			9605as	9740as	11955as	15285as
			15360as			
0000	0100	DRM	UK, BBC World Service		6010na	
0000	0100	f	UK, Bible Voice	5980me		
0000	0100		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0000	0100		USA, KAIJ Dallas TX		5755na	
0000	0100		USA, KTBN Salt Lake City UT		7505na	15590na
0000	0100		USA, WBCQ Kennebunk ME		5110na	7415na
			9330na			
0000	0100		USA, WBOH Newport NC		5920am	
0000	0100		USA, WEWN Birmingham AL		5810va	
0000	0100		USA, WHRA Greenbush ME		5850na	
0000	0100		USA, WHRI Cypress Creek SC		7315am	7490am
0000	0100		USA, WINB Red Lion PA		9265am	
0000	0100	twhfa	USA, WRMI Miami FL		7385na	
0000	0100	sm	USA, WRMI Miami FL		9955am	
0000	0100		USA, WTJC Newport NC		9370na	
0000	0100		USA, WWCR Nashville TN		3215na	5070na
			7465na	13845na		
0000	0100		USA, WWRB Manchester TN		3185na	5050na
			6890na			
0000	0100	mtwhfa	USA, WWRB Manchester TN		5745ca	
0000	0100		USA, WYFR/Family R Okeechobee FL			6065na
			9505na	9715na	11720am	
0000	0100		Zambia, Christian Voice		4965af	
0005	0030	Sun/Mon	Austria, Radio Austria Intl		7325na	
0005	0100		Canada, Radio Canada Intl		9755am	
0013	0028	twhfa	Austria, Radio Austria Intl		7325na	
0030	0045	s	Germany, Pan American BC		6165as	
0030	0100		Australia, Radio	9660as	12080as	13670as
			15240pa	15415as	17715as	17750va
			17795va			
0030	0100	m	Greece, Voice of	7475eu	9420eu	12105af
0030	0100		Greece, Voice of	12105af		
0030	0100		Lithuania, Radio Vilnius		9875na	
0030	0100		Thailand, Radio	5890na		
0030	0100	fas	UK, Bible Voice	5955as		
0030	0100		USA, Voice of America		7120va	9620va
			11695va	11725va	11805va	12005va
			15185va	15205va		
0033	0100	Sun/Mon	Austria, Radio Austria Intl		7325na	
0043	0058	twhfa	Austria, Radio Austria Intl		7325na	
0055	0100		Italy, RAI Italia	11800na		

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

0100	0105		Canada, Radio Canada Intl		9755am	
0100	0115		Italy, RAI Italia	11800na		
0100	0127		Czech Rep, Radio Prague		6200na	7345na
0100	0128		Vietnam, Voice of	6175na		
0100	0130	s	Germany, Universal Life		7260as	
0100	0130	m	Greece, Voice of	7475eu	9420eu	12105af
0100	0130		Slovakia, Radio Slovakia Int		7230na	9440sa
0100	0130		UK, BBC World Service		7230na	9440sa
0100	0156		Romania, Radio Romania Intl		6150na	9515na
0100	0157		Canada, Radio Canada Intl		5840as	5970as
0100	0157		Netherlands, Radio		6165na	
0100	0158		Hungary, Radio Budapest		5980na	
0100	0200		Anguilla, University Network		6090am	
0100	0200		Australia, ABC NT Katherine		5025do	
0100	0200		Australia, ABC NT Tennant Creek			4910do
0100	0200		Australia, Radio	9660as	12080as	13670as
			15240pa	15415as	15515as	17715as
			17750va	17795va	21745va	
0100	0200		Canada, CFRX Toronto ON		6070na	
0100	0200		Canada, CFVP Calgary AB		6030na	
0100	0200		Canada, CKZN St John's NF		6160na	
0100	0200		Canada, CKZU Vancouver BC		6160na	
0100	0200		China, China Radio Intl		6005na	6020na
			6075as	6080na	7130eu	7180as
			9570na	9580na	11650as	11885as
0100	0200		Costa Rica, University Network		5030va	6150va
			7375va	9725va		
0100	0200		Cuba, Radio Havana		6000na	6180na
0100	0200		Guyana, Voice of	3291do		
0100	0200		Indonesia, Voice of		9525as	11785pa
			15150al			
0100	0200		Japan, Radio Japan/NHK World			6030va
			11860as	11935sa	15325as	17685pa
			17810as	17825ca	17845as	
0100	0200		Malaysia, RTM/Trax FM		7295as	
0100	0200	vl	Namibia, Namibian BC Corp		3270do	3290do
			6060do	6175do		
0100	0200		New Zealand, Radio NZ Intl		15720pa	
0100	0200	DRM	New Zealand, Radio NZ Intl		17675pa	
0100	0200		North Korea, Voice of Korea		7140as	9345as
			9730am	11735am	13760am	15180am
0100	0200	vl	Papua New Guinea, Wantok R. Light			7120va
0100	0200		Singapore, MediaCorp Radio		6150do	
0100	0200		Sri Lanka, SLBC	6005as	9770as	15745as
0100	0200		Taiwan, Radio Taiwan Intl		11875na	15465na
0100	0200		UK, BBC World Service		7320as	9605as
			11955as	15285as	15310as	15360as
0100	0200	f	UK, Bible Voice	5945me		
0100	0200		Ukraine, Radio Ukraine Intl		7440na	
0100	0200		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
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		11705va	12005va
0100	0200		USA, WBCQ Kennebunk ME		5110na	7415na
			9330na			
0100	0200		USA, WBOH Newport NC		5920am	
0100	0200		USA, WEWN Birmingham AL		5810va	
0100	0200		USA, WHRA Greenbush ME		5850na	
0100	0200	mtwhf	USA, WHRI Cypress Creek SC		5835am	7490am
0100	0200	as	USA, WHRI Cypress Creek SC		7315am	
0100	0200		USA, WINB Red Lion PA		9265am	
0100	0200	twhfa	USA, WRMI Miami FL		7385na	
0100	0200	sm	USA, WRMI Miami FL		9955am	
0100	0200		USA, WTJC Newport NC		9370na	
0100	0200		USA, WWCR Nashville TN		3215na	5070na
			5935na	7465na		
0100	0200		USA, WWRB Manchester TN		3185na	5050na
			6890na			
0100	0200	mtwhfa	USA, WWRB Manchester TN		5745ca	
0100	0200		USA, WYFR/Family R Okeechobee FL			6065na
			9505na	15195as		
0100	0200		Uzbekistan, CVC International		7355as	
0100	0200		Zambia, Christian Voice		4965af	
0105	0159	Sun/Mon	Canada, Radio Canada Intl		9755am	
0115	0130	twhf	Seychelles, FEBA	5885as		
0130	0200		Iran, Voice of the Islamic Rep		6120na	7160na
0130	0200		Lithuania, Radio Vilnius		7325na	
0130	0200		Sweden, Radio	11550va		
0130	0200		USA, Voice of America		5960va	
0130	0200	twhfa	USA, Voice of America		7405va	
0140	0200		Vatican City, Vatican Radio		5915va	7335va

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

0200	0205	Sun/Mon	Canada, Radio Canada Intl		9755am	
0200	0227		Czech Rep, Radio Prague		6200na	7345na
0200	0227		Iran, Voice of the Islamic Rep		6120na	7160na

0200	0228		Hungary, Radio Budapest	5980na		
0200	0300		Anguilla, University Network	6090am		
0200	0300	twhfa	Argentina, RAE	11710am		
0200	0300		Australia, ABC NT Alice Springs			2310do
			4835do			
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek			4910do
0200	0300		Australia, Radio	9660as	12080as	13670as
			15240pa	15415as	15515as	17750va
			21725va			
0200	0300		Canada, CFRX Toronto ON	6070na		
0200	0300		Canada, CFVP Calgary AB	6030na		
0200	0300		Canada, CKZN St John's NF	6160na		
0200	0300		Canada, CKZU Vancouver BC	6160na		
0200	0300		China, China Radio Intl	11770as	13640as	
0200	0300		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0200	0300		Cuba, Radio Havana	6000na	6180na	
0200	0300		Egypt, Radio Cairo	7270na		
0200	0300		Guyana, Voice of	3291do		
0200	0300		Malaysia, RTM/Trax FM	7295as		
0200	0300	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0200	0300		New Zealand, Radio NZ Intl	15720pa		
0200	0300	DRM	New Zealand, Radio NZ Intl	17675pa		
0200	0300		North Korea, Voice of Korea	13650as	15100as	
0200	0300	vl	Papua New Guinea, Wantok R. Light			7120va
0200	0300		Philippines, Radio Pilipinas	12025va	15115va	
			15230va			
0200	0300		Russia, Voice of	6230na	7250na	13665na
			15425na			
0200	0300		Singapore, MediaCorp Radio	6150do		
0200	0300		South Korea, KBS World Radio			9560na
			15575na			
0200	0300		Sri Lanka, SLBC	6005as	9770as	15745as
0200	0300		UK, BBC World Service	6035af	6195as	
			7320as	11750as	11955as	15285as
			15310as	15360as	17760as	
0200	0300		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
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	5810va		
0200	0300		USA, WHRA Greenbush ME	5850na		
0200	0300	as	USA, WHRI Cypress Creek SC	7315am		
0200	0300	mtwhf	USA, WHRI Cypress Creek SC	5835am	7490am	
0200	0300		USA, WINB Red Lion PA	9265am		
0200	0300	twhfa	USA, WRMI Miami FL	7385na		
0200	0300	sm	USA, WRMI Miami FL	9955am		
0200	0300		USA, WTJC Newport NC	9370na		
0200	0300		USA, WWCR Nashville TN	3215na	5070na	
			5765na	5935na		
0200	0300		USA, WWRB Manchester TN	3185na	5050na	
			6890na			
0200	0300	mtwhfa	USA, WWRB Manchester TN	5745ca		
0200	0300		USA, WYFR/Family R Okeechobee FL			5985am
			6065na	9505na	9525na	11855am
0200	0300		Uzbekistan, CVC International	7355as		
0200	0300		Zambia, Christian Voice	4965af		
0200	3000		Taiwan, Radio Taiwan Intl	5950na	9680na	
0215	0220		Vatican City, Vatican Radio	12070va		
0215	0230		Nepal, Radio	3230as	5005as	6100as
			7165as			
0230	0258		Vietnam, Voice of	6175na		
0230	0300		Sweden, Radio	6010na		
0245	0300	twhfas	Albania, Radio Tirana	6115eu	7465eu	
0245	0300		Myanmar, Radio	9730do		
0250	0300		Vatican City, Vatican Radio	7305am	9610am	

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

0300	0307		Croatia, Croatian Radio	7285na		
0300	0320		Vatican City, Vatican Radio	7305am	9610am	
0300	0330		Egypt, Radio Cairo	7270na		
0300	0330		Myanmar, Radio	9730do		
0300	0330		Philippines, Radio Pilipinas	12025va	15115va	
			15230va			
0300	0330	s	Swaziland, TWR	3200af		
0300	0330		Thailand, Radio	5890na		
0300	0330		USA, KJES Vado NM	7555na		
0300	0330		USA, WBCQ Kennebunk ME	9330na		
0300	0330		Vatican City, Vatican Radio	7360af		
0300	0358		Germany, Deutsche Welle	7330as	9785as	
0300	0400		Anguilla, University Network	6090am		
0300	0400		Australia, ABC NT Alice Springs			2310do
			4835do			
0300	0400		Australia, ABC NT Katherine	5025do		
0300	0400		Australia, ABC NT Tennant Creek			4910do
0300	0400		Australia, Radio	9660as	12080as	13670as
			15240pa	15415as	15515as	17750va
			21725va			
0300	0400		Bulgaria, Radio	7400na	9700na	
0300	0400	twhfas	Canada, CBC NQ SW Service	9625na		
0300	0400		Canada, CFRX Toronto ON	6070na		
0300	0400		Canada, CFVP Calgary AB	6030na		
0300	0400		Canada, CKZN St John's NF	6160na		
0300	0400		Canada, CKZU Vancouver BC	6160na		
0300	0400		China, China Radio Intl	6190na	9460as	
			9690na	9790na	11770as	13620as
			15110as	15120as		
0300	0400		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0300	0400		Cuba, Radio Havana	6000na	6180na	
0300	0400		Germany, Deutsche Welle	9480as		
0300	0400		Guyana, Voice of	3291do		
0300	0400		Japan, Radio Japan/NHK World			21610pa
0300	0400		Malaysia, RTM/Trax FM	7295as		
0300	0400		Malaysia, RTM/Voice of Malaysia			6175as
			9750as	15295as		
0300	0400	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0300	0400		New Zealand, Radio NZ Intl	15720pa		
0300	0400	DRM	New Zealand, Radio NZ Intl	17675pa		
0300	0400		North Korea, Voice of Korea	7140as	9345as	
			9730as			
0300	0400	vl	Papua New Guinea, Wantok R. Light			7120va
0300	0400		Russia, Voice of	5995me	6240na	7350na
			13665na	15425na		
0300	0400	vl	Rwanda, Radio	6055do		
0300	0400		Singapore, MediaCorp Radio	6150do		
0300	0400		South Africa, Channel Africa	3345af	7390af	
0300	0400		Sri Lanka, SLBC	6005as	9770as	15745as
0300	0400		Taiwan, Radio Taiwan Intl	5950na	15215sa	
			15320as			
0300	0400	s	UK, BBC World Service	6195as		
0300	0400		UK, BBC World Service	3255af	6005me	
			6145af	6190af	7130af	7160af
			9410as	9750af	11760as	15320as
			15360as	17760as	17790as	21660as
0300	0400		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
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	6080af	
			15580af			
0300	0400		USA, WBCQ Kennebunk ME	5110na	7415na	
0300	0400		USA, WBOH Newport NC	5920am		
0300	0400		USA, WEWN Birmingham AL	5810va		
0300	0400		USA, WHRA Greenbush ME	5850na		
0300	0400	mtwhf	USA, WHRI Cypress Creek SC	5835am	6110am	
			7520am			
0300	0400	as	USA, WHRI Cypress Creek SC	7315am		
0300	0400		USA, WINB Red Lion PA	9265am		
0300	0400	twhfa	USA, WRMI Miami FL	7385na		
0300	0400	sm	USA, WRMI Miami FL	9955am		
0300	0400		USA, WTJC Newport NC	9370na		
0300	0400		USA, WWCR Nashville TN	3215na	5070na	
			5765na	5935na		
0300	0400		USA, WWRB Manchester TN	3185na	5050na	
			6890na			
0300	0400	mtwhfa	USA, WWRB Manchester TN	5745ca		
0300	0400		USA, WYFR/Family R Okeechobee FL			6065na
			9505na	9985am	11740am	
0300	0400		Uzbekistan, CVC International	13685as		
0300	0400		Zambia, Christian Voice	4965af		
0300	0400	vl	Zimbabwe, ZBC Corp	5975do		
0300	0500	vl/mtwhf	UK, Sudan Radio Service	7120af		
0315	0330	t	Ecuador, HCJB Global	9745va		
0330	0335		Bahrain, Radio Bahrain	6010as		
0330	0345	t	Ecuador, HCJB Global	6065va		
0330	0358		Hungary, Radio Budapest	6035na		
0330	0358		Vietnam, Voice of	6175am		
0330	0400		Sweden, Radio	6010na		
0330	0400		UK, BBC World Service	11665af		
0330	0400	twhfas	USA, WBCQ Kennebunk ME	9330na		
0345	0400	twhfas	Albania, Radio Tirana	6115eu	7465eu	

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

0400	0427		Czech Rep, Radio Prague	6200na	7345na	
0400	0430		Australia, Radio	9660as	12080as	13670as
			15240pa	15515as	17750va	21725va
0400	0430	mtwhf	France, Radio France Intl	7270af	7315af	
			9805af			
0400	0430	as	USA, WWRB Manchester TN	5745ca		
0400	0456		Romania, Radio Romania Intl	6115va	9515na	

			9690va	11895va		
0400	0457		Germany, Deutsche Welle	5905af	7225af	
0400	0500		Anguilla, University Network	6090am		
0400	0500		Armenia, CVC International	15515as		
0400	0500		Australia, ABC NT Alice Springs			2310do
			4835do			
0400	0500		Australia, ABC NT Katherine	5025do		
0400	0500		Australia, ABC NT Tennant Creek			4910do
0400	0500	twhfas	Canada, CBC NQ SW Service	9625na		
0400	0500		Canada, CFRX Toronto ON	6070na		
0400	0500		Canada, CKZN St John's NF	6160na		
0400	0500		Canada, CKZU Vancouver BC	6160na		
0400	0500		China, China Radio Intl	6190na	9460as	
			13620as	15120as	17725as	17855as
0400	0500		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0400	0500		Cuba, Radio Havana	6000na	6180na	
0400	0500		Germany, Deutsche Welle	6180af	9565af	
			15445af			
0400	0500		Guyana, Voice of	3291do		
0400	0500		Malaysia, RTM/Trax FM	7295as		
0400	0500		Malaysia, RTM/Voice of Malaysia			6175as
			9750as	15295as		
0400	0500	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0400	0500		New Zealand, Radio NZ Intl	15720pa		
0400	0500	DRM	New Zealand, Radio NZ Intl	17675pa		
0400	0500		Nigeria, Radio/Kaduna	6090do		
0400	0500	vl	Papua New Guinea, Wantok R. Light		7120va	
0400	0500		Russia, Voice of	7150na	7255na	7350na
			9840na	12030na	13655na	
0400	0500	vl	Rwanda, Radio	6055do		
0400	0500		Singapore, MediaCorp Radio	6150do		
0400	0500		South Africa, Channel Africa	3345af		
0400	0500		Turkey, Voice of	6020va	7240va	
0400	0500	vl	Uganda, Radio	4976do	5026do	
0400	0500		UK, BBC World Service	3255af	6005af	
			6190af	6195eu	7120af	7160af
			11665af	11760as	12095af	15310as
			15360as	15575as	17760as	17790as
			21660as			
0400	0500	DRM	UK, BBC World Service	6010na		
0400	0500		Ukraine, Radio Ukraine Intl	7440na	9515as	
0400	0500		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
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, Voice of America	4930af	4960af	
			6080af	9885af	15580af	
0400	0500		USA, WBCQ Kennebunk ME	5110na	7415na	
0400	0500		USA, WBOH Newport NC	5920am		
0400	0500		USA, WEWN Birmingham AL	5810va	5850va	
0400	0500		USA, WHRA Greenbush ME	5850na		
0400	0500	mtwhf	USA, WHRI Cypress Creek SC	5835am	7490am	
0400	0500	as	USA, WHRI Cypress Creek SC	7315am		
0400	0500		USA, WMLK Bethel PA	9265eu		
0400	0500	thwhfa	USA, WRMI Miami FL	7385na		
0400	0500	sm	USA, WRMI Miami FL	9955am		
0400	0500		USA, WTJC Newport NC	9370na		
0400	0500		USA, WWCR Nashville TN	3215na	5070na	
			5765na	5935na		
0400	0500		USA, WWRB Manchester TN	3185oc	5050na	
			6890na			
0400	0500		USA, WYFR/Family R Okeechobee FL		6065na	
			6855na	7780va	9505na	9715na
0400	0500		Uzbekistan, CVC International	13685as		
0400	0500		Zambia, Christian Voice	4965af		
0400	0500	vl	Zimbabwe, ZBC Corp	5975do		
0430	0445		Israel, Kol Israel	7545va	9345va	17600va
0430	0457		Czech Rep, Radio Prague	9890na		
0430	0500		Australia, Radio	9660as	12080as	13670as
			15240pa	15415as	15515va	17750va
			21725va			
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	a	USA, WWRB Manchester TN	5745ca		
0445	0500		Italy, RAI Italia	5965af	6120af	7170af

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

0500	0507	twhfas	Canada, CBC NQ SW Service	9625na		
0500	0530	mtwhf	France, Radio France Intl	9805af	11995af	
			13680af			
0500	0530		Germany, Deutsche Welle	6180af	7285af	
			9755af	12045af	15410af	
0500	0530	vl	Rwanda, Radio	6055do		
0500	0530		Vatican City, Vatican Radio	7360af	9660af	
			11625af			
0500	0555		South Africa, Channel Africa	7240af	9685af	
0500	0557		Netherlands, Radio	6165na		
0500	0559		New Zealand, Radio NZ Intl	15720pa		
0500	0559	DRM	New Zealand, Radio NZ Intl	17675pa		
0500	0600		Anguilla, University Network	6090am		
0500	0600		Armenia, CVC International	15515as		
0500	0600		Australia, ABC NT Alice Springs			2310do
			4835do			
0500	0600		Australia, ABC NT Katherine	5025do		
0500	0600		Australia, ABC NT Tennant Creek			4910do
0500	0600		Australia, Radio	9660as	12080as	13670as
			15160as	15240pa	15515as	17750va
0500	0600		Bhutan, BBS	6035as		
0500	0600		Canada, CFRX Toronto ON	6070na		
0500	0600		Canada, CKZN St John's NF	6160na		
0500	0600		Canada, CKZU Vancouver BC	6160na		
0500	0600		China, China Radio Intl	5960na	6190na	
			7220af	11880as	15350as	15465as
			17505va	17540as	17725as	17855as
0500	0600		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0500	0600		Cuba, Radio Havana	6000na	6060na	
			6180na	9550va	9600va	11760va
0500	0600		Germany, CVC International	9430af		
0500	0600		Guyana, Voice of	3291do		
0500	0600		Japan, Radio Japan/NHK World			5975eu
			6110na	7230eu	15195as	17810as
			21755pa			
0500	0600		Malaysia, RTM/Trax FM	7295as		
0500	0600		Malaysia, RTM/Voice of Malaysia			6175as
			9750as	15295as		
0500	0600	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
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	15120af		
0500	0600	vl	Papua New Guinea, Wantok R. Light		7120va	
0500	0600		Russia, Voice of	7150na	7255na	7350na
			9840na	13665na		
0500	0600		Singapore, MediaCorp Radio	6150do		
0500	0600		Swaziland, TWR	4775af	6120af	9500af
0500	0600	vl	Uganda, Radio	4976do	5026do	
0500	0600	DRM	UK, BBC World Service	1296eu		
0500	0600		UK, BBC World Service	3255af	6005as	
			6190af	6195af	7160af	9410eu
			9440eu	11665af	11695as	11760as
			11765af	11955as	12095eu	15310as
			15575as	17640af	17760as	17790as
			21660as			
0500	0600	mtwhf	UK, BBC World Service	15420af		
0500	0600	vl/ mtwhf	UK, Sudan Radio Service	9525af		
0500	0600		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0500	0600		USA, KAIJ Dallas TX	5755na		
0500	0600		USA, KTBN Salt Lake City UT	7505na		
0500	0600		USA, KWHR Naalehu HI	11565as	13650as	
0500	0600		USA, Voice of America	4930af	6080af	
			9885af	15580af		
0500	0600		USA, WBCQ Kennebunk ME	5110na	7415na	
0500	0600		USA, WBOH Newport NC	5920am		
0500	0600		USA, WEWN Birmingham AL	5850va	7570va	
0500	0600		USA, WHRA Greenbush ME	7555na		
0500	0600	mtwhf	USA, WHRI Cypress Creek SC	5835am	7490am	
0500	0600	as	USA, WHRI Cypress Creek SC	7315am		
0500	0600		USA, WMLK Bethel PA	9265eu		
0500	0600		USA, WRMI Miami FL	9955am		
0500	0600		USA, WTJC Newport NC	9370na		
0500	0600		USA, WWCR Nashville TN	3215na	5070na	
			5765na	5935na		
0500	0600		USA, WWRB Manchester TN	3185oc	5085na	
0500	0600		USA, WYFR/Family R Okeechobee FL		6855na	
			7520va			
0500	0600		Uzbekistan, CVC International	13685as		
0500	0600		Zambia, Christian Voice	5915al	6065af	
0500	0600	vl	Zimbabwe, ZBC Corp	5975do		
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do	
0530	0600		Thailand, Radio	13770eu		
0545	0600	vl	Rwanda, Radio	6055do		

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

0600	0615	as	South Africa, TWR	11640af		
0600	0620		Vatican City, Vatican Radio	4005eu	7250eu	
0600	0630		Australia, Radio	9660as	12080as	13670as
			15160as	15240pa	15515as	17750va
0600	0630	mtwhf	France, Radio France Intl	7315af	9865af	
			11995af	13680af	15160af	17770af
0600	0630		Germany, Deutsche Welle	7240af	7285af	
			9565af	12045af		
0600	0630		USA, Voice of America	6080af	6105af	
			9885af	15580af		
0600	0645	mtwhf	South Africa, TWR	11640af		

0600	0700		Anguilla, University Network	6090am		
0600	0700		Armenia, CVC International	15515as		
0600	0700		Australia, ABC NT Alice Springs			2310do
			4835do			
0600	0700		Australia, ABC NT Katherine	5025do		
0600	0700		Australia, ABC NT Tennant Creek			4910do
0600	0700		Australia, CVC International	15335as		
0600	0700		Canada, CFRX Toronto ON	6070na		
0600	0700		Canada, CFVP Calgary AB	6030na		
0600	0700		Canada, CKZN St John's NF	6160na		
0600	0700		Canada, CKZU Vancouver BC	6160na		
0600	0700		China, China Radio Intl	6115na	11750af	
			11770as	11880as	13645as	15140as
			15350as	15465as	17505va	17540as
			17710as			
0600	0700		Costa Rica, University Network	5030va	6150va	
			7375va	9725va	11870va	
0600	0700		Cuba, Radio Havana	6000va	6060va	
			6180na	9550va	9600va	11760va
0600	0700		Germany, CVC International	11720af		
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do	
0600	0700		Guyana, Voice of	3291do		
0600	0700		Japan, Radio Japan/NHK World			7230eu
			11690va	11715eu	11740as	17870pa
0600	0700		Liberia, ELWA	4760do		
0600	0700		Malaysia, RTM/Trax FM	7295as		
0600	0700		Malaysia, RTM/Voice of Malaysia			6175as
			9750as	15295as		
0600	0700	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0600	0700		New Zealand, Radio NZ Intl	9765pa		
0600	0700	DRM	New Zealand, Radio NZ Intl	9890pa		
0600	0700		Nigeria, Radio/Ibadan	6050do		
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	
0600	0700		Nigeria, Radio/Lagos	3326do	4990do	
0600	0700		Nigeria, Voice of	15120af		
0600	0700	vl	Papua New Guinea, Wantok R. Light		7120va	
0600	0700		Russia, Voice of	11575eu	17665oc	17805oc
0600	0700	irreg/ vl	Sierra Leone, SLBS	3316do		
0600	0700		Singapore, MediaCorp Radio	6150do		
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do	
0600	0700		South Africa, Channel Africa	7240af	15255af	
0600	0700		Swaziland, TWR	4775af	6120af	9500af
0600	0700	DRM	UK, BBC World Service	1296eu		
0600	0700		UK, BBC World Service	6005af	6190af	
			6195eu	7160eu	9410eu	11675as
			11940af	12095eu	11765af	11955as
			15360as	15420af	15575as	17640af
			17760as	17790as	21660as	
0600	0700		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0600	0700		USA, KAIJ Dallas TX	5755na		
0600	0700		USA, KTBN Salt Lake City UT	7505na		
0600	0700		USA, KWHR Naalehu HI	11565as	13650as	
0600	0700		USA, WBCQ Kennebunk ME	5110na	7415na	
0600	0700		USA, WBOH Newport NC	5920am		
0600	0700		USA, WEWN Birmingham AL	5850va	7570va	
0600	0700		USA, WHRA Greenbush ME	7555na		
0600	0700	twhfa	USA, WHRI Cypress Creek SC	5835am		
0600	0700		USA, WHRI Cypress Creek SC	7315am	7490am	
0600	0700		USA, WMLK Bethel PA	9265eu		
0600	0700		USA, WRMI Miami FL	9955am		
0600	0700		USA, WTJC Newport NC	9370na		
0600	0700		USA, WWCR Nashville TN	3215na	5070na	
			5765na	5935na		
0600	0700		USA, WWRB Manchester TN	3185oc	5085na	
0600	0700		USA, WYFR/Family R Okeechobee FL		5945am	
			6000am	7780va	9860na	11580af
			11630va			
0600	0700	vl	Vanuatu, Radio	4960do		
0600	0700		Yemen, Rep of Yemen Radio	9780me		
0600	0700		Zambia, Christian Voice	5915al	6065af	
0600	0700	vl	Zimbabwe, ZBC Corp	5975do		
0605	0620	m	Austria, Radio Austria Intl	17870me		
0605	0630	Sat/Sun	Austria, Radio Austria Intl	17870me		
0630	0656		Romania, Radio Romania Intl	7180va	9690va	
			15135va	17780va		
0630	0700		Australia, Radio	9660as	12080as	13670as
			15160as	15240pa	15415as	15515as
			17750va			
0630	0700		UK, BBC World Service	11795af		
0630	0700		USA, Voice of America	6080af	9885af	
			15580af			
0630	0700		Vatican City, Vatican Radio	7360af	9660af	
			11625af			
0635	0700	Sat/Sun	Austria, Radio Austria Intl	17870me		
0645	0700	twhf	Austria, Radio Austria Intl	17870me		

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

0700	0705		Croatia, Croatian Radio	9470oc	11690oc	
0700	0706		UK, BBC World Service	6005af		
0700	0730		France, Radio France Intl	11725af	15605af	
0700	0730		Slovakia, Radio Slovakia Int	13715oc	15460oc	
0700	0757	DRM	Netherlands, Radio	7300eu		
0700	0800		Anguilla, University Network	6090am		
0700	0800		Australia, ABC NT Alice Springs			2310do
			4835do			
0700	0800		Australia, ABC NT Katherine	5025do		
0700	0800		Australia, ABC NT Tennant Creek			4910do
0700	0800		Australia, CVC International	15335as		
0700	0800		Australia, CVC International	15335as		
0700	0800		Australia, Radio	9660as	9710as	12080as
			13630as	15160pa	15240pa	15415as
			17750va			
0700	0800		Canada, CFRX Toronto ON	6070na		
0700	0800		Canada, CFVP Calgary AB	6030na		
0700	0800		Canada, CKZN St John's NF	6160na		
0700	0800		Canada, CKZU Vancouver BC	6160na		
0700	0800		China, China Radio Intl	11785eu	11880as	
			13645as	15465as	17490eu	17540as
			17790as			
0700	0800		Costa Rica, University Network	5030va	6150va	
			7375va	9725va	11870va	
0700	0800		Germany, CVC International	15640af		
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do	
0700	0800		Greece, Voice of	12105eu	15630eu	
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, RTM/Voice of Malaysia			6175as
			9750as	15295as		
0700	0800		Myanmar, Radio	9730do		
0700	0800	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0700	0800		New Zealand, Radio NZ Intl	9765pa		
0700	0800	DRM	New Zealand, Radio NZ Intl	9890pa		
0700	0800		Nigeria, Radio/Ibadan	6050do		
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do	
0700	0800		Nigeria, Radio/Lagos	3326do	4990do	
0700	0800	vl	Papua New Guinea, Wantok R. Light		7120va	
0700	0800		Russia, Voice of	17665oc	17805oc	
0700	0800	DRM	Russia, Voice of	11615eu		
0700	0800	irreg/ vl	Sierra Leone, SLBS	3316do		
0700	0800		Singapore, MediaCorp Radio	6150do		
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do	
0700	0800	vl	South Africa, Channel Africa	9620af		
0700	0800	Sat/Sun	Swaziland, TWR	4775af		
0700	0800		Swaziland, TWR	6120af	9500af	
0700	0800		Taiwan, Radio Taiwan Intl	5950na		
0700	0800	DRM	UK, BBC World Service	1296eu		
0700	0800	mtwhf	UK, BBC World Service	15400af		
0700	0800		UK, BBC World Service	5875eu	6190af	
			6195eu	7320eu	9410eu	11695as
			11760me	11765af	11795eu	11940af
			11955as	12095eu	15360as	15420af
			15575as	17790as		
0700	0800		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0700	0800		USA, KAIJ Dallas TX	5755na		
0700	0800		USA, KTBN Salt Lake City UT	7505na		
0700	0800		USA, KWHR Naalehu HI	11565as	13650as	
0700	0800		USA, WBCQ Kennebunk ME	5110na	7415na	
0700	0800		USA, WBOH Newport NC	5920am		
0700	0800		USA, WEWN Birmingham AL	5850va	7570va	
0700	0800		USA, WHRA Greenbush ME	7465na		
0700	0800	twhfa	USA, WHRI Cypress Creek SC	5835am		
0700	0800		USA, WHRI Cypress Creek SC	7315am	7490am	
0700	0800		USA, WMLK Bethel PA	9265eu		
0700	0800		USA, WRMI Miami FL	9955am		
0700	0800		USA, WTJC Newport NC	9370na		
0700	0800		USA, WWCR Nashville TN	3215na	5070na	
			5765na	5935na		
0700	0800		USA, WWRB Manchester TN	3185oc	5085na	
0700	0800		USA, WYFR/Family R Okeechobee FL		6855na	
			7455na	7780va	9495am	9715na
			9985af			
0700	0800	vl	Vanuatu, Radio	4960do		
0700	0800		Zambia, Christian Voice	5915al	6065af	
0730	0745	mtwhfa	Vatican City, Vatican Radio	4005eu	6185eu	
			7250eu	9645eu	11740eu	15595va
0730	0800	mtwhfa	Australia, HCJB Global	11750pa		
0730	0800		Bulgaria, Radio	9500eu	11900eu	
0730	0800		Pakistan, Radio	15100eu	17835eu	
0745	0800	s	Albania, TWR Europe	11865eu		
0745	0800	s	Monaco, TWR Europe	9800eu		

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

0800	0825		Malaysia, RTM/Voice of Malaysia			6175as
			9750as	15295as		
0800	0827		Czech Rep, Radio Prague	7345eu	9860eu	

0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Creek			4910do
0800	0830		Liberia, ELWA	4760do		
0800	0830		Myanmar, Radio	9730do		
0800	0830		Pakistan, Radio	15100eu	17835eu	
0800	0845	a	Guam, TWR/KTWR	11840pa		
0800	0900	smtwhf	Albania, TWR Europe		11865eu	
0800	0900		Anguilla, University Network	6090am		
0800	0900		Australia, ABC NT Alice Springs			2310do
			4835do			
0800	0900		Australia, CVC International		15335as	
0800	0900	mtwhfa	Australia, HCJB Global		11750pa	
0800	0900		Australia, Radio	5995va	9580va	9710va
			12080as	13630va	15415as	17750va
0800	0900		Canada, CFRX Toronto ON		6070na	
0800	0900		Canada, CFVP Calgary AB		6030na	
0800	0900		Canada, CKZN St John's NF		6160na	
0800	0900		Canada, CKZU Vancouver BC		6160na	
0800	0900		China, China Radio Intl		9415as	11785eu
			11880as	15350as	15465as	17490eu
			17540as			
0800	0900		Costa Rica, University Network		5030va	6150va
			7375va	9725va	11870va	
0800	0900		Germany, CVC International		15640af	
0800	0900	vl	Ghana, Ghana BC Corp		3366do	4915do
0800	0900	mtwhf	Guam, TWR/KTWR	11840pa		
0800	0900		Guyana, Voice of	3291do	5950do	
0800	0900		Indonesia, Voice of		9525as	11785pa
			15150al			
0800	0900	a	Latvia, Radio SWH	9290eu		
0800	0900		Liberia, Star Radio	9525af		
0800	0900		Malaysia, RTM/Trax FM		7295as	
0800	0900	s	Monaco, TWR Europe		9800eu	
0800	0900	mtwhf	Monaco, TWR Europe		9800eu	
0800	0900		New Zealand, Radio NZ Intl		9765pa	
0800	0900	DRM	New Zealand, Radio NZ Intl		9890pa	
0800	0900		Nigeria, Radio/Ibadan		6050do	
0800	0900		Nigeria, Radio/Kaduna		4770do	6090do
0800	0900		Nigeria, Radio/Lagos		3326do	4990do
0800	0900		Papua New Guinea, Catholic Radio			4960do
0800	0900		Papua New Guinea, NBC		4890do	
0800	0900	vl	Papua New Guinea, Wantok R. Light			7120va
0800	0900		Russia, Voice of	15195as	17495oc	17665oc
			17805oc			
0800	0900	DRM	Russia, Voice of	12060eu		
0800	0900	irreg/ vl	Sierra Leone, SLBS	3316do		
0800	0900		Singapore, MediaCorp Radio		6150do	
0800	0900	vl	Solomon Islands, SIBC		5020do	9545do
0800	0900	vl	South Africa, Channel Africa		9620af	
0800	0900		South Korea, KBS World Radio			9570as
			9640eu			
0800	0900		Swaziland, TWR	6120af	9500af	
0800	0900		Taiwan, Radio Taiwan Intl		9610as	
0800	0900	DRM	UK, BBC World Service		1296eu	
0800	0900		UK, BBC World Service		5875eu	6190af
			6195eu	7320eu	9740as	11760va
			11940af	12095eu	15285as	17790as
			17885af	21470af	21660as	
0800	0900	mtwhf	UK, BBC World Service		15400af	17830af
0800	0900	Sat/Sun	UK, BBC World Service		15575as	17830af
0800	0900	f	UK, Bible Voice	5945eu		
0800	0900	a	UK, Bible Voice	5945eu		
0800	0900	s	UK, Bible Voice	5945eu		
0800	0900		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0800	0900		USA, KAIJ Dallas TX		5755na	
0800	0900		USA, KNLS Anchor Point AK		7355as	
0800	0900		USA, KTBN Salt Lake City UT		7505na	
0800	0900		USA, KWHR Naalehu HI		9930as	11565as
0800	0900		USA, WBOH Newport NC		5920am	
0800	0900		USA, WEWN Birmingham AL		5850na	
0800	0900		USA, WHRA Greenbush ME		7465na	
0800	0900	twhfa	USA, WHRI Cypress Creek SC		5835am	
0800	0900		USA, WHRI Cypress Creek SC		7315	an
			7490am			
0800	0900		USA, WMLK Bethel PA		9265eu	
0800	0900		USA, WRMI Miami FL		9955am	
0800	0900		USA, WTJC Newport NC		9370na	
0800	0900		USA, WWCR Nashville TN		3215na	5070na
			5765na	5935na		
0800	0900		USA, WWRB Manchester TN		3185oc	5085na
0800	0900		USA, WYFR/Family R Okeechobee FL			5950na
			6855na	7455na		
0800	0900	vl	Vanuatu, Radio	4960do		
0800	0900		Zambia, Christian Voice		5915al	6065af
0805	0900	mtwhf	Guam, TWR/KTWR	15170as		
0815	0850	a	Albania, TWR Europe		11865eu	
0815	0850	a	Monaco, TWR Europe		9800eu	
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek			2325do

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

0900	0900		USA, WBCQ Kennebunk ME	5110na	7415na	
0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do	
0900	0915	s	UK, Bible Voice	5945eu		
0900	0920	smtwhf	Albania, TWR Europe		11865eu	
0900	0920	s	Monaco, TWR Europe		9800eu	
0900	0920	mtwhf	Monaco, TWR Europe		9800eu	
0900	0930	mtwhfa	Australia, HCJB Global		11750pa	
0900	0945	s	UK, Bible Voice	5945eu		
0900	1000		Anguilla, University Network	6090am		
0900	1000		Australia, ABC NT Alice Springs			2310do
			4835do			
0900	1000		Australia, ABC NT Katherine	2485do		
0900	1000		Australia, ABC NT Tennant Creek			2325do
0900	1000		Australia, CVC International		11955as	
0900	1000		Australia, Radio	9580va	9590va	15415as
0900	1000		Bhutan, BBS	6035as		
0900	1000		Canada, CFRX Toronto ON		6070na	
0900	1000		Canada, CFVP Calgary AB		6030na	
0900	1000		Canada, CKZN St John's NF		6160na	
0900	1000		Canada, CKZU Vancouver BC		6160na	
0900	1000		China, China Radio Intl		9415as	15210as
			15350as	17490eu	17690as	17750as
0900	1000		Costa Rica, University Network		5030va	6150va
			7375va	9725va	11870va	13750va
0900	1000		Germany, Deutsche Welle		17700eu	21780as
0900	1000		Guyana, Voice of	3291do	5950do	
0900	1000	Sat/Sun	Italy, IRRS	9310eu	13840eu	
0900	1000		Malaysia, RTM/Trax FM		7295as	
0900	1000	vl	Namibia, Namibian BC Corp		3270do	3290do
			6060do	6175do		
0900	1000		New Zealand, Radio NZ Intl		9765pa	
0900	1000	DRM	New Zealand, Radio NZ Intl		9890pa	
0900	1000		Nigeria, Radio/Ibadan		6050do	
0900	1000		Nigeria, Radio/Kaduna		4770do	6090do
0900	1000		Nigeria, Radio/Lagos		3326do	4990do
0900	1000		Papua New Guinea, Catholic Radio			4960do
0900	1000		Papua New Guinea, NBC		4890do	
0900	1000	vl	Papua New Guinea, Wantok R. Light			7120va
0900	1000		Russia, Voice of	17495oc	17665oc	
0900	1000	DRM	Russia, Voice of	11615eu		
0900	1000	vl	Rwanda, Radio	6055do		
0900	1000	irreg/ vl	Sierra Leone, SLBS	3316do		
0900	1000		Singapore, MediaCorp Radio		6150do	
0900	1000	vl	Solomon Islands, SIBC		5020do	9545do
0900	1000	vl	South Africa, Channel Africa		9620af	
0900	1000	DRM	UK, BBC World Service		1296eu	
0900	1000	mtwhf	UK, BBC World Service		15400af	15575as
			17830af			
0900	1000		UK, BBC World Service		5975as	6190af
			6195as	7320eu	9470eu	9740as
			11760me	11940af	12095eu	15285as
			15485eu	17760as	17790as	17885af
			21470af	21660as		
0900	1000	Sat/Sun	UK, BBC World Service		15575as	17830af
0900	1000		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0900	1000		USA, KAIJ Dallas TX		5755na	
0900	1000		USA, KTBN Salt Lake City UT		7505na	
0900	1000		USA, KWHR Naalehu HI		9930as	11565as
0900	1000		USA, WBCQ Kennebunk ME		5110na	7415na
0900	1000		USA, WBOH Newport NC		5920am	
0900	1000		USA, WEWN Birmingham AL		5850na	
0900	1000		USA, WHRI Cypress Creek SC		7315am	7520am
0900	1000		USA, WRMI Miami FL		9955am	
0900	1000		USA, WTJC Newport NC		9370na	
0900	1000		USA, WWCR Nashville TN		3215na	5070na
			5765na	5935na		
0900	1000		USA, WWRB Manchester TN		3185oc	5085na
0900	1000		USA, WYFR/Family R Okeechobee FL			5950na
			6885na	7455na	9460va	
0900	1000	vl	Vanuatu, Radio	4960do		
0900	1000		Zambia, Christian Voice		5915al	6065af
0930	1000		Australia, HCJB Global		15360as	
0930	1000		Lithuania, Radio Vilnius		9710eu	

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

1000	1027		Czech Rep, Radio Prague	9955am	15710as
			21745af		
1000	1030		Mongolia, Voice of	12085as	
1000	1030		UK, BBC World Service	5975as	15285as
			21660as		
1000	1057		Netherlands, Radio	6040as	9795as
			12065as		
1000	1059		New Zealand, Radio NZ Intl	9765pa	
1000	1100		Anguilla, University Network	11775am	
1000	1100		Australia, ABC NT Alice Springs		2310do
			4835do		
1000	1100		Australia, ABC NT Katherine	2485do	

1000	1100		Australia, ABC NT Tennant Creek			2325do
1000	1100		Australia, CVC International	11955as		
1000	1100		Australia, HCJB Global	15430as		
1000	1100		Australia, Radio	9580va	9590va	15415as
1000	1100	DRM	Austria, CVC International	9760eu		
1000	1100		Canada, CFRX Toronto ON	6070na		
1000	1100		Canada, CFVP Calgary AB	6030na		
1000	1100		Canada, CKZN St John's NF	6160na		
1000	1100		Canada, CKZU Vancouver BC	6160na		
1000	1100		China, China Radio Intl	5955as	7135as	
			7215as	13590as	13720as	15190as
			15210as	15350as	17490eu	17690as
			17750as			
1000	1100		Costa Rica, University Network	5030va	6150va	
			7375va	9725va	11870va	13750va
1000	1100		Guyana, Voice of	3291do	5950do	
1000	1100		India, All India Radio	13710oc	15020as	
			15235as	17510pa	17800as	17895pa
1000	1100	Sat/Sun	Italy, IRRS	9310eu	13840eu	
1000	1100		Japan, Radio Japan/NHK World			6120na
			9695as	11730as	17585va	17720me
			21755oc			
1000	1100		Malaysia, RTM/Trax FM	7295as		
1000	1100	DRM	New Zealand, Radio NZ Intl	9890pa		
1000	1100		Nigeria, Voice of	15120af		
1000	1100		North Korea, Voice of Korea	6185as	6285am	
			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	9620af		
1000	1100	DRM	UK, BBC World Service	1296eu		
1000	1100		UK, BBC World Service	6190af	6195as	
			7320eu	9470eu	9740as	11760me
			11940af	11945as	15485eu	15575as
			17640eu	17790as	17885af	21470af
1000	1100	Sat/Sun	UK, BBC World Service	17830af		
1000	1100		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1000	1100		USA, KAIJ Dallas TX	5755na		
1000	1100		USA, KNLS Anchor Point AK	7355as		
1000	1100		USA, KTBN Salt Lake City UT	7505na		
1000	1100		USA, KWHR Naalehu HI	9930as	11565as	
1000	1100		USA, WBCQ Kennebunk ME	5110na	7415na	
1000	1100		USA, WBOH Newport NC	5920am		
1000	1100		USA, WEWN Birmingham AL	5850na		
1000	1100		USA, WHRI Cypress Creek SC	7315am	7520am	
1000	1100		USA, WRMI Miami FL	9955am		
1000	1100		USA, WTJC Newport NC	9370na		
1000	1100		USA, WWCR Nashville TN	5070na	5765na	
			5935na	9985na		
1000	1100		USA, WWRB Manchester TN	3185oc	5085na	
1000	1100		USA, WYFR/Family R Okeechobee FL			5950na
			6855na	6890na	7455na	9460va
1000	1100		Zambia, Christian Voice	5915al	6065af	
1030	1045	mtwhf	Ethiopia, Radio	5990af	7110af	9704af
1030	1045		Israel, Kol Israel	15760eu	17535eu	
1030	1058		Vietnam, Voice of	7285as		
1030	1100		Australia, HCJB Global	15400as		
1030	1100		Iran, Voice of the Islamic Rep	15460as	17660as	
1030	1100	Sat/Sun	Italy, IRRS	9310va		
1030	1100		UK, BBC World Service	9605as	11750as	
			15285as	15545as		
1030	1100	s	UK, Bible Voice	5950as		

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

1100	1105		Pakistan, Radio	15100as	17835as	
1100	1127		Iran, Voice of the Islamic Rep	15460as	17600as	
1100	1128		Vietnam, Voice of	9840as	7220as	7285as
1100	1130		Australia, HCJB Global	15400as		
1100	1130	mtwhf	UK, BBC World Service	6130am		
1100	1200		Anguilla, University Network	11775am		
1100	1200		Australia, ABC NT Alice Springs			2310do
			4835do			
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	5995va	6020va	9475as
			9560pa	9580va	9590va	12080as
1100	1200	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1100	1200		Canada, CFRX Toronto ON	6070na		
1100	1200		Canada, CFVP Calgary AB	6030na		
1100	1200		Canada, CKZN St John's NF	6160na		
1100	1200		Canada, CKZU Vancouver BC	6160na		
1100	1200		China, China Radio Intl	5955as	5960na	
			9570as	11650as	11795as	13590as
			13645as	13665eu	13720as	17490eu
1100	1200		Costa Rica, University Network	5030va	6150va	
			7375va	9725va	11870va	13750va
1100	1200	s	Germany, Universal Life	6055me		
1100	1200	Sat/Sun	Italy, IRRS	9310eu	15735eu	
1100	1200		Japan, Radio Japan/NHK World			6120na
			9695as	11730as		
1100	1200	vl	Libya, Voice of Africa		17725af	21695af
1100	1200		Malaysia, RTM/Trax FM	7295as		
1100	1200		New Zealand, Radio NZ Intl	13840pa		
1100	1200	DRM	New Zealand, Radio NZ Intl	9890pa		
1100	1200		Nigeria, Voice of	15120af		
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	9620af		
1100	1200		Taiwan, Radio Taiwan Intl	7445as		
1100	1200	DRM	UK, BBC World Service	1296eu		
1100	1200	Sat/Sun	UK, BBC World Service	5875am	6130am	
1100	1200		UK, BBC World Service	6190af	6195as	
			7320eu	9470eu	9740as	11760me
			11940af	11945as	15485eu	15575as
			17640eu	17790as	17830af	17885af
			21470af			
1100	1200	Sat/Sun	UK, Bible Voice	5950as		
1100	1200		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1100	1200		USA, KAIJ Dallas TX	5755na		
1100	1200		USA, KTBN Salt Lake City UT	7505na		
1100	1200		USA, KWHR Naalehu HI	9930as	11565as	
1100	1200		USA, WBOH Newport NC	5920am		
1100	1200		USA, WEWN Birmingham AL	5850na		
1100	1200		USA, WHRI Cypress Creek SC	5875am	7315am	
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	15825na		
1100	1200		USA, WWRB Manchester TN	3185oc	5085na	
1100	1200		USA, WYFR/Family R Okeechobee FL			5950na
			6890na	7780na	11725am	11725na
			11830na			
1100	1200		Zambia, Christian Voice	5915al	6065af	
1115	1130	mtwhf	UK, Bible Voice	5950as		
1130	1145		UK, BBC World Service	7135as	11920as	
1130	1157		Czech Rep, Radio Prague	11640eu	17545va	
1130	1200	mtwhfa	Australia, HCJB Global	15430as		
1130	1200	a	Germany, Universal Life	6055me		
1130	1200		Guam, AWR/KSDA	15260as		
1130	1200	mtwhf	UK, BBC World Service	5875am	6130am	
1130	1200		Vatican City, Vatican Radio	15595va	17765va	
1138	1200	s	Greece, Voice of	9420eu	17525va	
1157	1200		Greece, Macedonias Radio	9935eu		

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

1200	1215	f	UK, Bible Voice	5950as		
1200	1230		France, Radio France Intl		15275af	17815af
			21620af			
1200	1257		Netherlands, Radio	11675na		
1200	1259		Canada, Radio Canada Intl	7105as	9665as	
1200	1259	DRM	New Zealand, Radio NZ Intl	9890pa		
1200	1300		Anguilla, University Network	11775am		
1200	1300		Australia, ABC NT Alice Springs			2310do
			4835do			
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	5995va	6020va	9475as
			9560pa	9580va	9590va	
1200	1300	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1200	1300		Canada, CFRX Toronto ON	6070na		
1200	1300		Canada, CFVP Calgary AB	6030na		
1200	1300		Canada, CKZN St John's NF	6160na		
1200	1300		Canada, CKZU Vancouver BC	6160na		
1200	1300		China, China Radio Intl	5955as	7250as	
			9460as	9730as	9760as	11650as
			11690as	11980as	12080as	13655eu
			13790eu	17490eu		
1200	1300		Costa Rica, University Network	9725va	11870va	
			13750va			
1200	1300		Germany, CVC International	15715me		
1200	1300	Sat/Sun	Germany, Universal Life	6045me		
1200	1300	Sat/Sun	Italy, IRRS	9310af	15735eu	
1200	1300	f	Italy, IRRS	15750va		
1200	1300	vl	Libya, Voice of Africa		17625af	17660af
			17670af	17675af	17680af	
1200	1300		Malaysia, RTM/Trax FM	7295as		
1200	1300		New Zealand, Radio NZ Intl	13840pa		
1200	1300		Nigeria, Voice of	15120af		
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	vl	South Africa, Channel Africa	9620af		
1200	1300		South Korea, KBS World Radio			9650na
1200	1300		Taiwan, Radio Taiwan Intl	7130am		
1200	1300		UAE, AWR Africa	15140as		
1200	1300	DRM	UK, BBC World Service	1296eu		
1200	1300		UK, BBC World Service	5975as		6190af
			6195as	7320eu	9470eu	9660am
			9740as	9750am	11760me	11895as
			11940as	15310as	15485eu	15575as
			17640eu	17790as	17830af	17885af
			21470af			
1200	1300		Ukraine, Radio Ukraine Intl	9925eu		
1200	1300		USA, American Forces Radio	4319usb		5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1200	1300		USA, KAIJ Dallas TX	5755na		
1200	1300		USA, KNLS Anchor Point AK	7355as		9920as
1200	1300		USA, KTBN Salt Lake City UT	7505na		
1200	1300		USA, KWHR Naalehu HI	11565as		12130as
1200	1300		USA, Voice of America	9645va		9760va
			11705va	11730va	15190va	
1200	1300		USA, WBOH Newport NC	5920am		
1200	1300		USA, WEWN Birmingham AL	9955na		
1200	1300		USA, WHRA Greenbush ME	15665na		
1200	1300		USA, WHRI Cypress Creek SC	7520am		9660am
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, WWCR Nashville TN	5070na		5765na
			5935na	15825na		
1200	1300		USA, WWRB Manchester TN	9385na		
1200	1300		USA, WYFR/Family R Okeechobee FL			6890na
			7780na	11530am	11970na	
1200	1300	DRM	Vatican City, Vatican Radio	13770am		
1200	1300		Zambia, Christian Voice	5915al		6065af
1215	1300		Egypt, Radio Cairo	17835as		
1230	1258		Vietnam, Voice of	9840as		12020as
1230	1300		Bangladesh, Bangla Betar	7185as		
1230	1300		Bulgaria, Radio	11700eu		15700eu
1230	1300		Thailand, Radio	9810oc		
1245	1300	s	Australia, HCJB Global	15430as		
1255	1258		Finland, YLE/Radio Finland	13715do		15400do
1257	1300		Greece, Voice of	9935eu		

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

1300	1300		Germany, CVC International	15715me		
1300	1330		Egypt, Radio Cairo	17835as		
1300	1350	s	Italy, IRRS	15735as		
1300	1356		Romania, Radio Romania Intl	15105eu		17745eu
1300	1359		Poland, Polish Radio	5975eu		9525eu
1300	1400		Anguilla, University Network	11775am		
1300	1400		Australia, CVC International	13635as		
1300	1400		Australia, Radio	5995va	6020va	9560as
			9580va	9590va		
1300	1400	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1300	1400		Canada, CFRX Toronto ON	6070na		
1300	1400		Canada, CFVP Calgary AB	6030na		
1300	1400		Canada, CKZN St John's NF	6160na		
1300	1400		Canada, CKZU Vancouver BC	6160na		
1300	1400		China, China Radio Intl	5955as		7300as
			9570na	9655as	9730as	9765as
			9870as	11760as	11885na	11900as
			11980as	13610eu	13790eu	15230na
1300	1400		Costa Rica, University Network	9725va		11870va
			13750va			
1300	1400		Germany, Overcomer Ministries			6110na
1300	1400	s	Latvia, Radio SWH	9290eu		
1300	1400	vl	Libya, Voice of Africa	17625af		17660af
			17670af	17675af	17680af	
1300	1400		Malaysia, RTM/Trax FM	7295as		
1300	1400	DRM	New Zealand, Radio NZ Intl	7145pa		
1300	1400		New Zealand, Radio NZ Intl	5950pa		
1300	1400		Nigeria, Voice of	15120af		
1300	1400		North Korea, Voice of Korea	7570eu		9335na
			11710na	12015eu		
1300	1400		Papua New Guinea, Catholic Radio			4960do
1300	1400		Papua New Guinea, NBC	4890do		
1300	1400	vl	Papua New Guinea, Wantok R. Light			7120va
1300	1400		Singapore, Radio Singapore Intl			6080as
			6150as			
1300	1400	vl	South Africa, Channel Africa	9620af		
1300	1400		South Korea, KBS World Radio			9570na
			9770as			
1300	1400	DRM	UK, BBC World Service	1296eu		
1300	1400		UK, BBC World Service	5975as		6190af
			6195as	7320eu	9470eu	9740as
			11760me	11895as	11940af	15310as
			15420af	15485as	15575as	17640eu
			17790af	17830af	17885af	21470af
1300	1400		USA, American Forces Radio	4319usb		5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1300	1400		USA, KAIJ Dallas TX	5755na		
1300	1400		USA, KTBN Salt Lake City UT	7505na		
1300	1400		USA, KWHR Naalehu HI	12130as		
1300	1400		USA, Voice of America	9645va		9760va
			11705va			
1300	1400	w f	USA, WBCQ Kennebunk ME	9330na		
1300	1400		USA, WBOH Newport NC	5920am		
1300	1400		USA, WEWN Birmingham AL	9955na		
1300	1400		USA, WHRA Greenbush ME	15665na		
1300	1400		USA, WHRI Cypress Creek SC	6095am		
1300	1400	Sat/Sun	USA, WHRI Cypress Creek SC	11785am		
1300	1400		USA, WINB Red Lion PA	13570am		
1300	1400		USA, WRMI Miami FL	7385na		
1300	1400		USA, WTJC Newport NC	9370na		
1300	1400		USA, WWCR Nashville TN	7465na		9985na
			13845na	15825na		
1300	1400		USA, WWRB Manchester TN	9385na		
1300	1400		USA, WYFR/Family R Okeechobee FL			5865as
			7495as	7780as	11560na	11855na
			11970na			
1300	1400		Zambia, Christian Voice	5915al		6065af
1305	1320	m	Austria, Radio Austria Intl	6155va		13730va
			17855va			
1305	1330	Sat/Sun	Austria, Radio Austria Intl	6155me		13730va
			17855va			
1315	1330	twhf	Austria, Radio Austria Intl	17855va		
1330	1357	a DRM	Czech Rep, Radio Prague	6065na		
1330	1400		Guam, AWR/KSDA	15260as		
1330	1400		India, All India Radio	9690as		11620as
			13710as			
1330	1400		Laos, National Radio	7145as		
1330	1400		Sweden, Radio	7420va		11550va 15240va
1330	1400	DRM	Sweden, Radio	7275eu		
1330	1400		Turkey, Voice of	11735va		12035va
1335	1400	Sat/Sun	Austria, Radio Austria Intl	6155va		13730va
			17855va			
1345	1400	mtwhf	Austria, Radio Austria Intl	6155va		13730va
			17855va			

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

1400	1415	t h	Germany, Pan American BC	13645me		
1400	1415	vl	Seychelles, FEBA	7150as		
1400	1427		Czech Rep, Radio Prague			11600as 13580na
1400	1427	f DRM	Czech Rep, Radio Prague	9750na		
1400	1430		Australia, Radio	5995va	6080va	7240as
			9590va			
1400	1430	f	Guam, TWR/KTWR	9975as		
1400	1430		Thailand, Radio	9830oc		
1400	1430		Turkey, Voice of	11735va	12035va	
1400	1430		UK, BBC World Service	9470eu		
1400	1500		Anguilla, University Network	11775am		
1400	1500		Australia, CVC International	13635as		
1400	1500		Bhutan, BBS	6035as		
1400	1500	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1400	1500		Canada, CFRX Toronto ON	6070na		
1400	1500		Canada, CFVP Calgary AB	6030na		
1400	1500		Canada, CKZN St John's NF	6160na		
1400	1500		Canada, CKZU Vancouver BC	6160na		
1400	1500		China, China Radio Intl	5955as		7300as
			9460as	9700eu	9765as	9795eu
			9870as	13675na	13685af	13740na
			15230na	17630af		
1400	1500		Costa Rica, University Network	9725va		11870va
			13750va			
1400	1500		France, Radio France Intl	5920as		7180as
			9580af	15615af		
1400	1500		Germany, CVC International	15715me		
1400	1500	a	Germany, Overcomer Ministries			17810eu
1400	1500		Germany, Overcomer Ministries			6110eu
			13810va			
1400	1500	a	Greece, Voice of	9420eu		17525va
1400	1500	mtwh	Guam, TWR/KTWR	9975as		
1400	1500		India, All India Radio	9690as		11620as
			13710as			
1400	1500		Japan, Radio Japan/NHK World			7200as
			9875as	11840oc		
1400	1500		Jordan, Radio	11690na		
1400	1500		Libya, Voice of Africa			17660af 17725af
			17850af	21695af		
1400	1500		Malaysia, RTM/Trax FM	7295as		
1400	1500		Netherlands, Radio	9345as		12080as
			15595as			
1400	1500	DRM	New Zealand, Radio NZ Intl	7145pa		
1400	1500		New Zealand, Radio NZ Intl	5950pa		
1400	1500		Nigeria, Voice of	15120af		
1400	1500		Oman, Radio Oman	15140as		

1400	1500	vl	Papua New Guinea, Wantok R. Light			7120va
1400	1500		Singapore, MediaCorp Radio		6150do	
1400	1500	vl	South Africa, Channel Africa		9620af	
1400	1500		Taiwan, Radio Taiwan Intl		15265as	
1400	1500	DRM	UK, BBC World Service		7320eu	
1400	1500		UK, BBC World Service		5975as	6190af
			6195as	9410eu	9740eu	11760as
			11895as	11920as	11940as	12095af
			15485eu	17830eu	17885af	21470af
1400	1500	DRM	UK, BBC World Service		7320eu	
1400	1500	Sat/Sun	UK, Bible Voice	11695as		
1400	1500		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1400	1500		USA, KAIJ Dallas TX		9480na	
1400	1500		USA, KJES Vado NM		11715na	
1400	1500		USA, KNLS Anchor Point AK		7355as	
1400	1500		USA, KTBN Salt Lake City UT		7505na	15590na
1400	1500		USA, KWHR Naalehu HI		9930as	
1400	1500		USA, Voice of America		4930af	6080af
			7125va	9695va	11655va	11885va
			12150va	15205va	15580af	17895af
1400	1500		USA, WBCQ Kennebunk ME		9330na	
1400	1500		USA, WBOH Newport NC		5920am	
1400	1500		USA, WEWN Birmingham AL		9955na	
1400	1500		USA, WHRA Greenbush ME		15665na	
1400	1500		USA, WHRI Cypress Creek SC		6095am	9840am
1400	1500	Sat/Sun	USA, WHRI Cypress Creek SC		11795am	
1400	1500		USA, WINB Red Lion PA		13570am	
1400	1500		USA, WRMI Miami FL		7385na	
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/Family R Okeechobee FL			7580as
			11560as	11565na	11855na	13695na
			17760na			
1400	1500		Zambia, Christian Voice		5915al	6065af
1415	1430		Nepal, Radio	3230as	5005as	6100as
			7165as			
1430	1445	s	Germany, Pan American BC		13645as	13820as
1430	1459	DRM	Canada, Radio Canada Intl		7240eu	
1430	1500		Australia, Radio	5995va	6080va	7240as
			9475as	9590va	11660pa	
1430	1500		Myanmar, Radio	5986as		
1430	1500	DRM	South Korea, KBS World Radio			9770eu
1430	1500		Sweden, Radio	11550va	15240va	
1430	1500		UK, BBC World Service		7465eu	

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

1500	1510	mtwhfa	Turkmenistan, Turkmen Radio		5015eu	
1500	1515	vl	Seychelles, FEBA	7150as		
1500	1527		Czech Rep, Radio Prague		7385na	
1500	1528		Vietnam, Voice of	9550va	9840va	12020va
			13860va			
1500	1530	mtwhf	Eritrea, Radio Bana		5100va	
1500	1530		Guam, AWR/KSDA	12105as		
1500	1530		UK, BBC World Service		11860af	15420af
			17885af			
1500	1530		USA, Voice of America		7175va	9760va
			15460va			
1500	1545		Sweden, IBRA Radio		7340as	
1500	1550	DRM	New Zealand, Radio NZ Intl		7145pa	
1500	1550		New Zealand, Radio NZ Intl		5950pa	
1500	1557		Canada, Radio Canada Intl		9635as	11870as
			11975as			
1500	1557		Netherlands, Radio		9345as	12080as
			15595as			
1500	1558		Libya, Voice of Africa		17660af	17725af
			17850af	21695af		
1500	1559		Germany, Overcomer Ministries			17815na
1500	1600		Anguilla, University Network		11775am	
1500	1600		Australia, CVC International		13635as	
1500	1600		Australia, Radio	5995va	6080va	7240as
			9475as	9590va		
1500	1600	Sat/Sun	Canada, CBC NQ SW Service		9625na	
1500	1600		Canada, CFRX Toronto ON		6070na	
1500	1600		Canada, CFVP Calgary AB		6030na	
1500	1600		Canada, CKZN St John's NF		6160na	
1500	1600		Canada, CKZU Vancouver BC		6160na	
1500	1600		China, China Radio Intl		5955as	7160as
			7325as	9435eu	9525eu	9785as
			9870as	13685af	13740na	13630af
1500	1600	DRM	China, China Radio Intl		9750eu	
1500	1600		Costa Rica, University Network		9725va	11870va
			13750va			
1500	1600		Germany, CVC International		11830af	
1500	1600	s	Italy, IRRS	9310eu		
1500	1600		Japan, Radio Japan/NHK World			6190as
			7200as	9505va	9875as	
1500	1600		Jordan, Radio	11690na		
1500	1600	DRM	Luxembourg, Radio Luxembourg			7295eu
1500	1600		Malaysia, RTM/Trax FM		7295as	
1500	1600		North Korea, Voice of Korea		7570eu	9335na
			11710na	12015eu		
1500	1600	vl	Papua New Guinea, Wantok R. Light			7120va
1500	1600	DRM	Romania, Radio Romania Intl		7340eu	
1500	1600		Russia, Voice of	7260as	7350as	9660as
1500	1600		Singapore, MediaCorp Radio		6150do	
1500	1600	vl	South Africa, Channel Africa		9620af	
1500	1600		South Africa, Channel Africa		17770af	
1500	1600		UAE, AWR Africa	11670as		
1500	1600	DRM	UK, BBC World Service		5870eu	
1500	1600		UK, BBC World Service		5875eu	5965as
			5975as	6190af	6195as	7465eu
			9410eu	9740as	9810as	11820eu
			11920as	11940af	12095eu	15105af
			15400af	17830af	21470af	
1500	1600	f DRM	UK, China BS VT Digital		9710eu	
1500	1600	vl/ mtwhf	UK, Sudan Radio Service		15575af	
1500	1600		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1500	1600		USA, KAIJ Dallas TX		9480na	
1500	1600		USA, KJES Vado NM		11715na	
1500	1600		USA, KTBN Salt Lake City UT		7505na	15590na
1500	1600		USA, KWHR Naalehu HI		9930as	
1500	1600		USA, Voice of America		4930af	6080af
			7125va	9645va	11890va	12150va
			13735va	15205va	15580af	17895af
1500	1600		USA, WBCQ Kennebunk ME		9330na	
1500	1600		USA, WBOH Newport NC		5920am	
1500	1600		USA, WEWN Birmingham AL		9450na	
1500	1600		USA, WHRA Greenbush ME		15665na	
1500	1600		USA, WHRI Cypress Creek SC		9840am	11795am
			13760am			
1500	1600		USA, WINB Red Lion PA		13570am	
1500	1600		USA, WRMI Miami FL		9955na	
1500	1600		USA, WTJC Newport NC		9370na	
1500	1600		USA, WWCR Nashville TN		9985na	12160na
			13845na	15825na		
1500	1600	s	USA, WWRB Manchester TN		11920va	
1500	1600		USA, WWRB Manchester TN		9385na	
1500	1600		USA, WYFR/Family R Okeechobee FL			6085as
			11855na	12010as	15210na	
1500	1600		Zambia, Christian Voice		4965af	
1500	1600	f DRM	Taiwan, Radio Taiwan Intl		9770eu	
1505	1600		Canada, Radio Canada Intl		9610am	
1505	1600	DRM	Canada, Radio Canada Intl		9800na	
1515	1530		Vatican City, Vatican Radio		11850va	13765va
1530	1545		India, All India Radio		9425as	
1530	1600		Bangladesh, Bangla Betar		4750as	
1530	1600		Iran, Voice of the Islamic Rep		6160as	7330as
1530	1600	mha	UK, Bible Voice	12035as		
1530	1600		USA, Voice of America		6110va	7175va
			9760va	15460va		
1530	1600		Vatican City, Vatican Radio		9310va	11850va
			13795va			
1545	1600	s	Germany, Pan American BC		13820me	
1551	1600	DRM	New Zealand, Radio NZ Intl		9890pa	
1551	1600		New Zealand, Radio NZ Intl		9870pa	

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

1600	1605		Canada, Radio Canada Intl		9610am	
1600	1605	DRM	Canada, Radio Canada Intl		9800na	
1600	1615		Pakistan, Radio	6215va	7530va	11570va
1600	1620	mtwh	Moldova, Radio DMR Pridnestrovye			6235eu
1600	1627		Iran, Voice of the Islamic Rep		6160as	7330as
1600	1628	s	Hungary, Radio Budapest		6025eu	9565eu
1600	1628		Vietnam, Voice of	7280va	9550va	9730va
			11630va	13860va		
1600	1630	h	Germany, Pan American BC		13820me	
1600	1630		Guam, AWR/KSDA	9585as	12065as	
1600	1630		Myanmar, Radio	9730do		
1600	1630	Sat/Sun	Swaziland, TWR	6070af		
1600	1630		USA, Voice of America		11890va	15205va
1600	1640	f	Moldova, Radio DMR Pridnestrovye			6235eu
1600	1658		Germany, Deutsche Welle		6170as	9795as
			11695as			
1600	1700		Anguilla, University Network		11775am	
1600	1700		Australia, CVC International		13635as	
1600	1700		Australia, Radio	5995va	6080va	7240as
			9475as	9710va	11660pa	
1600	1700	a	Canada, CBC NQ SW Service		9625na	
1600	1700		Canada, CFRX Toronto ON		6070na	
1600	1700		Canada, CFVP Calgary AB		6030na	
1600	1700		Canada, CKZN St John's NF		6160na	
1600	1700		Canada, CKZU Vancouver BC		6160na	
1600	1700		China, China Radio Intl		7150af	7255eu
			9435eu	9525eu	9570af	
1600	1700		Costa Rica, University Network		11870va	13750va
1600	1700		Egypt, Radio Cairo	11740af		

1600	1700		Ethiopia, Radio	5990af	7110af	7165af
			9560af	9704af		
1600	1700		France, Radio France Intl		7170af	9730af
			11615af	15160af		
1600	1700		Germany, CVC International		11830af	
1600	1700	s	Germany, Overcomer Ministries			17815na
1600	1700		Jordan, Radio	11690na		
1600	1700		Malaysia, RTM/Trax FM		7295as	
1600	1700		New Zealand, Radio NZ Intl		9870pa	
1600	1700	DRM	New Zealand, Radio NZ Intl		9890pa	
1600	1700		North Korea, Voice of Korea		9990va	11545af
1600	1700	vl	Papua New Guinea, Wantok R. Light			7120va
1600	1700		Russia, Voice of	4965as	4975as	6130eu
			7260eu	7305as	7320eu	
1600	1700		Taiwan, Radio Taiwan Intl		11550as	11955sa
1600	1700		UK, BBC World Service		3255af	3915af
			5875eu	5975as	6190af	6195as
			7465eu	9410eu	9740as	11665eu
			11820eu	11920as	12095eu	15105af
			15400af	21470af		
1600	1700	DRM	UK, BBC World Service		1296eu	5875eu
1600	1700	vl/ mtwhf	UK, Sudan Radio Service		15575af	
1600	1700		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1600	1700		USA, KAIJ Dallas TX		9480na	
1600	1700		USA, KJES Vado NM		11715na	
1600	1700		USA, KTBN Salt Lake City UT		15590na	
1600	1700		USA, KWHR Naalehu HI		9930as	
1600	1700		USA, Voice of America		4930af	6080af
			13600va	13795af	15445va	15580af
			17640va	17715af	17805af	17895af
1600	1700		USA, WBCQ Kennebunk ME		9330na	
1600	1700		USA, WBOH Newport NC		5920am	
1600	1700		USA, WEWN Birmingham AL		9450va	15785va
1600	1700		USA, WHRA Greenbush ME		17650na	
1600	1700		USA, WHRI Cypress Creek SC		9840am	15285am
1600	1700		USA, WINB Red Lion PA		13570am	
1600	1700	smtwhf	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	11920va
			15250af			
1600	1700		USA, WYFR/Family R Okeechobee FL			6085am
			11565na	11830na	12010as	13695na
			17690af	17760na	18980va	21455va
1600	1700		Zambia, Christian Voice		4965af	
1605	1620	m	Austria, Radio Austria Intl		13675na	
1605	1630	Sat/Sun	Austria, Radio Austria Intl		13675na	
1615	1630	twhf	Austria, Radio Austria Intl		13675ca	
1615	1700	Sat/Sun	UK, BBC World Service		11860af	15420af
			17885af			
1630	1700		Swaziland, TWR	6070af		
1630	1700	Sat/Sun	Swaziland, TWR	6130af		
1630	1700	mtwhf	UK, BBC World Service		15420af	
1630	1700	s	UK, Bible Voice	9460me		
1635	1700	Sat/Sun	Austria, Radio Austria Intl		134675na	
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio		4930eu	
1640	1700	mtwhf	UK, Bible Voice	9460me		
1645	1700	m	Austria, Radio Austria Intl		13675na	
1645	1700	twhf	Austria, Radio Austria Intl		13675na	
1645	1700	mtwhf	Swaziland, TWR	6130af		
1645	1700	f	Sweden, IBRA Radio		7250as	
1645	1700		Tajikistan, Tajik Radio		7245as	
1645	1700	a	UK, Bible Voice	9460me		

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

1700	1715	mtwhf	Swaziland, TWR	6130af		
1700	1715	mtwhf	UK, Bible Voice	9460me		
1700	1720	mtwh	Moldova, Radio DMR Pridnestrovye			6235eu
1700	1727		Czech Rep, Radio Prague		5930eu	15710af
1700	1730		France, Radio France Intl		11615af	
1700	1730		Germany, Deutsche Welle		3995eu	
1700	1730		Jordan, Radio	11690na		
1700	1730	mtwhf	UK, United Nations Radio		7170va	9565va
			17810va			
1700	1740	f	Moldova, Radio DMR Pridnestrovye			6235eu
1700	1745		UK, BBC World Service		6005af	9630af
1700	1750		New Zealand, Radio NZ Intl		9870pa	
1700	1750	DRM	New Zealand, Radio NZ Intl		9890pa	
1700	1800		Anguilla, University Network		11775am	
1700	1800		Australia, CVC International		13635as	
1700	1800		Australia, Radio	5995va	6080va	7240as
			9475as	9580va	9710va	11660pa
			11880pa			
1700	1800	a	Canada, CBC NQ SW Service		9625na	
1700	1800		Canada, CFRX Toronto ON		6070na	
1700	1800		Canada, CFVP Calgary AB		6030na	
1700	1800		Canada, CKZN St John's NF		6160na	
1700	1800		Canada, CKZU Vancouver BC		6160na	
1700	1800		China, China Radio Intl		7150af	7205eu
			7255eu	9570af		
1700	1800		Costa Rica, University Network		11870va	13750va
1700	1800		Egypt, Radio Cairo	11740af		
1700	1800		Germany, CVC International		15680af	
1700	1800	s	Germany, Universal Life		5775va	
1700	1800	fs	Italy, IRRS	9310va		
1700	1800		Japan, Radio Japan/NHK World			9535va
			11970eu	15355af		
1700	1800	DRM	Japan, Radio Japan/NHK World			9770eu
1700	1800		Malaysia, RTM/Trax FM		7295as	
1700	1800		Nigeria, Voice of	15120af		
1700	1800	vl	Papua New Guinea, Wantok R. Light			7120va
1700	1800		Russia, Voice of	6125as	7125as	7270va
			7320eu	9470me		
1700	1800		South Africa, Channel Africa		15235af	
1700	1800		Swaziland, TWR	3200af		
1700	1800		Taiwan, Radio Taiwan Intl		11850af	
1700	1800	DRM	UK, BBC World Service		1296eu	5875eu
1700	1800		UK, BBC World Service		3255af	3915as
			5975as	6190af	6195eu	7465eu
			9410eu	9740as	11665eu	11955as
			12095af	15400af	21470af	
1700	1800	Sat/Sun	UK, Bible Voice	9460me		
1700	1800	vl/ mtwhf	UK, Sudan Radio Service		11705af	
1700	1800		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1700	1800		USA, KAIJ Dallas TX		9480na	
1700	1800		USA, KTBN Salt Lake City UT		15590na	
1700	1800		USA, KWHR Naalehu HI		9930as	
1700	1800		USA, Voice of America		6080af	13710af
			15580af			
1700	1800	Sat/Sun	USA, Voice of America		4930af	
1700	1800		USA, WBCQ Kennebunk ME		9330na	18910na
1700	1800		USA, WBOH Newport NC		5920am	
1700	1800		USA, WEWN Birmingham AL		9450va	15785va
1700	1800		USA, WHRA Greenbush ME		17650na	
1700	1800		USA, WHRI Cypress Creek SC		9840am	15285am
			15650am			
1700	1800		USA, WINB Red Lion PA		13570am	
1700	1800	smtwhf	USA, WMLK Bethel PA		9265eu	
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	11920va
			15250af			
1700	1800		USA, WYFR/Family R Okeechobee FL			13695na
			17555na	21680na		
1700	1800		Zambia, Christian Voice		4965af	
1705	1800		Canada, Radio Canada Intl		9610am	
1705	1800	DRM	Canada, Radio Canada Intl		9800na	
1715	1730		Vatican City, Vatican Radio		4005eu	7250eu
			9635eu	9645eu		
1715	1800	t	UK, Bible Voice	9460me		
1730	1800		Guam, AWR/KSDA	9980me		
1730	1800		Liberia, ELWA	4760do		
1730	1800		Philippines, Radio Pilipinas		11720va	15190va
			17720va			
1730	1800		Slovakia, Radio Slovakia Int		5915eu	6055eu
1730	1800		Swaziland, TWR	9500af		
1730	1800	s	UK, Bible Voice	9730me		
1730	1800		USA, Voice of America		4930af	11815af
1730	1800	mtwhf	USA, Voice of America		15775af	
1730	1800		Vatican City, Vatican Radio		9755af	11625af
			13795af			
1745	1800		India, All India Radio		7410eu	9445af
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	
1751	1800		New Zealand, Radio NZ Intl		11725pa	
1751	1800	DRM	New Zealand, Radio NZ Intl		11675pa	

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

1800	1815	t	UK, Bible Voice	9460me		
1800	1815	a	UK, Bible Voice	7210me		
1800	1827		Czech Rep, Radio Prague		5930eu	9400va
1800	1828		Vietnam, Voice of	5955eu	7280va	9730va
1800	1830		South Africa, AWR Africa		3215af	3345af
			11830af			
1800	1830		UK, BBC World Service		9740as	
1800	1830	Sat/Sun	USA, Voice of America		4930af	
1800	1830		USA, Voice of America		6080af	11975af
			13710af	15580af	17895af	
1800	1850	DRM	New Zealand, Radio NZ Intl		11675pa	
1800	1856		Romania, Radio Romania Intl		7120eu	9640eu
1800	1857		Netherlands, Radio		6020af	7395af
			9895af	11655af		
1800	1859		Poland, Radio Polonia		6015eu	7130eu
1800	1900		Anguilla, University Network		11775am	

1800	1900	mtwhf	Argentina, RAE	9690eu	15345eu	
1800	1900		Australia, Radio	6080va	7240as	9475as
			9500as	9580va	9710va	11880pa
1800	1900		Canada, CFRX Toronto ON		6070na	
1800	1900		Canada, CFVP Calgary AB		6030na	
1800	1900		Canada, CKZN St John's NF		6160na	
1800	1900		Canada, CKZU Vancouver BC		6160na	
1800	1900		Canada, Radio Canada Intl		7185af	9610am
			11875af	13650af	15365af	17740af
1800	1900	DRM	Canada, Radio Canada Intl		9800na	
1800	1900		China, China Radio Intl		6100eu	7100eu
1800	1900		Costa Rica, University Network		11870va	13750va
1800	1900		Egypt, Radio Cairo	11740af		
1800	1900		Germany, CVC International		9490af	
1800	1900		Germany, Universal Life		5775va	
1800	1900		India, All India Radio		7410eu	9445af
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	
1800	1900	fs	Italy, IRRS	9310va		
1800	1900		Liberia, ELWA	4760do		
1800	1900		Malaysia, RTM/Trax FM		7295as	
1800	1900		New Zealand, Radio NZ Intl		11725pa	
1800	1900		North Korea, Voice of Korea		7570eu	12015eu
1800	1900	vl	Papua New Guinea, Wantok R. Light			7120va
1800	1900		Philippines, Radio Pilipinas		11720va	15190va
			17720va			
1800	1900		Russia, Voice of	6125as	7105eu	7125as
			7270va	7295as	7320eu	11510af
1800	1900	Sat/Sun	Russia, Voice of	6055eu	6175eu	
1800	1900		Swaziland, TWR	3200af	9500af	
1800	1900		Taiwan, Radio Taiwan Intl		3965eu	
1800	1900	DRM	UK, BBC World Service		1296eu	5970eu
1800	1900		UK, BBC World Service		3255af	5875eu
			5955as	6190af	6195eu	7465eu
			9410eu	11955as	12095af	15400af
			17830af	21470af		
1800	1900	a	UK, Bible Voice	9730me		
1800	1900		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1800	1900		USA, KAIJ Dallas TX		9480na	
1800	1900		USA, KTBN Salt Lake City UT		15590na	
1800	1900	smtwhf	USA, WBCQ Kennebunk ME		7415na	
1800	1900		USA, WBCQ Kennebunk ME		9330na	18910na
1800	1900		USA, WBOH Newport NC		5920am	
1800	1900		USA, WEWN Birmingham AL		9450va	15785va
1800	1900		USA, WHRA Greenbush ME		17650na	
1800	1900		USA, WHRI Cypress Creek SC		9840am	15285am
			15650am			
1800	1900		USA, WINB Red Lion PA		13570am	
1800	1900	smtwhf	USA, WMLK Bethel PA		9265eu	
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	11920va
			15250af			
1800	1900		USA, WYFR/Family R Okeechobee FL			7240va
			7345va	13695na	17535na	17555na
			18980va			
1800	1900		Yemen, Rep of Yemen Radio		9780me	
1800	1900		Zambia, Christian Voice		4965af	
1815	1900		Bangladesh, Bangla Betar		7185eu	
1830	1845		Israel, Kol Israel	6985va	7545va	9345eu
1830	1845		Sweden, IBRA Radio		9529af	
1830	1900		Bulgaria, Radio	7400eu	9400eu	
1830	1900		Sweden, Radio	6065eu		
1830	1900		Turkey, Voice of	6055eu		
1830	1900		UK, BBC World Service		6005af	9630af
1830	1900	s	UK, Bible Voice	9730me		
1830	1900	h	UK, Bible Voice	9460me		
1830	1900		USA, Voice of America		4930af	6080af
			11975af	13710af	15580af	17895af
1845	1900	mtwhfa	Albania, Radio Tirana		6170eu	
1845	1900		Congo, RTV Congolaise		4765af	5985af
1845	1900	a	UK, Bible Voice	7210me		
1851	1900	DRM	New Zealand, Radio NZ Intl		15720pa	

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

1900	1903		Bahrain, Radio Bahrain		6010as	
1900	1905		Canada, Radio Canada Intl		9610am	
1900	1905	DRM	Canada, Radio Canada Intl		9800na	
1900	1915		Congo, RTV Congolaise		4765af	5985af
1900	1928		Vietnam, Voice of	7280va	9730va	
1900	1930		Germany, Deutsche Welle		7245af	9735af
			11690af	12025af	15275af	
1900	1930	s	Germany, Universal Life		5775me	
1900	1930		Philippines, Radio Pilipinas		11720va	15190va
			17720va			
1900	1930	s	UK, Bible Voice	6015eu		
1900	1930	a	UK, Bible Voice	7260af	9460me	
1900	1945		India, All India Radio		7410eu	9445af
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	
1900	1950	DRM	New Zealand, Radio NZ Intl		15720pa	
1900	1950		New Zealand, Radio NZ Intl		11725pa	
1900	1957		Netherlands, Radio		7120af	7395af
			9895af	11655af	17725na	17810af
1900	1957	Sat/Sun	Netherlands, Radio		15315na	15525na
			17725na			
1900	2000		Anguilla, University Network		11775am	
1900	2000		Australia, Radio	6080va	7240as	9500as
			9580va	9710va	11880pa	
1900	2000		Canada, CFRX Toronto ON		6070na	
1900	2000		Canada, CFVP Calgary AB		6030na	
1900	2000		Canada, CKZN St John's NF		6160na	
1900	2000		Canada, CKZU Vancouver BC		6160na	
1900	2000		China, China Radio Intl		7295va	9440va
1900	2000		Costa Rica, University Network		11870va	13750va
1900	2000		Eqt Guinea, Radio Africa		15190af	
1900	2000		Germany, CVC International		9490af	
1900	2000	vl	Ghana, Ghana BC Corp		3366do	4915do
1900	2000		Italy, IRRS	9310va		
1900	2000		Liberia, ELWA	4760do		
1900	2000		Malaysia, RTM/Trax FM		7295as	
1900	2000	vl	Namibia, Namibian BC Corp		3270do	3290do
			6060do	6175do		
1900	2000		Nigeria, Radio/Ibadan		6050do	
1900	2000		Nigeria, Radio/Kaduna		4770do	6090do
1900	2000		Nigeria, Radio/Lagos		3326do	4990do
1900	2000		Nigeria, Voice of	15120af		
1900	2000		North Korea, Voice of Korea		7100af	9975va
			11535va			
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	7105eu	7290eu
			7335af	11510af		
1900	2000	irreg/ vl	Sierra Leone, SLBS		3316do	
1900	2000	vl	Solomon Islands, SIBC		5020do	9545do
1900	2000	vl	South Africa, Channel Africa		3345af	
1900	2000		South Korea, KBS World Radio			7275eu
1900	2000		Swaziland, TWR	3200af		
1900	2000		Thailand, Radio	7155eu		
1900	2000	vl	Uganda, Radio	4976do	5026do	
1900	2000	DRM	UK, BBC World Service		1296do	
1900	2000		UK, BBC World Service		3255af	5875eu
			5955as	6005af	6190af	6195eu
			9410eu	9630af	11955as	12095af
			15400af	17830af		
1900	2000	Sat/Sun	UK, Bible Voice	9470me		
1900	2000		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1900	2000		USA, KAIJ Dallas TX		9480na	
1900	2000		USA, KJES Vado NM		15385na	
1900	2000		USA, KTBN Salt Lake City UT		15590na	
1900	2000		USA, Voice of America		4930af	4940af
			6080af	11975af	13710af	15580af
1900	2000		USA, WBCQ Kennebunk ME		7415na	9330na
			18910na			
1900	2000		USA, WBOH Newport NC		5920am	
1900	2000		USA, WEWN Birmingham AL		9450va	15785va
1900	2000		USA, WHRA Greenbush ME		17650na	
1900	2000		USA, WHRI Cypress Creek SC		9840am	13760am
			15285am			
1900	2000		USA, WINB Red Lion PA		13570am	
1900	2000	smtwhf	USA, WMLK Bethel PA		9265eu	
1900	2000		USA, WRMI Miami FL		9955am	
1900	2000		USA, WTJC Newport NC		9370na	
1900	2000		USA, WWCR Nashville TN		9975na	12160na
			13845na	15825na		
1900	2000		USA, WWRB Manchester TN		9385na	11920va
			15250af			
1900	2000		USA, WYFR/Family R Okeechobee FL			3230af
			6020af	6085am	7160va	7395af
			13695na	15115af	15565va	17535na
			17555na	18980va		
1900	2000		Zambia, Christian Voice		4965af	
1900	2000	vl	Zimbabwe, ZBC Corp		5975do	
1915	2000	f	UK, Bible Voice	9470me		
1930	2000	Sat/Sun	Germany, Pan American BC		5850me	
1930	2000		Iran, Voice of the Islamic Rep		6010eu	6255va
			7320af	9855af	11695af	
1930	2000		Lithuania, Radio Vilnius		6250eu	
1930	2000		Serbia, International Radio Serbia			6100eu
1930	2000		Slovakia, Radio Slovakia Int		5915eu	7345eu
1930	2000	s	UK, Bible Voice	7260af		
1935	1955		Italy, RAI Italia	6035eu	9760eu	
1945	2000	mtwhfa	Albania, Radio Tirana		7465eu	
1945	2000	vl	Rwanda, Radio	6055do		
1945	2000	a	UK, Bible Voice	6015va		
1945	2000		Vatican City, Vatican Radio		9800am	
1951	2000	DRM	New Zealand, Radio NZ Intl		11675pa	

1951 2000 New Zealand, Radio NZ Intl 17675pa

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

2000 2015 s Germany, Pan American BC 5850me
2000 2015 a UK, Bible Voice 6015va
2000 2025 Israel, Kol Israel 7545va 9345va 15640va
2000 2027 Iran, Voice of the Islamic Rep 6010eu 6255va 7320af 9855af 11695af
2000 2028 Hungary, Radio Budapest 3975eu 6025eu
2000 2030 Egypt, Radio Cairo 15375af
2000 2030 f Germany, Pan American BC 5850me
2000 2030 Lithuania, Radio Vilnius 6250eu
2000 2030 South Africa, AWR Africa 9655af
2000 2030 Swaziland, TWR 3200af
2000 2030 Turkey, Voice of 6055eu
2000 2030 s UK, Bible Voice 6015va
2000 2030 Vatican City, Vatican Radio 7365af 9755af 11625af
2000 2057 Netherlands, Radio 7120af 11655af 15525na 17725na 17810af
2000 2057 Sat/Sun Netherlands, Radio 15315na 15525na 17725na
2000 2058 Germany, Deutsche Welle 6145af 9735af 9830af 12025af 15275af
2000 2059 mtwhf Spain, Radio Exterior Espana 9680af 11680af
2000 2100 Anguilla, University Network 11775am
2000 2100 Australia, ABC NT Alice Springs 2310do 4835do
2000 2100 Australia, ABC NT Katherine 2485do
2000 2100 Australia, ABC NT Tennant Creek 2325do
2000 2100 Australia, Radio 6080va 7240as 9500as 11650pa 11660pa 11880pa
2000 2100 Canada, CFRX Toronto ON 6070na
2000 2100 Canada, CFVP Calgary AB 6030na
2000 2100 Canada, CKZN St John's NF 6160na
2000 2100 Canada, CKZU Vancouver BC 6160na
2000 2100 China, China Radio Intl 5960eu 7170eu 7190eu 7285eu 7295va 7295va 9440va 9600eu 11640af 13630af
2000 2100 Costa Rica, University Network 13750va
2000 2100 Eqt Guinea, Radio Africa 15190af
2000 2100 Germany, CVC International 7285af
2000 2100 vl Ghana, Ghana BC Corp 3366do 4915do
2000 2100 Indonesia, Voice of 9525eu 11785eu 15150al
2000 2100 Italy, IRRS 5775eu
2000 2100 Liberia, ELWA 4760do
2000 2100 Malaysia, RTM/Trax FM 7295as
2000 2100 vl Namibia, Namibian BC Corp 3270do 3290do 6060do 6175do
2000 2100 New Zealand, Radio NZ Intl 17675pa
2000 2100 Nigeria, Radio/Ibadan 6050do
2000 2100 Nigeria, Radio/Kaduna 4770do 6090do
2000 2100 Nigeria, Radio/Lagos 3326do 4990do
2000 2100 Nigeria, Voice of 15120af
2000 2100 Papua New Guinea, Catholic Radio 4960do
2000 2100 Papua New Guinea, NBC 4890do
2000 2100 vl Papua New Guinea, Wantok R. Light 7120va
2000 2100 Russia, Voice of 5955as 6145eu 7105eu 7290eu 7330eu
2000 2100 vl Solomon Islands, SIBC 5020do 9545do
2000 2100 vl South Africa, Channel Africa 3345af
2000 2100 vl Uganda, Radio 4976do 5026do
2000 2100 DRM UK, BBC World Service 1296eu
2000 2100 UK, BBC World Service 3255af 5875eu 6005af 6190af 6195eu 9630af 12095af 15400af 17830af
2000 2100 USA, American Forces Radio 4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
2000 2100 USA, KAIJ Dallas TX 9480na
2000 2100 USA, KJES Vado NM 15385na
2000 2100 USA, KTBN Salt Lake City UT 15590na
2000 2100 USA, WBCQ Kennebunk ME 7415na 9330na 18910na
2000 2100 USA, WBOH Newport NC 5920am
2000 2100 USA, WEWN Birmingham AL 9450va 15785va
2000 2100 USA, WHRI Cypress Creek SC 11765am 15285am
2000 2100 USA, WINB Red Lion PA 13570am
2000 2100 smtwhf USA, WMLK Bethel PA 9265eu
2000 2100 USA, WRMI Miami FL 9955am
2000 2100 USA, WTJC Newport NC 9370na
2000 2100 USA, WWCR Nashville TN 9975na 12160na 13845na 15825na
2000 2100 USA, WWRB Manchester TN 9385na 11920va 15250af
2000 2100 USA, WYFR/Family R Okeechobee FL 3230af 5745va 5810va 6855va 7300va 7580va 15115af 15195af
2000 2100 Zambia, Christian Voice 4965af
2000 2100 vl Zimbabwe, ZBC Corp 5975do
2005 2100 Syria, Radio Damascus 9330eu 12085eu
2025 2045 Italy, RAI Italia 6010va
2030 2045 Thailand, Radio 9535eu
2030 2058 Vietnam, Voice of 7280va 9550va 9730va 13860va
2030 2100 Cuba, Radio Havana 9505va 11760va
2030 2100 Sweden, Radio 6065va 7420va
2030 2100 USA, Voice of America 4930af 6080af 7595as 11975af 13710af 15580af
2030 2100 Sat/Sun USA, Voice of America 4940af
2045 2100 India, All India Radio 7410eu 9445eu 9910oc 9950eu 11620eu 11715oc
2045 2100 DRM Vatican City, Vatican Radio 9800am
2050 2100 Vatican City, Vatican Radio 4005eu 5885eu 7250eu

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

2100 2120 Vatican City, Vatican Radio 4005eu 5885eu 7250eu
2100 2127 Czech Rep, Radio Prague 5930va 9430va
2100 2130 mtwhfa Albania, Radio Tirana 7530eu
2100 2130 Australia, ABC NT Katherine 2485do
2100 2130 Australia, ABC NT Tennant Creek 2325do
2100 2130 Austria, AWR Europe 9830af
2100 2130 a Canada, CBC NQ SW Service 9625na
2100 2130 China, China Radio Intl 11640af 13630af
2100 2130 Cuba, Radio Havana 9505va 11760va
2100 2130 Italy, IRRS 5775eu
2100 2130 USA, Voice of America 7595as
2100 2130 DRM Vatican City, Vatican Radio 9800na
2100 2145 Nigeria, Radio/Ibadan 6050do
2100 2159 Canada, Radio Canada Intl 5850eu 9770eu
2100 2159 smtwhf Germany, Overcomer Ministries 7310eu
2100 2159 Sat/Sun Spain, Radio Exterior Espana 6125eu 11625af
2100 2200 Anguilla, University Network 11775am
2100 2200 Australia, ABC NT Alice Springs 2310do 4835do
2100 2200 Australia, Radio 9500as 9660as 11650pa 11695pa 12080as 13630as 15515as
2100 2200 Belarus, Radio 7360eu 7390eu 7420eu
2100 2200 Canada, CFRX Toronto ON 6070na
2100 2200 Canada, CFVP Calgary AB 6030na
2100 2200 Canada, CKZN St John's NF 6160na
2100 2200 Canada, CKZU Vancouver BC 6160na
2100 2200 China, China Radio Intl 7190eu 7285eu 9600eu
2100 2200 Costa Rica, University Network 13750va
2100 2200 Eqt Guinea, Radio Africa 15190af
2100 2200 Germany, Deutsche Welle 7280af 9615af 11690af
2100 2200 vl Ghana, Ghana BC Corp 3366do 4915do
2100 2200 Guyana, Voice of 3291do 5950do
2100 2200 India, All India Radio 7410eu 9445eu 9910oc 9950eu 11620eu 11715oc
2100 2200 Japan, Radio Japan/NHK World 6035va 6090eu 6180eu 11855ca 17825na 21670pa
2100 2200 Liberia, ELWA 4760do
2100 2200 Liberia, Star Radio 11960af
2100 2200 Malaysia, RTM/Trax FM 7295as
2100 2200 vl Namibia, Namibian BC Corp 3270do 3290do 6060do 6175do
2100 2200 DRM New Zealand, Radio NZ Intl 15720pa
2100 2200 New Zealand, Radio NZ Intl 17675pa
2100 2200 Nigeria, Radio/Kaduna 4770do 6090do
2100 2200 Nigeria, Radio/Lagos 3326do 4990do
2100 2200 North Korea, Voice of Korea 7570eu 12015eu
2100 2200 Papua New Guinea, Catholic Radio 4960do
2100 2200 Papua New Guinea, NBC 4890do
2100 2200 vl Papua New Guinea, Wantok R. Light 7120va
2100 2200 vl Rwanda, Radio 6055do
2100 2200 irreg/ vl Sierra Leone, SLBS 3316do
2100 2200 vl South Africa, Channel Africa 3345af
2100 2200 Syria, Radio Damascus 9330eu 12085eu
2100 2200 DRM UK, BBC World Service 1296eu
2100 2200 UK, BBC World Service 3255af 3915as 5875eu 5965as 6005af 6125as 6190af 6195va 9480eu 9650eu 11675am 15400af
2100 2200 USA, American Forces Radio 4319usb 5446usb 5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
2100 2200 USA, KAIJ Dallas TX 9480na
2100 2200 USA, KTBN Salt Lake City UT 15590na
2100 2200 USA, Voice of America 6080af 15580af
2100 2200 USA, WBCQ Kennebunk ME 7415na 9330na 18910na
2100 2200 USA, WBOH Newport NC 5920am
2100 2200 USA, WEWN Birmingham AL 6890va 15785va
2100 2200 USA, WHRI Cypress Creek SC 9660am 11765am
2100 2200 USA, WINB Red Lion PA 13570am

2100	2200		USA, WRMI Miami FL	9955am		
2100	2200		USA, WTJC Newport NC	9370na		
2100	2200		USA, WWCR Nashville TN	9975na	12160na	
			13845na	15825na		
2100	2200		USA, WWRB Manchester TN	9385na	11920va	
			15250af			
2100	2200		USA, WYFR/Family R Okeechobee FL		5745va	
			5810va	5955af	6855va	7300va
			7580va	15195af	15565af	
2100	2200		Zambia, Christian Voice	4965af		
2100	2200	vl	Zimbabwe, ZBC Corp	5975do		
2115	2200		Egypt, Radio Cairo	9990af		
2115	2200		USA, WYFR/Family R Okeechobee FL		11875af	
2130	2156		Romania, Radio Romania Intl	6055va	6115va	
			7145va	9755va		
2130	2200		Australia, ABC NT Katherine	5025do		
2130	2200		Australia, ABC NT Tennant Creek		4910do	
2130	2200	mtwhfa	Canada, CBC NQ SW Service	9625na		
2130	2200		Guam, AWR/KSDA	9720as		
2130	2200	DRM	Netherlands, Radio	9800na		
2130	2200		Turkey, Voice of	9525va		
2130	2200		USA, Voice of America	7405as		

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

2200	2210		Syria, Radio Damascus	9330eu	12085eu	
2200	2228		Hungary, Radio Budapest	6025eu	9535af	
2200	2230		India, All India Radio	7410eu	9445eu	
			11715oc	9950eu	11620eu	11715oc
2200	2230		Papua New Guinea, NBC	4890do		
2200	2230		South Korea, KBS World Radio		3955eu	
2200	2230		Turkey, Voice of	9525as		
2200	2245		Egypt, Radio Cairo	9990eu		
2200	2257	DRM	Netherlands, Radio	15425na		
2200	2258	DRM	New Zealand, Radio NZ Intl	15720pa		
2200	2259		New Zealand, Radio NZ Intl	17675pa		
2200	2300		Anguilla, University Network	6090am		
2200	2300		Australia, ABC NT Alice Springs		2310do	
			4835do			
2200	2300		Australia, ABC NT Katherine	5025do		
2200	2300		Australia, ABC NT Tennant Creek		4910do	
2200	2300		Australia, Radio	13620as	13630pa	15230va
			15240pa	15515va	17785va	
2200	2300		Belarus, Radio	7360eu	7390eu	7490eu
2200	2300		Bulgaria, Radio	7400eu	9400eu	
2200	2300	smtwhf	Canada, CBC NQ SW Service	9625na		
2200	2300		Canada, CFRX Toronto ON	6070na		
2200	2300		Canada, CFVP Calgary AB	6030na		
2200	2300		Canada, CKZN St John's NF	6160na		
2200	2300		Canada, CKZU Vancouver BC	6160na		
2200	2300	DRM	Canada, Radio Canada Intl	9800na		
2200	2300		China, China Radio Intl	5915as	7170eu	
2200	2300		Costa Rica, University Network	13750va		
2200	2300		Eqt Guinea, Radio Africa	15190af		
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do	
2200	2300		Guyana, Voice of	3291do		
2200	2300		Malaysia, RTM/Trax FM	7295as		
2200	2300	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do	
2200	2300		Nigeria, Radio/Lagos	3326do	4990do	
2200	2300		Papua New Guinea, Catholic Radio		4960do	
2200	2300	vl	Papua New Guinea, Wantok R. Light		7120va	
2200	2300	irreg/ vl	Sierra Leone, SLBS	3316do		
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do	
2200	2300		Taiwan, Radio Taiwan Intl	15600eu		
2200	2300	DRM	UK, BBC World Service	1296eu		
2200	2300		UK, BBC World Service	5955as	5965as	
			5975am	6195as	7105as	9480eu
			9650eu	9740af	15400af	
2200	2300		Ukraine, Radio Ukraine Intl	5830eu		
2200	2300		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
2200	2300		USA, KAIJ Dallas TX	9480na		
2200	2300		USA, KTBN Salt Lake City UT	15590na		
2200	2300		USA, Voice of America	7120va	7405as	
			11725va	15185va	15290va	
2200	2300	mtwhf	USA, WBCQ Kennebunk ME	5110na	18910na	
2200	2300		USA, WBCQ Kennebunk ME	7415na	9330na	
2200	2300		USA, WBOH Newport NC	5920am		
2200	2300		USA, WEWN Birmingham AL	7560va	9975va	
2200	2300		USA, WHRI Cypress Creek SC	7490am	9660am	
2200	2300		USA, WINB Red Lion PA	13570am		
2200	2300		USA, WRMI Miami FL	7385na		
2200	2300		USA, WTJC Newport NC	9370na		
2200	2300		USA, WWCR Nashville TN	7465na	9985na	
			12160na	13845na		
2200	2300	as	USA, WWRB Manchester TN	3185na		
2200	2300		USA, WYFR/Family R Okeechobee FL		21525af	
2200	2300		Zambia, Christian Voice	4965af		
2205	2230		Italy, RAI Italia	6090as		
2230	2257		Czech Rep, Radio Prague	5930na	9435af	
2230	2300		Guam, AWR/KSDA	15320as		
2230	2300		Papua New Guinea, NBC	9675do		
2230	2300		Sweden, Radio	6065eu		
2230	2300		USA, Voice of America	7230va	9780va	
			13755va			
2245	2300		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
2259	2300		New Zealand, Radio NZ Intl	17675pa		
2259	2300	DRM	New Zealand, Radio NZ Intl	17675pa		

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

2300	0000		Anguilla, University Network	6090am		
2300	0000		Australia, ABC NT Alice Springs		2310do	
			4835do			
2300	0000		Australia, ABC NT Katherine	5025do		
2300	0000		Australia, ABC NT Tennant Creek		4910do	
2300	0000	smtwhf	Canada, CBC NQ SW Service	9625na		
2300	0000		Canada, CFRX Toronto ON	6070na		
2300	0000		Canada, CFVP Calgary AB	6030na		
2300	0000		Canada, CKZN St John's NF	6160na		
2300	0000		Canada, CKZU Vancouver BC	6160na		
2300	0000		China, China Radio Intl	5915as	5990am	
			6040na	6145as	7180as	11970na
2300	0000		Costa Rica, University Network	13750va		
2300	0000		Cuba, Radio Havana	9550va		
2300	0000		Egypt, Radio Cairo	11950eu		
2300	0000		Guyana, Voice of	3291do		
2300	0000		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
2300	0000		Malaysia, RTM/Trax FM	7295as		
2300	0000	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
2300	0000		New Zealand, Radio NZ Intl	15720pa		
2300	0000	DRM	New Zealand, Radio NZ Intl	17675pa		
2300	0000		Papua New Guinea, Catholic Radio		4960do	
2300	0000		Papua New Guinea, NBC	9675do		
2300	0000	vl	Papua New Guinea, Wantok R. Light		7120va	
2300	0000	irreg/ vl	Sierra Leone, SLBS	3316do		
2300	0000		Singapore, MediaCorp Radio	6150do		
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do	
2300	0000		Turkey, Voice of	5960va		
2300	0000		UK, BBC World Service	3915as	5965as	
			5985as	6170as	9480eu	11945as
			11955as			
2300	0000		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
2300	0000		USA, KAIJ Dallas TX	9480na		
2300	0000		USA, KTBN Salt Lake City UT	15590na		
2300	0000		USA, Voice of America	7120va	7405va	
			11725va	15185va	15290va	
2300	0000		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na	18910na		
2300	0000		USA, WBOH Newport NC	5920am		
2300	0000		USA, WEWN Birmingham AL	7560va	9975va	
2300	0000		USA, WHRA Greenbush ME	5850na		
2300	0000		USA, WHRI Cypress Creek SC	7315am	7490am	
2300	0000		USA, WINB Red Lion PA	9265am		
2300	0000	mtwhf	USA, WRMI Miami FL	7385na		
2300	0000	Sat/Sun	USA, WRMI Miami FL	9955am		
2300	0000		USA, WTJC Newport NC	9370na		
2300	0000		USA, WWCR Nashville TN	5070na	7465na	
			9985na	13845na		
2300	0000	smtwhf	USA, WWRB Manchester TN	5745ca		
2300	0000		Zambia, Christian Voice	4965af		
2300	2315		Nigeria, Radio/Kaduna	4770do	6090do	
2300	2315		Nigeria, Radio/Lagos	3326do		
2300	2315		USA, WYFR/Family R Okeechobee FL		11875af	
			15170am	15400am	17555na	17575am
2300	2330		Australia, Radio	9660as	12080as	13630pa
			13670pa	15230pa	15240va	17785va
			17795va			
2300	2330	DRM	Germany, Deutsche Welle	9800na		
2300	2330		USA, Voice of America	6180va	7205va	
			15150va			
2300	2356		Romania, Radio Romania Intl	6055va	6155va	
			7105va	9610va	9755va	
2315	2330		Croatia, Croatian Radio	7285sa		
2330	0000		Australia, Radio	9660as	12080as	13620pa
			13670pa	15230pa	15415va	17750va
			17785va	17795va		
2330	0000		Burma, Dem Voice of Burma	5955eu		
2330	0000		Lithuania, Radio Vilnius	7325na		
2330	0000		USA, Voice of America	6180va	7205va	
			11665va	13640va	15150va	
2330	2357		Czech Rep, Radio Prague	5930na	7345na	
2330	2358		Vietnam, Voice of	9840as	12020as	
2330	2359	DRM	Sweden, Radio	9800na		
2335	0000	Sun/Mon	Austria, Radio Austria Intl	9870sa		
2343	2368	twhfa	Austria, Radio Austria Intl	9870sa		

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Ultra High Frequency Follow-On (UFO) Program

The United States Navy began replacing and upgrading its ultra-high frequency (UHF) communications network in 1993 with the first launch of a new generation of military satellites. This new constellation of customized satellites was built by Hughes Space and Communications Company, which is now Boeing Satellite Systems, Inc.

Known as the UHF Follow-On (UFO) series, these 601 model satellites support the Navy's global communications network, serving ships at sea and a variety of other U.S. military fixed and mobile terminals. They are compatible with ground- and sea-based terminals already in service. The UHF Follow-On satellites are intended to replace the Fleet Satellite Communications (FLTSATCOM) and the Hughes-built Leasat spacecraft.

In March 1996, under a contract modification for $150 million, the Navy ordered a high-power, high-speed Global Broadcast Service (GBS) payload to be incorporated onto payloads F8 through F10. This GBS package is revolutionizing communications for the full range of the Defense Department's high-capacity requirements, from intelligence dissemination to quality-of-life programming. The first GBS payload was put into service in 1998, and the final one was launched in November 1999.

In November 1999, the Space and Naval Warfare Systems Command's Communications Satellite Program Office added an 11th satellite to the contract. This satellite was launched on December 18, 2003, and will help sustain the constellation into the latter part of the decade.

❖ Model 601 Platform

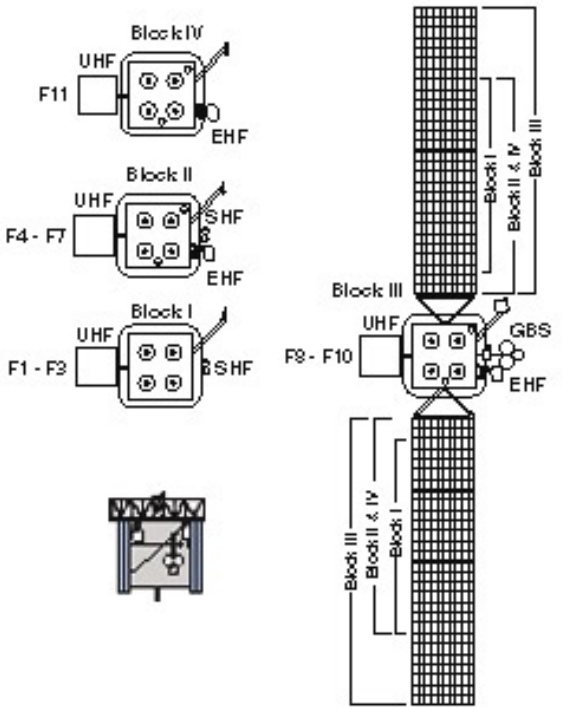
The UFO spacecraft has proven to be a very flexible platform for the evolution of critical advanced DOD communications services. These satellites consist of four different versions of the body-stabilized, three-axis Boeing 601 model platform.

The Boeing 601 satellite consists of two main modules. The bus module houses the bus electronics, propulsion subsystem, and battery packs. The payload module contains the communications equipment and antennas. The satellite dimensions when stowed were 11 feet high and 10.5 by 11.1 feet wide. Table One is a summary of various parameters for each of the four UFO satellite blocks.

The first seven satellites and F11 measure more than 60 feet long from the tip of one three-panel solar array wing to the tip of the other. Spacecraft F8 through F10 each have four solar panels on a side, making the spacecraft 75 feet tip to tip. These arrays generate a combined 2,500 watts of electrical power on the first three satellites, 2,800 watts for F4 through F7 and F11, and 3,800 watts for F8 through F10 with the GBS communications payload.

The arrays are folded against the spacecraft bus for launch, forming a cube roughly 11 feet per side. The satellites weigh an average of 2,600 pounds with the UHF payload, 3,000 pounds with the additional EHF payload, and 3,400 pounds with the GBS payload.

The Atlas rocket series was chosen to provide the launches from Cape Canaveral, Florida. The Atlas I rocket was used for the F1 through F3 satellites. Atlas II was chosen for F4 through F8, and an Atlas IIA for F9 and F10. The Atlas IIIB was used to launch UFO F11.



❖ Increased Comm Capability

These UFO satellites were manufactured in El Segundo, California. Using a building-block approach, Boeing and the Navy enhanced the constellation's capabilities in stages. Satellites F1 through F3 carry UHF and SHF (super-high frequency) payloads to provide mobile communications and fleet broadcast services. Starting with F4, an additional EHF (extremely high frequency) payload was added to provide protected communications. F7 introduced an enhancement to the EHF package that essentially doubled traffic capacity in that band. The SHF payload was replaced by the high data rate GBS package on F8 through F10. F11 carries an enhanced EHF package and an upgraded UHF payload as well.

The UFO satellites offer DoD and the Navy increased communications channel capacity over the same frequency spectrum used by previous systems such as the FLTSATCOM and Leasat constellations. Each spacecraft has 11 solid-state UHF amplifiers and 39 UHF channels with a total 555 kHz bandwidth. The UHF payload comprises 21 narrowband channels at 5 kHz each and 17

TABLE ONE: UFO SATELLITE BLOCK SUMMARY

Spacecraft	*Block*	*Weight*	*Power*	*L (ft)*	*W (ft)*	*Payload*
F1 - F3	I	2600 lbs	2500 watts	60	23	UHF/SHF
F4 - F7	II	3000 lbs	2800 watts	60	23	UHF/SHF/EHF
F8 - F10	III	3400 lbs	3800 watts	75	22	UHF/EHF/GBS
F11	IV	3000 lbs	2800 watts	60	23	UHF/EHF

relay channels at 25 kHz. By comparison, each FLTSATCOM platform offers 22 channels for two-way tactical communications. The 23rd channel on a FLTSATCOM carries the fleet broadcast service downlink.

The F1 through F7 spacecraft include an SHF subsystem, which provides command and ranging capabilities when the satellite is on station as well as the secure uplink for Fleet Broadcast service, which is downlinked at UHF like its FLTSATCOM and Leasat cousins.

The Navy added an extremely high frequency communications package beginning with the fourth spacecraft. This additional comm capability includes 11 EHF channels distributed between an earth coverage beam and a steerable 5° spot beam and is compatible with Milstar ground terminals. The EHF subsystem provides enhanced anti-jam telemetry, command, broadcast, and fleet interconnectivity communications, using advanced signal processing techniques.

This new EHF Fleet Broadcast capability supersedes the need for the SHF fleet uplink and is replacing that communication function. With the launch of UFO F7 in 1996, the EHF package was enhanced to provide 20 channels through the use of advanced digital integrated circuit technology.

Following is specific communication information for some of the UFO satellites:

UFO F2 - UHF payload, 39 UHF channels, transmit antenna/receive antenna
UFO F4, F5, F6 - EHF payload, 8 EC services, 14 SBA services, spot beam antenna, EC horns
UFO F7 - Enhanced EHF payload, 8 EC/SBA services or 32 SBA/EC service
UFO F8, F9, F10 - Global Broadcast Service Payload, four x 24 Mbps transponders, three steerable transmit antennas, two receive antennas (1 steerable)
UFO F11 - Digital payload, UHF services, EHF services

❖ GBS Service Launched in 1998

The Global Broadcast Service payload replaced the SHF payload on spacecraft F8, 9, and 10. This new package includes four 130-watt, 24 megabits-per-second (Mbps) military Ka-band (30/20 GHz) transponders with three steerable downlink spot beam antennas (2 at 500 nmi and 1 at 2,000 nmi) as well as one steerable and one fixed uplink antenna. This modification resulted in a 96 Mbps capability per satellite. The three UFO GBS equipped spacecraft give DOD a near-global coverage (except for the polar regions).

The latest payload UFO F11 is most similar to F7, providing UHF and enhanced EHF communications. The UHF payload incorporates a new UHF digital receiver, providing two additional UHF channels and greater flexibility in configuring communication services. We are currently working to identify the two new frequencies associated with this new comm package on UFO F11.

Table Two is the launch summary for the UFO constellation. Table Three is a complete listing of all the known bandplans/frequencies (less the new UHF channel capability on UFO F11) being used by these satellites.

TABLE TWO: UFO SATELLITE LAUNCH SUMMARY

Sat/USA	*Launch Date*	*Intl Desig/SSC#*	*Miscellaneous Notes*
F1/None	3/25/1993	93-015A/22563	Launch failure, satellite left in useless orbit
F2/USA 95	9/3/1993	93-056A/22787	Initial slot 71.5 deg east, now 29 deg east
F3/USA104	6/24/1994	94-035A/23132	15.5 deg west
F4/USA 108	1/29/1995	95-003A/23467	177 deg west
F5/USA 111	5/31/1995	95-027A/23589	CONUS orbital slot (co located w/F6/7)
F6/USA 114	10/22/1995	95-057A/23696	105 deg west (Note: Tested at 171.5 deg west replaced Leasat 3, UFO Quebec?)
F7/USA 127	7/25/1996	96-042A/23967	CONUS orbital slot (co located w/F5/6)
F8/USA 138	3/16/1998	98-016A/25258	172 deg east
F9/USA 140	10/20/1998	98-058A/25501	22.5 deg west
F10/USA 146	11/23/1999	99-063A/25967	72.5 deg East
F11/USA 174	12/18/2003	03-057A/28117	Indian Ocean orbital slot (co located w/F10)

Note: Information in this table is current as of November 2005. FSC-7 is operational over the Pacific and co located with UFO F4/F8. Leasat 5 is also parked in geo orbit just west of Australia and is reportedly being used by the Royal Aussie Navy. FSC-8 is co located with UFO F9. The UFO satellites listed above, FleetSatCom birds FSC-7/8, and Leasat 5 make up the current operational UHF constellation for the Department of Defense.

TABLE THREE: UFO BANDPLANS-FREQUENCIES

Fleet Broadcast Service

	November	Oscar	Papa	Quebec
Channel 1	250.350/SHF	250.450/SHF	250.550/SHF	250.650/SHF
Channel 1 Alt	250.400/SHF	250.500/SHF	250.600/SHF	250.700/SHF

Navy Fleet Relay (25 kHz) channels (41 MHz offset)

	November	*Oscar*	*Papa*	*Quebec*
Channel 2	251.850/292.850	251.950/292.950	252.050/293.050	252.150/293.150
Channel 3	253.550/294.550	253.650/294.650	253.750/294.750	253.850/294.850
Channel 4	255.250/296.250	255.350/296.350	255.450/296.450	255.550/296.550
Channel 5	256.850/297.850	256.950/296.950	257.050/298.050	257.150/298.150
Channel 6	258.350/299.350	258.450/299.450	258.550/299.550	258.650/299.650
Channel 7	265.250/306.250	265.350/306.350	265.450/306.450	265.550/306.550
Channel 8	266.750/307.750	266.850/307.850	266.950/307.950	267.050/308.050
Channel 9	268.150/309.150	268.250/309.250	268.350/309.350	268.450/309.450
Channel 10	269.650/310.650	269.750/310.750	269.850/310.850	269.950/310.950
Channel 11	260.375/293.975	260.575/294.175	260.425/294.025	260.625/294.225
Channel 12	260.475/294.075	260.675/294.275	260.525/294.125	260.725/294.325
Channel 13	261.575/295.175	262.075/295.675	261.625/295.225	262.125/295.725
Channel 14	261.675/295.275	262.175/295.775	261.725/295.325	262.225/295.825
Channel 15	261.775/295.375	262.275/295.875	261.825/295.425	262.325/295.925
Channel 16	261.875/295.475	262.375/295.975	261.925/295.525	262.425/296.025
Channel 17	263.575/297.175	263.775/297.375	263.625/297.225	263.825/297.425
Channel 18	263.675/297.275	263.875/297.475	263.725/297.325	263.925/297.525

UFO 5 kHz Non Processed Channels

	November	*Oscar*	*Papa*	*Quebec*
Channel 19	243.915/317.015	243.995/317.095	244.075/317.175	244.155/317.255
Channel 20	243.925/317.025	244.005/317.105	244.085/317.185	244.165/317.265
Channel 21	243.935/317.035	244.015/317.115	244.095/317.195	244.175/317.275
Channel 22	243.945/317.045	244.025/317.125	244.105/317.205	244.185/317.285
Channel 23	243.955/317.055	244.035/317.135	244.115/317.215	244.195/317.295
Channel 24	243.965/317.065	244.045/317.145	244.125/317.225	244.205/317.305
Channel 25	243.975/317.075	244.055/317.155	244.135/317.235	244.215/317.315
Channel 26	243.985/317.085	244.065/317.165	244.145/317.245	244.225/317.325

Note: Non Processed Channel is a satellite transponder in which the received signal is amplified and frequency-translated, but the digital data is not reconstituted before retransmission.

UFO 5 kHz Channels

	November	*Oscar*	*Papa*	*Quebec*
Channel 27	248.845/302.445	248.975/302.575	249.105/302.705	249.235/302.835
Channel 28	248.855/302.455	248.985/302.585	249.115/302.715	249.245/302.845
Channel 29	248.865/302.465	248.995/302.595	249.125/302.725	249.255/302.855
Channel 30	248.875/302.475	249.005/302.605	249.135/302.735	249.265/302.865
Channel 31	248.885/302.485	249.015/302.615	249.145/302.745	249.275/302.875
Channel 32	248.895/302.495	249.025/302.625	249.155/302.755	249.285/302.885
Channel 33	248.905/302.505	249.035.302.635	249.165/302.765	249.295/302.895
Channel 34	248.915/302.515	249.045/302.645	249.175/302.775	249.305/302.905
Channel 35	248.925/302.525	249.055/302.655	249.185/302.785	249.315/302.915
Channel 36	248.935/302.535	249.065.302.665	249.195/302.795	249.325/302.925
Channel 37	248.945/302.545	249.075/302.675	249.205/302.805	249.335/302.935
Channel 38	248.955/302.555	249.085/302.685	249.215/302.815	249.345/302.945
Channel 39	248.965/302.565	249.095/302.695	249.225/302.825	249.355/302.955

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A Radio Mystery

Late last November, a mystery station appeared on 1610 kHz. It was heard nationwide, but the programming was pretty boring – just a high-pitched tone. At night, signals were strong in places as widely varied as Nashville, Chicago, Washington DC, and Springfield, Massachusetts. DXers triangulated the signal to somewhere in eastern Virginia. After a few days, it disappeared – only to reappear on 1020 kHz, apparently from the same site. The FCC website had no clues.

A post to the Radio Insight website (see Resources) answered some, but by no means all of the questions about this mystery. The station was legal and was being operated for antenna tests. It was running 10 kW from a site on the East Coast. Both frequencies (1020 and 1610) were transmitted from the same site and were part of the same test. At the time it was indicated there would be four days of testing on 590 kHz as well, but the 590 kHz tests were determined to be unnecessary. (Some DXers did report hearing tone on 590 earlier, before the 1610 kHz tests began)

Global Forum writer Glenn Hauser found a possibly-relevant link on the FCC website. For a month in 2005, BAE Systems of Maryland held Special Temporary Authority (STA) to operate a 10 kW station on 590, 1020, and 1600 kHz from Bowling Green, Virginia. (Yes, the third frequency on the STA was 1600, not 1610.) The coordinates look awfully close to Fort A.P. Hill. The STA application indicates BAE is a government contractor testing mobile broadcasting stations for overseas deployment.

BAE only requested authority through November 2005 and they deny involvement in the 2006 operation. The STA document does look a lot like what actually happened, and DXers triangulated the signal to a place quite close to the coordinates specified. My guess is that either a different contractor was involved or BAE handed the equipment over to the military in 2005 and it was the military itself that was doing the testing. Government agencies – like the Army – don't need FCC approval to operate radio transmitters, which would explain why the FCC was unaware of these tests.

Anyway, if you heard these mystery tone tests on 590, 1020, and/or 1610... you aren't going to get a QSL... and you'll probably never know for certain what you heard... but Fort A.P. Hill, Virginia, is a pretty good guess.

❖ New book on radio history

Washington Times columnist and author Marc Fisher has written a comprehensive book on the history of radio programming. Despite its subtitle *Radio, Rock, and the Revolution that Shaped a Generation*, *Something in the Air* covers all of the programming types that made radio what it is today. There's a chapter on the rise of "underground, progressive" radio; on the origin of talk radio; on public radio; and even on new technologies. (Even here, satellite radio out-competes IBOC. XM Radio gets six pages; HD less than a page.) Don't stop reading when you reach the end of the book; extensive footnotes are interesing reading as well. I know a lot of DXers are also radio history buffs; you'll enjoy this book.

I do have one copy to give away. It will go to the first person who sends me the correct answer to this question: "Which U.S. state has the fewest AM radio stations?" To keep it fair to those without email, please send your answer (and your mailing address!) via the Post Office, to 7540 Highway 64 West, Brasstown NC 28902-0098. The correct response with the earliest postmark wins. In case more than one shares the same postmark, one will be chosen at random. Good luck!

❖ IBOC/HD/Other digital radio news

In a January press release, the audience measurement firm Bridge Ratings had some bad news for IBOC vendors. The study indicated that awareness of HD Radio ("Have you ever heard of HD radio?") increased significantly over the six months from June 2006 through January 2007. However, strangely enough, fewer people know what HD Radio is! Maybe scarier for the future of digital radio, fewer people are interested in buying an HD radio. Bridge Ratings reduced their estimate of receiver sales for 2007 by 28%. I did see the Accurian HD receiver for sale at the Radio Shack store in Springfield, Tenn. just before Christmas. That's the first time I've seen a digital receiver at a retail store.

The Canadian Radio-Television and Communications Commission (CRTC) is revising their policy on digital radio and has released a preliminary report. Canada authorizes Eureka-147 digital radio on L-band. (1452-1492 MHz). This is the same standard used in Europe, though not on precisely the same frequency band. It is not IBOC; it does not interfere with existing analog service. The CRTC's primary intent was for existing AM and FM stations to migrate to digital; eventually, AM and FM stations would be shut down. Provisions were, however, made for standalone digital-only stations.

Since 1998, 76 digital stations have been authorized in Canada. 57 are digital operations for existing commercial analog stations; 18 are for existing CBC stations; and one permit was issued for an ethnic standalone digital station in Toronto. The transition, however, has stalled. Fifteen of the authorized stations (including the standalone station) are not on the air. Some stations that once operated have ceased broadcasting. Few receivers have been sold, and there is no interest in expanding service beyond the six cities where it already exists.

The CRTC asked several questions:

- How can radio transition from analog to digital, and how can the Commission help?
- Should the Commission give up on considering digital a replacement technology? (Should they consider that analog radio will continue indefinitely?)
- Should new digital-only stations be encouraged?
- Should other technologies (IBOC, Digital Radio Mondiale, DMB, DVB-H) be considered?
- If they give up on digital radio, what should be done with the 1452-1492 MHz spectrum?

The only real comments on IBOC came from Ibiquity and the CBC. Ibiquity stated that "...the technology is compatible with the current broadcast infrastructure and therefore enables the reuse of frequency spectrum as well as some of the existing equipment." They also claimed their system provides other public benefits through multicasting. (Though it should be noted Canada's existing Eureka system allows multicasting of six programs per frequency; IBOC only allows three.)

Comprehensive technical comments were filed by the CBC. They argued that AM IBOC "...would create a serious degradation in sound quality for existing AM stations." (All AM stations, not just the ones adopting IBOC.) They indicated that nighttime AM IBOC "...is not practical" (due to interference concerns). As for FM IBOC, the CBC says it would create difficulties in coordinating network operations. Coordinating CBC services with first- and second-adjacent IBOC stations would be difficult.

The CRTC concurs with some of the CBC's comments: "...digital IBOC signals will add a

certain amount of noise to a station's analog signal, marginally reducing its effective service area," and "...IBOC signals can degrade the service areas of technically related stations located in the same or adjacent markets." They won't prohibit the use of IBOC simply because of any interference to the station's own signal. However, interference to other stations is not acceptable.

The door to IBOC in Canada is not closed entirely. "...the Commission has concluded that, if the aforementioned issues can be addressed, particularly any potential interference to other stations, the use of IBOC technology ... could be considered for licensing." That said, the decision is not entirely the CRTC's. Responsibility for broadcast regulation in Canada is split between the CRTC and the Department of Communications. The Department is responsible for technical regulation and would have to approve IBOC before the CRTC could permit it.

❖ Digital TV news

WTVE channel 51 in Reading, Pennsylvania, has been operating a low-power digital facility on channel 25. In late November, the FCC granted their application for a more powerful digital transmitter. Actually, they granted an application for eight more powerful digital transmitters...

WTVE is installing a "Distributed Transmission System" or "DTS." Eight transmitters will be spread around their service area. The most powerful (by 50 times) will be on the WCAU-TV tower in Philadelphia. All eight transmitters will operate simultaneously with the same program. One would presume WTVE engineers have determined the interference areas between the transmitters are lightly populated.

Another DTS exists in Pennsylvania: the PBS station at Penn State University, WPSU channel 3, has been operating a DTS on channel 15 in the west-central part of the state. WSTE, channel 7 in Puerto Rico, has filed for permission to operate an analog DTS.

In another digital TV move in Pennsylvania, WHYY-DT in Philadelphia has made a mysterious move from channel 55 to channel 50. There is no record of this move on the FCC website. My guess is this is related to the "MediaFLO" system I mentioned last time. This is a scheme to broadcast both audio and video to cell phones, using the channel 55 spectrum nationwide. TV stations in Dallas, Long Island, Orlando, and Seattle have all moved to accommodate this system.

❖ New Brunswick DX

(or not...) One of the most widely-heard CBC AM stations is moving to FM. CBA-1070 Moncton has been granted permission to move to 106.1 FM. The move leaves the province with only six full-power AM stations. (Plus six 40-watt low-power relay transmitters... These can be DXed.) Prince Edward Island has already lost all its AM stations (except 20-watt relays).

As is usually the case with AM to FM conversions in Canada, AM 1070 will continue to operate for 90 days after the FM transmitter comes on the air. I expect the FM transmitter to be built fairly quickly. It will share an antenna with three existing CBC FM stations, so no tower construction is required. In some other cities (Montreal, Toronto) another, lower-powered AM station has taken over the AM frequency abandoned by the CBC. CBA was the only remaining AM station in Moncton; the powerhouse 1070 signal is likely to remain silent forever.

❖ Maine DX & new stations elsewhere

Next door to New Brunswick is Maine – and the Pine Tree State may soon be easier to DX. Note in the sidebar that a permit has been granted for a new 50,000-watt station in Hampden, Maine, on 750 kHz. The station's nighttime pattern will send all its power right out to sea. (It will be strong in Bangor, Ellsworth, Bar Harbor – and Bermuda.) During the day, however, it will be non-directional. Remember, last month I wrote that nighttime long-distance AM conditions don't "snap off" at sunrise and "snap on" at sunset. This station should be easily audible almost everywhere east of the Mississippi just before it switches to night pattern.

An application has been filed for another 50,000-watt station in nearby Orono. This station would be on 1530 kHz and would be directional at all times. None of the patterns particularly favor the west, but the daytime pattern is not particularly unfavorable. Assuming both of these stations are built, Maine will become much easier to DX.

Two other new-station applications are notable. Howard, Wisconsin, is a Green Bay suburb. This station will be one of a small number to transmit from different sites day and night. The daytime transmitter will be just west of the city, and the nighttime transmitter just to the south. In Canada, Gatineau, Quebec, is just across the river from Ottawa. The station would carry programming in French directed at children – possibly a "Radio Disney" kind of format?

❖ Till next month

You've seen quite a few pictures of large transmitters at well-known 50,000-watt stations. This month, we've got a smaller one: the 2,500-watt transmitter at WNNJ in North Jersey. Have you logged any interesting lower-powered DX? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to **dougsmith@monitoringtimes.com**. Good DX!

The transmitter at WNNJ-1360, Newton, N.J..

❖ Resources: Relevant Websites

URLs in This Month's Column:

http://americanbandscan.blogspot.com My AM DX blog

www.bridgeratings.com/press_1.17.07.HDPercep.htm Bridge Ratings press release on HD Radio sales

www.radioinsight.com Radio Insight, an industry news site

www.worldofradio.com Glenn Hauser's World of Radio

http://gullfoss2.fcc.gov/prod/oet/cf/els/reports/STA_Print.cfm?mode=initial&application_seq=30515 FCC Special Temporary Authority for 590/1020/1610kHz "mystery station"?

www.crtc.gc.ca/archive/ENG/Notices/2006/pb2006-160.htm Canadian government regulatory agency report on digital radio

http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-06-2447A1.doc WTVE-51 permit for "Distributed Transmission System" (also available in .pdf and .txt formats)

NEW AM STATION PERMITS GRANTED

Arroyo Grande, Cal.	1060	new	10,000/1,000 DA-2
Hampden, Me.	750	new	50,000/10,000 DA-N
Tonopah, Nev.	1400	new	1,000/880 ND
Howard, Wis.	1520	new	250/3,000 DA-2

APPLICATIONS FOR NEW AM STATIONS

Ajo, Ariz.	1340	new	250/250 ND
Nogales, Ariz.	1340	new	250/250 ND
Keystone, Colo.	1320	new	1,000/500 DA-2
Wendell, Ida.	1340	new	250/250 ND
Orono, Me.	1530	new	50,000/9,000/270 DA-3
Battle Mountain, Nev.	1450	new	250/250 ND
Lovelock, Nev.	1450	new	250/250 ND
Mount Angel, Ore.	1130	new	25,000/490 DA-2
Gatineau, Que.	1670	new	1,000/1,000 ND

STATION GRANTED MOVE TO NEW FREQUENCY

Moncton, N.B.	106.1	CBA	moves from 1070 AM

STATIONS MOVING TO NEW LOCATIONS

San Francisco, Cal.	860	KTRB	50,000/50,000 DA-2 (moves from Modesto)
Conway, S.C.	860	WFMO	50,000/740 DA-2 (moves from Fairmont, N.C.)

Ron Walsh VE3GO/VE3IDW
ronwalsh@monitoringtimes.com

Intrigue and Inversions

"Lake Ontario, Gale and Freezing Spray Warnings in effect. Winds W 40 knots, waves 5 to 6 Metres tonight.

As I write this article, we are digging out from about 18 inches of lake effect snow that was piled up by gale force winds off Lake Ontario. Like all mariners, I put red and green lights on my snow blower and pilot it around the lot. Wind chill warnings of minus 30C are also in effect.

I was prepared for this storm by checking the marine weather forecasts that are still available here. The land forecast had a snow squall warning, while the marine forecasts had gale warnings for three days in a row. With very little lake ice, due to a very warm January, the winds off the lake picked up moisture like a sponge. The lake effect was obvious on the radar images from Environment Canada.

In fact, we have had several storm force wind warnings this fall and winter. In November, I overheard a conversation which stated that the winds were strong enough to cause an ocean vessel on Lake Ontario to list.

Although the commercial traffic all but stopped for the winter, the marine band is still worth monitoring. The local ferries still operate and VBR Prescott Coast Guard radio monitors the band. They still operate their 24-hour marine broadcast, which distributes weather and notices to mariners. Canadian Marine broadcasts for the lakes are on 161.65 and 161.775 MHz. The frequencies are alternated throughout the Great Lakes to avoid interference. (Channels 21B and 83B, respectively.)

In this area, the Environment Canada weather radio on 162.400 MHz also gives a marine forecast. On the local scene as well is Metalcraft Marine checking out their completed vessels. They manufacture aluminum vessels and are presently working on 47 foot vessels for Miami-Dade County, Fla; Jacksonville, Fla; Wilmington, NC; and the United Arab Emirates. They are also rebuilding the former *CCGC Bittern* as a fireboat for the City of Kingston.

Dave Martin of Niagara Falls, NY, reports there is still some activity in his region. He heard the Canadian Coast Guard icebreakers on channel 8, 156.4 MHz. They would be operating above the Welland Canal in eastern Lake Erie. They also provide assistance to lake ships heading for ports like Port Colborne, Nanticoke, and Buffalo. With the milder weather, there is still some commercial traffic on that lake.

He also reported that 47.38 MHz was used for the New York Power Authority icebreaking vessel – a good reminder that marine activity can be heard on other public service frequencies. Docks, local companies, deck crews, and ship suppliers often use non marine radios for communication. If you live in a major port area, police, fire and other rescue frequencies often provide interesting information. It is one of the reasons I bought a new digital (APCO-25) capable scanner. I can monitor the Ontario Provincial Police and other agencies connected with marine activities.

❖ Inversions

Like all VHF transmissions, the marine band can propagate some surprisingly distant transmissions from much greater distances than usual. This effect, also known as ducting, occurs when you have a temperature inversion. Amateurs know an inversion is underway when they get long distance contacts on 6 and 2 meters. This is a clue for me to listen on the marine band as well.

This past November 23rd, we had a very strong inversion here in Kingston. Besides the amateur frequencies, I use the Environment Canada (NOAA) weather frequencies as an indicator. I can usually hear two frequencies here – Kingston radio and Watertown, NY. During this inversion, I had *all seven* weather frequencies active and had two stations interacting on some of them. I could copy, among other stations, Rochester, Buffalo and Syracuse, NY, along with Peterborough, Ottawa, and Toronto, Ontario.

On the marine band, I could copy Seaway Long Point on Lake Erie, Seaway Welland, and Seaway Beauharnois, which are rarely heard here. I also copied Seaway control stations in Newcastle, Clayton, Sodus, and Iroquois very well. The ships were coming in from much greater ranges, too. I was copying some freighters from the western end of the lake.

The effect lasted for most of the day and provided some great listening. Keep an eye on the VHF band, particularly when it is very warm, when a weather change is approaching, or in the morning and evening hours for inversion propagation.

❖ Intrigue

I must admit to having a large marine library, mainly devoted to the history of the Great Lakes. With the shorter days, I get a chance to read more while listening for DX. Reading these books has provided many hours of enjoyment and a great deal of useful information. This includes references to the marine radio history of the Lakes. Radio here really began shortly after the *Titanic* disaster.

I recently purchased a copy of *The Battle of the St. Lawrence* by Nathan M. Greenfield. This deals with the antisubmarine battles in the Gulf of St. Lawrence during World War II. It is surprising how far up the St. Lawrence this battle came. While reading this book, I came across a unique piece of radio history on "KURT." Further research at the website of the Canadian War Museum provided more detail.

On May 14, 1942, (some sources say

Ferry Wolfe Islander turns toward Kingston dock with Royal Military College in the background.

Oct. 22, 1943) U-537 approached the coast of Labrador. The crew of the submarine wrestled 12 heavy cases, some weighing up to 220 pounds, into rubber rafts and took them ashore. This was a remote automated weather station called KURT after its inventor, Dr. Kurt Sommermeyer, who was said to be on board the submarine for this mission. The station was known as the Wetter-Funkgerat (WFL) #26, the sixth in a series of 21 such stations. Nine of the cases contained the batteries for the station. (By the way, some of these were large Ni-Cad batteries: They are not so recent an invention as people thought.) The power for this station was supposed to last for several months before needing to be replaced.

This station recorded the temperature, wind direction, wind speed, humidity and barometric pressure. Every three hours it translated this into Morse code and sent it out automatically. According to the crew, minutes after it was set up, the station was transmitting data. As the submarine got further away, they found the signal was being jammed – ironically, by a German station! KURT transmitted on 3940 kHz, using a Lorenz 150FK type transmitter that put out 150 watts. Of course, this is in the 80 meter amateur band, but we must remember that amateur radio was prohibited during the war. To confuse people, the station was camouflaged and had Canadian Weather Service stenciled on the equipment. This agency did not exist. Even some used American cigarette packages were left to help with the disguise.

The signal from KURT died and the station was forgotten until the 1970s, when a history of the German weather service mentioned this station. In the early 1980s an expedition found KURT right where it had been left, over 40 years before. In fact, little was missing from the station.

Our weekly radio net for the Kingston Amateur Radio Club has a trivia question for the participants. I thought this story would be one nobody would get. However, the world is smaller than you think. Bill Nangle, VE3CLQ, got the answer within seconds. When I asked how he knew, he answered that he was one of the military helicopter crew that was diverted to pick up KURT and deliver it to the war museum!

KURT is now on display in Ottawa and some of our local amateurs have expressed an interest in a group visit to see this piece of radio history.

I was particularly interested in this piece of trivia, as I have now purchased a remote weather station for my radio shack, which gathers all the above weather information and more. Its remote is powered by two batteries which should last over a year, it operates on 900 MHz, and the unit cost $69.00 on sale.

❖ HF Listening

The longer nights of winter increased the HF marine DX coming in here. I have no trouble picking up Canadian East Coast marine stations on 2182 kHz. Fundy, Halifax, Sydney, and Placentia radio have been copied. Several USCG stations, such as Hampton Roads, have been heard there as well. The Canadian weather broadcasts on 2598 and 2749 kHz are also easily copied. Several storm-warning broadcasts were heard.

Even the ships have been heard here. The Vessel *Julie Ann III* was heard on 2118 kHz while communicating with Halifax CG Radio on 2514 kHz. Even Bermuda Radio ZBR had to wait for a phone call through Fundy Radio before broadcasting on 2582 kHz.

The old stand-by frequencies of 5717 for Canadian Rescue Forces, plus the USCG on 5696 and 8983 have also been active.

8104 USB has been active, particularly in the morning, with yacht traffic from the Caribbean.

Don Rice of Providence, UT, asks the following question: He has heard signals that consist of a Morse code ID and then four short FSK bursts (he hasn't found what setting to use to decode them), used by USCG stations NMN on 12593 and NMO on 12589 and 8430. Other users are WLO, and occasionally he has heard XSG on 8435 and XSQ on 8433.

According to my listings, 12589 is a simplex frequency for NMO, Honolulu, that is used for CW and SITOR. 12593 is duplex channel 1228, paired with a ship frequency of 12440.5, while 8430 is duplex channel 828 and has a ship frequency of 8390. Both are used for digital transmissions. XSG is a Chinese station Guangzhow radio with simplex SITOR on 8435 while 8433 is used simplex for SITOR from XSG Shanghai. Any information you have about these stations would be appreciated.

Albert P., Belle Isle, decoded the following GMDSS relay and sent this information:

"This was an HF Digital Selective Calling packet formatted for the Global Maritime Distress and Safety System net.

"The distress packet was originally sent on one or more of the GMDSS HF net frequencies by the French tuna boat *Cap Saint Paul* from a location in the South Atlantic midway between the southern coast of Liberia and St. Helena Island.

"The packet I received was relayed on the 8414.5 kHz GMDSS net frequency by the Bahamian-registered vessel *Neddril Muravlenko* (C6NV5). I've appended the actual decoded packet below.

"It was received via a roof-mounted B&W Tilted Folded Dipole in a N-S oriented inverted-V configuration; through one-half of a Cubic R3030A receiver; into the right channel of the soundcard on a PC running Hoka's Code300-32 decoder suite."

Packet Decode:

FORMAT SPECIFIER: ALL SHIPS
CATEGORY: DISTRESS
SELF IDENTIFICATION: 309566000 Bahamas
TELECOMMAND: DISTRESS RELAY
IDENTIFICATION OF SHIP IN DISTRESS: 228279000 France
DISTRESS NATURE:
DISTRESS COORDINATES: SW LATITUDE 1 deg 32 min SOUTH
LONGITUDE 9 deg 8 min WEST
TIME UTC: 9 : 19
TELECOMMAND: J3E telephone
RQ
CHECK SUM ERROR
DECODED AT: 6:00:22 PM 1/23/2007

Hopefully this will help people with digital marine communications. I have to admit I am not as knowledgable as I want to be. I have a computer installed and will need another cable to set up my digital monitoring. I want to run it off my FT-897 so I can do VHF as well.

As always, any input from readers is greatly appreciated. Any frequency information you have is of value to other readers.

❖ Historical Radio

As always, the people at KSM keep me informed about activities at their rejuvenated marine station. KPH and KSM continue to keep the marine CW tradition alive. Richard Dillman W6AWO and the rest of the Marine Radio Historical Society should certainly be proud of their efforts.

First of all, KSM is now operative on 4 MHz CW. They can be heard on 4350.5 as well as on their other frequencies of 426, 6477, 12993 and 16914 kHz CW.

They have also restored the 1940's vintage PW-15 transmitter. This transmitter was used by Press Wireless to send press across the Pacific and worldwide. When this service stopped, it became a CW transmitter at the Palo Alto site of KPH. It was removed, restored and installed at their Bolinas site. It is now being used on 12993 kHz and is believed to be the only PW-15 still in operation.

You can always get information about schedules, QSLs, etc. at their website **www.radiomarine.org**. They are, in fact, showing videos of their operations on **youtube** (go to **www.youtube.com** and search for KSM).

❖ Final Thoughts

I noted a listing for WLC Rogers City on 5898.5 kHz with digital transmissions. I am not sure about this, but hope this historic Great Lakes HF station is still there. It went silent on SSB 4369.8 a few years ago and is sorely missed. A check of the Internet showed WLC as part of MarineNet Wireless. This is an email service using PACTOR III. They list 2194, 5897.1, and 8031 simplex as well as duplex frequency pair of 4379.5 / 4087.5 as assigned to WLC. However, they are listed as off air and the note said they are rebuilding the site. Any further information would be appreciated.

I feel lucky to be typing this column at this time. On Christmas Eve this year, we celebrated the 100th anniversary of the first voice radio broadcast. Voice modulation was invented by Reginald Fessenden and was first used when he broadcast to the ships of the United Fruit Company. He was working for Edison, but is in fact a Canadian. You can imagine what the radio operators thought when they heard poetry, music, etc. instead of Morse!

Right now, I am checking into the Maritime Mobile Service Net on 14,300 and talking to Rooney 6Y5RP in Jamaica. At least to me, there is still a thrill in HF communications.

73 and good DX, Ron VE3GO / VE3IDW

Kevin Carey, WB2QMY
kevincarey@monitoringtimes.com

News and Updates

On the Air

Last month, I mentioned a brand new experimental station "ZM" that had taken to the air from Penn Yan, New York, on 187.5 kHz. Additional technical details have become available on this station. It is operated by Bob Raide, W2ZM, who is an avid enthusiast of tube-type equipment. Bob is a very active member of the Antique Wireless Association (**www.antiquewireless.org**) and enjoys building and modifying transmitters from the 1920s to 1950s era.

His longwave transmitter certainly qualifies as "vintage." It is built around a military BC 375E transmitter and a BC 306 antenna tuner. The oscillator tube of the transmitter is a 6J5 and the power amplifier is a 6V6 with 250 volts on the plate and 4 milliamps of plate current (power = 1 watt). It has a stable VFO and uses no crystals at all.

The antenna is simply a 50-ft wire going up to a 60-ft mast at a slight angle over his swimming pool. Bob is heard regularly in South Carolina and has regular two-way contacts with a station in Connecticut, using regular CW (Morse code) transmission. You may want to try for this station as a way to log your first DX on 1750 meters! You can QSL Bob using his address listed on **QRZ.com**.

Loggings

The following intercepts are provided by Arthur Gauntt who writes: "As an *MT* reader, I would like to share with you my recent beacon loggings as heard from my location in Gilbert, Arizon, on January 15, 2007, between 0500-0700 UTC. I am using an Icom IC-R75 receiver and an LF Engineering Model H-800 active antenna. I was surprised to hear the CLB beacon but the ID was unmistakable. When I hear multiple IDs on the same frequency, I wait until one ID occurs out of phase with the other so they both can be read."

Thanks, Arthur, we don't get many logs from your part of the country, and look forward to hearing from you often.

Figure 1. Longwave experimental station "ZM" operating from Penn Yan, NY on 187.5 kHz (Photo courtesy of W2ZM).

TABLE 1. SELECTED BEACON LOGGINGS

Freq.	ID	Location
201	IP	Mobile, AZ
206	GLS	Galveston, TX
214	CHX	Choix, Mexico
216	CLB	Wilmington, NC
220	RBJ	Tucson, AZ
222	CUW	Chihuahua, Mexico
236	YZA	Ashcroft, BC
242	EL	El Paso, TX
245	AVQ	Tucson, AZ
248	PQF	Mesquite, TX
248	WG	Winnipeg, Manitoba
251	YCD	Nanaimo, BC
260	AP	Denver, CO
260	AVZ	Terrell, TX
281	FFZ	Mesa, AZ
335	CVP	Helena, MT
338	PBT	Red Bluff, CA
338	RYN	Tucson, AZ
341	SG	La Cienega, NM
344	BKU	Baker, MT
350	NY	Enderby, BC
353	LWT	Lewistown, MT
356	PTT	Pratt, KS
359	BO	Boise, ID
365	AA	Fargo, ND
365	HQG	Hugoton, KS
368	GYM	Guaymas, Mexico
368	SIR	Sinclair, WY
371	ITU	Great Falls, MT
386	SYF	St. Francis, KS
394	ENZ	Nogales, AZ
397	SB	San Bernadino, CA
400	FN	Fort Collins, CO
400	VQ	San Luis Valley, CO
402	MOG	Montague, CA
407	CHD	Chandler, AZ
414	SKX	Taos, NM

What the Others are Saying

The *ARRL Letter* Vol 25, No. 48 reports the following DX news from experimenters on 137 kHz:

The low-frequency beacon of J. Allen, VY1JA, near Whitehorse in Canada's Yukon Territory, was received November 21 by German LF experimenter Hartmut Wolff. The largely overland path spanned 7026 km (4370 miles). Allen said the report was a pleasant surprise. Transmitting on 137.7786 kHz using very-slow-speed CW (QRSS), the VY1JA beacon runs 140 W output to a 100-foot top-loaded wire vertical. Wolff used a double K9AY loop on the receiving end, where he decoded the beacon signal using computer software designed to capture below-noise-level signals.

Allen invites reception reports, especially screen captures and .wav clips, via e-mail *vy1ja@northwestel.net* (QSLs go to N3SL). VY1JA currently beacons 24/7 sending "JA" at QRSS60 (60-second dits) on the hour and half-hour, followed by an approximately two-minute ID at 6 WPM at about :24 and :54 that includes the VY1JA grid square (CP20).

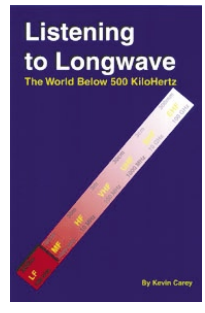
Bryan Turner, W8LN (AL), wrote to tell of an article on Page 65 of the November issue of *Sky & Telescope* magazine describing the VLF radio signals produced by meteors. Check it out at your local library.

A while back, I asked what became of the Marconi bust that used to be displayed outside at the site of the Marconi station in South Welfleet, Massachussetts (Cape Cod). This was the site of the first 2-way wireless contact between the US and Europe in 1903. During my visit last summer, I noticed the bust was missing from its former pedestal near the display area of the park. It had been stolen by vandals once before and then recovered, so I feared this may have happened again.

Thanks to some research by *MT* reader Roger Parmenter, I have learned that the bust is now safely on display at the entrance to park Headquarters. Roger also mentions that Princess Elettra Marconi (a daughter of Guglielmo Marconi) visited the site in October 2006 as part of ceremonies connected to the old station. As a side note, I had the pleasure of meeting Marconi's other daughter, Gioia Marconi Braga at the 1995 Antique Wireless Association Conference in Rochester, NY.

That wraps up another month. See you in May!

For a comprehensive overview of the low bands, my new book, Listening to Longwave, is now available at www.universal-radio.com



George Zeller
georgezeller@monitoringtimes.com

Radio Ice Cream

This month we feature one of the newest pirate radio operations on the North American shortwave bands. **Radio Ice Cream** has an unusual format that sets it apart from other pirates. Its programming is mainly advocacy for heavy metal classic rock music. But, they mix this with jokes about children who want ice cream, pizza, and candy. Their interval signal is a creative composition that mixes barking dogs, laughing children, and an instrumental music tune. The announcer goes by the name of Ice Cream Man. Look for their 100 watt signal on the pirate bands, normally around 6925 kHz. As we see here, they have been QSLing.

FCC Monitoring Web Site

The Federal Communications Commission web site is an interesting resource for those who are interested in the FCC's actions against unlicensed broadcasters. Among the useful material on this web site is its description of how a broadcaster can complain about interference from a pirate operation. It can be seen at the **www.fcc.gov/eb/broadcast/interference.html** URL. Among other things, this site says, "Broadcast stations that believe that they are experiencing interference from other stations and that such interference is the result of Commission rule, order or station authorization violations, may submit their complaints to: Federal Communications Commission, Enforcement Bureau, Technical & Public Safety Division, 445 12th Street, SW, Washington, DC 20554."

"Complaints must be in writing and must include as much of the following information as possible: (1) the call sign and address of the station experiencing the interference, (2) the telephone number of a contact person for the station, (3) the frequency on which the complaining station operates; (4) a detailed description of the nature of the interference, including the duration and frequency of the occurrence of interference; (5) the call sign and address of the station believed to be the source of the interference; (6) the frequency on which the alleged interfering station operates; (7) the provision of the Communications Act, Commission rule, order or station authorization believed to have been violated by the alleged source of the interference, and (8) any documentation supporting the alleged existence and cause of the interference."

Most pirate stations work vigorously to avoid interference to other broadcasters. Those who do not exert this effort would be well advised to pay attention to this official information from the FCC.

Marti Broadcasts in USA

For decades, stations such as the **Voice of America** have been prohibited from broadcasting toward the United States. The theory has been that the USA government should not use taxpayers' money for potential domestic "propaganda." But, for months now, the anti-Castro quasi-clandestine **Radio Marti** has been broadcasting in and toward Miami, Florida, on local commercial radio and TV stations, including **WAQI, Radio Mambi** on 710 kHz in Miami.

Low power **WPMF-TV** in Miami is also carrying Radio Marti programming to a domestic Miami audience. The rationale for this is that some Cubans may be able to hear and see programming from Miami broadcasters. Meanwhile, Cuba jams **Radio Marti** programming regularly. They also jam Radio Mambi with a domestic **Radio Rebelde** transmitter on 710 kHz in Cuba.

Look for forthcoming hearings in the US Congress on whether this domestic quasi-clandestine broadcasting in and to the United States is legal. The *Miami Herald* newspaper has editorialized on January 4 in favor of USA propaganda transmitted on medium wave and television inside the United States. It remains to be seen if this 180 degree change in United States broadcasting policy will be upheld by the United States Congress.

Copyright and Pirate Radio

Lance Yee asks this month whether pirate radio stations pay royalty fees to musicians for the music that they broadcast. This is one other issue that apparently is heading to the United States Congress. The issue is getting more attention on internet podcasts than it is in terms of pirate radio enforcement. Thus far, there has been no mechanism to enforce musician royalties on unlicensed stations and podcasts. But, we will keep our eyes on this one during the remainder of 2007.

What We Are Hearing

Monitoring Times readers heard nearly thirty different North American pirates this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on **6925 kHz**, plus or minus 30 or 40 kHz.

Altered States Radio- They ran Christmas fare well into the new year of 2007. They may have altered the state of things so severely that the calendar was altered. (Merlin)

Ann Hoffer Radio- Their shows are mainly music by Ann Hoffer. (None)

Bowling League- The Bowling League's main participants are Fred Flintstone and Barney Rubble. Obviously, comedy is the strong suit on this new pirate. (Try Belfast)

Captain Morgan- Rock music and comedy are transitioned with Twilight Zone television audio on this one. (None, says to send loggings to the Free Radio Network web site)

Channel Z Radio- At times they have been testing a new 18 watt portable transmitter on 15067 kHz. (Uses *channelzradio@gmail.com* e-mail)

Grasscutter Radio- Rock music is their format, not lawn mowing. The station still schedules joint broadcasts from time to time with **Sunshine Radio**. (Uses *grasscutterradio@yahoo.com* e-mail)

James Bond Radio- Their programming consists entirely of music from James Bond films. (None)

KBLK- Their slogan is "The Voice of Black Oppression," but it is still unclear if this is a genuine rap music pirate or whether it is a parody of that genre. (None)

KIPM- Relays of Alan Maxwell's elaborate "Illuminati" existential dramas are still being heard on the pirate bands. (None known)

Laser Hot Hits- Somebody has occasionally been relaying this Europirate rocker on the North American pirate band. (Merlin and *laserhothits@rock.com* e-mail)

MAC Shortwave- Paul Star's professionally produced replica of the old top 40 rock format still uses variable frequencies such as 3275, 6850, and 6925 kHz. (Uses *macshortwave@yahoo.com* e-mail)

My New Underpants- Believe it or not, this new pirate builds a whole show about how he likes his new underpants. To each his own. (None)

Mystery Radio- This Europirate features rock music. Their 6220 kHz broadcasts have been heard by many in eastern North America around local sunset times. (Uses *radio6220@hotmail.com* and *mysteryradio@hotmail.com* e-mail)

Pirate Radio Boston- Charlie Loudenboomer programs rock music, with an emphasis on New England bands. (Try Belfast)

Radio Ice Cream- See their details above. (Belfast)

Radio Piraña Internacional- This South American pirate created some excitement with daily broadcasts using 20 watts on variable 6307 kHz during some winter months. Check out their web site at **www.geocities.com/radio_piranha/** for station

Continued on page 61

ON THE HAM BANDS

THE FUNDAMENTALS OF AMATEUR RADIO

T.J. "Skip" Arey, N2EI
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April Odds and Ends

I recently received a survey from the American Radio Relay League (ARRL) asking me to give my comments about their journal *QST* and to pick my favorite columns. Over the years I have enjoyed many of the columns, but the one that always sends me down into my work shop is "Hints and Kinks." I always find a tip or two that I can apply to my shack or other aspects of my ham radio practice.

Well in the spirit of the "Hints and Kinks" column, this month I am going to offer an "Odds and Ends" column. I have a lot of little matters to discuss.

CHASING 5 BAND WAS

One of the more interesting and challenging amateur radio awards is 5 Band Worked All States. I like the WAS chase because it can be achieved with a fairly modest power level and a simple antenna. It is certainly possible to nail this award down with less than 100 watts and a dipole or two, putting it in the realm of possibility for any dedicated ham. That said, the real challenge is to get every state on all 5 bands.

Propagation is both your friend and your enemy. For example, the close-in states are a breeze to work on 40 and 80 meters, but try making a contact on 20 meters and the signal hops right past. In all my years of playing this game, New Hampshire and Delaware have eluded me on 15 meters. Also, I only need Vermont on 20 meters to nail down all 50 on that band.

Some of the best opportunities to fill in the blanks toward 5BWAS are the annual state QSO parties. They can be found listed in many of the popular amateur radio publications. I also list them briefly in the Contest Corner sidebar to this column.

You have to keep an eye on the variations in the rules for each of these mini-contests. Some have a specific signal report, some refer to a particular chunk of frequencies on each band; no two QSO parties are alike. And, when more than one or two QSO parties are offered on the same weekend, it is usually best to keep the basic rules handy.

A habit I developed over the years (call it a "Hint" if you like) is to go over the contest lists and make notes in the margins of bands I lack contacts on. So, next to the New Hampshire QSO party announcement, I would write "15"; next to the Vermont announcement I would write "20". This just helps to remind me what I am looking for in earnest while I give out points to other contesters.

All that said, if you have one or two that are really a challenge to you (such as those toughies I mentioned above), you can make a point of putting yourself out on the line during your own particular state QSO party. Under those circumstances, when calling CQ, it would be in order to call, in my case, "CQ NJ QSO party. This is N2EI looking for New Hampshire and Delaware." By hook or by crook, you fill up your book.

MICROSOFT VISTA and HAM RADIO

At the risk of stepping over into Dr. Catalano's patch ("Computers & Radio"), allow me to say a few words about Microsoft Vista. Each new version of the Windows operating system, at least beginning with Windows NT and continuing through Windows 2000 and all later iterations, has presented certain problems for some folks who use their personal computers to control their radios. Microsoft Vista has similar potential problems.

This is due to changes in the way the operating system addresses the serial port interface compared to earlier versions of Microsoft DOS and Windows. These newer versions of Windows do not natively support direct hardware access to the computer's serial ports, making some software/radio combinations problematic. Most radio and software designers address these matters, but it does mean that it is important to read up on any system's abilities and limitations before you open your wallet.

Newer radios and software packages have put aside the serial port in favor of USB port interface. This becomes very important if you go shopping for older used, but computer-controlled equipment. It may also force you to think twice about computer system upgrades if you have some of this equipment already running in your shack. You will be hard pressed to even find a serial port on many current PCs and laptops.

COMPUTERS ON THE CHEAP

I have talked about this several times in the past, but it is worth repeating now that a new operating system has been put on the market by Microsoft. If you have some computer connectable radio gear in your shack, and that equipment (and its software) was originally optimized to run via serial ports and under earlier versions of the Windows operating system, you may want to get creative about keeping things going.

The solution I have found best is to set up an older design PC or laptop loaded with "legacy" software as a dedicated control applications computer. Good used and "off lease" equipment can be found in local shops, yard sales, flea markets, as well as on the Internet for nearly a song.

Case in point: I wanted to set up a system for running my two "black box" receivers. Both are "first generation" designs, requiring a hardware serial port to function correctly with the provided software. A bit of searching on the Web pointed me to a good used laptop computer for $150. Grant it, it won't run the latest and greatest software, but, loaded up with a copy of Windows 98 I had in the shack from a long dead system and the few simple programs the radios were looking for, I now have something that gets the job done, and it doesn't even require me to turn on my primary computer system when I want to have a bit of radio fun.

VHF CONTESTING REVISITED

I recently had an Icom IC-251A All Mode 2 meter transceiver come through my shack. It is an older unit, but solid and up to the task of weak signal work, especially when connected to a modest amplifier and a beam with some good height above ground. Couple it with a good HF rig and you are set to use Mode "A" or Mode "T" on some of the current crop of Russian Hamsats. This unit can be found for under $200 and represents a great value for somebody wanting to get started in the VHF world beyond chatting on their local FM repeater.

I took advantage of the temporary possession of this rig to reacquaint myself with VHF contesting. I have taken a chair at a number of multi-op stations during major VHF contests in the past, but never had the opportunity to operate single op, single mode before. I once again found that any form of ham radio can be a lot of fun.

This year's ARRL January VHF Sweepstakes (Jan 20-22) gave me the chance to put the IC-251A to work. While serious VHF contesters stack long beams up high in the sky and pump a lot of watts, I threw myself into the fray armed with just the Icom's native 10 watts fed to the

discone I have on my second story roof for aircraft monitoring. Now, common sense indicates that this combination shouldn't even cause anybody's S-meter to deflect. But who said I ever had any common sense? I had no reason to believe I was going to take over the band with this rig, but with only a few hours of operation, I worked 30 contacts in 4 grid squares, enough to send a score in for my section.

Single op contesting in the VHF world can be a bit frustrating. Often, once two hams make an initial contact, the stations will query each other as to other bands and then they will QSY to gain those additional points. If you're single op, you have to live with occasionally hearing one you really want to catch run off to another band with another ham. More than once I stopped just short of screaming "WAAAAAAIT!!!!!" into my microphone.

But I also noticed the parallels to my other passion: QRP operation. Patience and good listening skills always bring home the bacon in the QRP world. The same can be said when playing single op VHF. You need to listen and learn the lay of the land before attempting a call.

If you haven't had the opportunity to give VHF contesting a try, what are you waiting for? You can have a lot of fun without mortgaging the house.

HOW ABOUT A GOOD BOOK?

I was going to devote the March issue to my annual review of the latest books in amateur radio. As you well know, recent events in the ham radio world suggested (as did my Editor) that I use the March column to look more deeply into the demise of the Morse code requirement for licensing.

What I will do with the stack of books is to is spread the literary review over a few issues to give you a chance. Call it Uncle Skip's Book of the Month Club if you like. Why should Oprah have all the fun?

Low Profile Amateur Radio
Operating a Ham Station from Almost Anywhere
2nd Edition
by Al Brogdon W1AB
$19.95 plus shipping and handling
The American Radio Relay League
225 Main Street
Newington, CT 06111-1494
www.arrl.org/
1-888-277-5289
ISBN: 0-87259-974-4
ARRL Order No. 9744

This second edition of the book, initially written in 1992 by Jim Kearman KR1S, contains all new material and is a significant expansion on the idea of playing ham radio without making the neighbors nervous. Being able to operate an amateur radio station is a growing problem for a growing number of folks in the ham community. I regularly hear from older hams who are moving into specialized retirement communities that set significant restrictions on such things as outside antennas and even power consumption. Al W1AB writes in a relaxed style, making use of dozens of real world examples of how hams were able to stay active in spite of all manner of restrictions.

The book begins with a thorough study of covenants, conditions and restrictions (often referred to by real estate people as CC&Rs). Al makes it clear that the more research you do in this area, the better equipped you will be to make good decisions about how to put a station on the air in spite of adverse rules.

Al goes on to look at options for low profile antennas, indoor antennas, and disguised antennas, studying the pluses and minuses that each design presents. He also covers the use of antenna tuning units to make less than ideal antennas behave with your stations. He goes on to look at transmitter output power and interference related to covert station operation. He presents the advantages of operating mobile as an alternative to a home station. Al also includes dozens of operating tips, including suggested modes that play to the strengths of a less than ideal operating platform.

All of the ideas in this book are essential reading for someone facing a restrictive operating environment, but many of Al's hints can also be fun to use even if you are not burdened by CC&Rs. For example, Al's own idea about placing his complete ham station into an armoire is perfect for someone who may want to keep their operating position in a room that is shared by other members of the family.

So much for April's "Odds and Ends." Have fun! I'll see you at the bottom end of 40 meters. (If not at the bottom end of 2 meters, hi hi!)

UNCLE SKIP'S CONTEST CALENDAR

ARS Spartan Sprint
Apr 3 0100 UTC - 0300 UTC

Missouri QSO Party
Apr 7 1800 UTC - Apr 8 0500 UTC
Apr 8 1800 UTC - 2400 UTC

ARCI Spring QSO Party
Apr 7 1200 UTC - Apr 8 2400 UTC

Georgia QSO Party
Apr 14 1800 UTC - Apr 15 0359 UTC
Apr 15 1400 UTC - 2359 UTC

Michigan QSO Party
Apr 14 1600 UTC - Apr 15 0400 UTC

Yuri Gagarin International DX Contest
Apr 14 2100 UTC - Apr 15 2100 UTC

Ontario QSO Party
Apr 21 1800 UTC - Apr 22 1800 UTC

Nebraska QSO Party
Apr 28 1700 UTC - Apr 29 1700 UTC

Florida QSO Party
Apr 28 1600 UTC - Apr 29 0159 UTC
Apr 29 1200 UTC - 2159 UTC

Outer Limits continued from Page 59

news. (Santiago)

Random Radio- Their eclectic format includes old time radio commercials, rock, folk, jazz, country, and other genres. It isn't clear if the **www.randomradioonline.net/** streaming audio web site is theirs or not. (None; asks for reports via the FRN web site)

Radio Three- Sal Amoniac spins the rock music during their shows. (Belfast)

Special Ed Radio- This new one concentrates on Marc Bolan music from the rock band T Rex. (None known yet)

Sunshine Radio- Their female announcer programs a rock music format. (Uses *sunshineradio@yahoo.com* e-mail)

Take It Easy Radio- This veteran pirate features lite rock music, including their theme song by the Eagles. (Merlin)

The Crystal Ship- The Poet, with his longtime slogan of the "Voice of the Blue States Republic," transmits on various frequencies including 1710, 3320, 3346, 3275, 6875, 6925, and 9057 kHz. Their left wing politics is always supplemented by rock music. (Belfast and uses *tcsshortwave@yahoo.com* e-mail)

Undercover Radio- Dr. Benway transmits rock music "from the middle of nowhere." He gave a prize for the station's 500th QSL to Bad Andy from Daytona Beach, FL, and this was Andy's first QSL. (Uses *undercoverradio@gmail.com* e-mail)

WBNY- Commander Bunny, the voice of the rodent revolution, still transmits both digital SSTV mode broadcasts and regular audio transmissions. (Belfast)

WDDR- This hard rock pirate has operated for decades. (Belfast and uses *ericblair@wddr1027.com* e-mail)

WHYP- The James Brownyard memorial station remains one of the best produced pirates in history. (Belfast and uses *whypradio@gmail.com* e-mail)

World Domination Radio- Sometimes using **WMDR** call letters, this new pirate features rock music, discussions of monkeys, and plugs for the rodent revolution. (None)

WTCR- This new rock music station has been using a slogan of "Twentieth Century Radio." (None)

WTPR- Tire Pressure Radio warns listeners to not listen to their rock music broadcasts, lest somebody let all of the air out of their car tires. (None)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE 68022; PO Box 146, Stoneham, MA 02180; Casilla 159, Santiago 14, Chile; and PO Box 293, Merlin, Ontario N0P 1W0. Unfortunately, PO Box 69, Elkhorn, NE 68022 is no longer a valid address.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings with a hope that pirates might QSL is now the e-mailed Free Radio Weekly newsletter, still free to contributors via *yukon@tm.net*. A few pirates will sometimes QSL reports left on the Free Radio Network web site, at **www.frn.net**

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors**:** Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Ralph Brandi, Middletown, NJ; Dean Burgess, Manchester MA; Ross Comeau, Andover, MA; Ed Cummings; Richard Cuff, Allentown, PA; Gerry Dexter, Lake Geneva, WI; Rich D'Angelo, Wyomissing, PA; John Figliozzi, Halfmoon, NY; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; William T. Hassig, Mt. Prospect, IL; John Herkimer, Caledonia, NY; Don Jensen, Kenosha, WI; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; George Maroti, Mount Kisco, NY; A. J. Michaels, Blue Ridge Summit, PA; John Poet, Belfast, NY; Martin Schoech, Eisenach, Germany; Bob Wilkner, Pompano Beach, FL; and Lance Yi, Phoenix AZ.

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Resonant, Incidentally-Resonant, and Non-Resonant Antennas

Did you know that most popular antenna designs are "resonant antenna" designs? That being the case, we might want to know: What is a "resonant" antenna? And then we might ask: Are there any antenna designs which are not resonant?

Let's check those ideas out.

❖ Resonance

Let's begin by defining resonance. Many radio receivers contain circuits composed of a variable capacitor (sometimes called a "tuning condenser") and an inductor (coil of wire). By adjusting the coil or the capacitor, the circuit can be tuned to (made resonant with) the signals of the stations that it is to receive. A resonant circuit responds best to signals whose frequency is the same as the circuit's resonant frequency and less to signals of other frequencies.

Resonant Antennas:

A conductor, such as a length of wire or an antenna element, has capacitance and inductance naturally distributed along its length. In fact, most antennas are a resonant circuit and have a resonant frequency. And, just as the resonant circuit mentioned above responds best to signals at the particular frequency at which it is resonant, a resonant antenna responds best to signals of the frequency at which the antenna is resonant. Common examples of resonant antennas include the half-wavelength dipole, the Yagi-Uda beam, the cubical quad beam, and the quarter-wavelength ground-plane antenna.

Incidentally-Resonant Antennas:

Some antennas, such as the tuned-feeder, random-length dipole (fig. 1D), the random-length, single-wire antenna (fig. 1E), and the short whip antennas used on vehicles for AM broadcast reception are utilized over a broad band of frequencies. Yet these antennas are not resonant at all of the frequencies at which they are operated. It is true that, as described above, the elements of these antennas do have a resonant frequency. But for these antennas, their resonance is not important to their functioning: it is simply incidental to their operation. We'll refer to these antennas as "incidentally-resonant" (IR) antennas.

Non-Resonant Antennas:

The IR antennas mentioned above are sometimes referred to as "non-resonant" (NR); however, as explained above, they do have a resonant frequency. Also, log-periodic antennas, because of their very-wide bandwidth, are occasionally referred to as "non resonant." This is somewhat misleading, however, as log-periodics do have what could be called a "continuously-variable resonant frequency" across their entire bandwidth.

On the other hand, there is a category of antennas to which the term "non-resonant" has been traditionally and more appropriately applied. These antennas are actually designed to prevent their elements from having a resonant frequency. This resonance-prevention is accomplished by including resistors in the design of these antennas. The resistors absorb and convert to heat the RF current traveling on the antenna to the resistors. This current would otherwise reflect back and forth in the elements and produce resonance.

Like the IR antennas, the NR antennas characteristically function well over very wide bandwidths. Examples of NR antennas are the terminated long-wire, terminated V, terminated rhombic, the T2FD (terminated, tilted, and folded dipole), and the terminated Beverage or wave antenna. The word "terminated" in the names of the antennas just mentioned refers to the use of terminating resistors that prevent resonance as discussed above.

These antennas can also be designed as resonant antennas (no terminating resistors). In this case the long-wire, V, rhombic, and Beverage antennas are bi-directional (have main lobes in two opposite directions). However, in their non-resonant designs, because the current due to signals arriving from one direction are absorbed by the resistors, the antennas are uni-directional. Depending on their design, the gain of either resonant, IR, or NR antennas can vary from low to high.

❖ Antenna Tuners

They don't tune antennas:

When used for transmitting, just about any antenna element, regardless of its resonant frequency, will radiate essentially all the RF energy that is efficiently fed to it. However, at frequencies other than its resonant frequency, the feed-point impedance is no longer simply a resistance, and so for maximum performance, particularly on transmitting, the use of an impedance-matching circuit is then necessary.

These circuits are known as "antenna tuners," or "transmatches." The purpose of these circuits is to provide a match between the entire antenna system (antenna, feed line, matching circuit) and the transmitter's output. Note here that creating a match between an antenna system and the transmitter does not make the antenna itself resonant.

They don't change the antenna's radiation pattern, either:

Using an antenna tuner does not affect an antenna's patterning of responsiveness. Radiation patterns (and the identical reception patterns) are determined by the length of the antenna's elements, the spacing between elements, and between the elements and the earth. These measurements are measured in wavelengths.

Of course, once it is constructed, the element

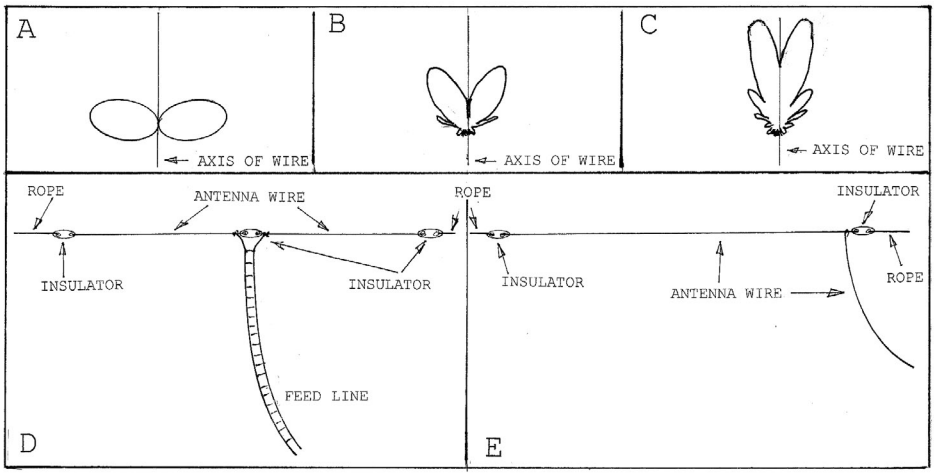

Fig. 1. Horizontal radiation patterns for a non-resonant long-wire antenna with three different lengths: a half wavelength (A), two wavelengths (B), and four wavelengths (C) (Laporte, Antenna Engineering). Also shown are construction details for an incidentally-resonant dipole antenna (D), and an incidentally-resonant long-wire antenna (E).

This Month's Interesting Antenna-Related Web site:

For more about NR antennas:
www.vk1od.net/iobr/
Suggestions on how to use an antenna tuner:
www.hamuniverse.com/tuner.html

lengths and spacings of an antenna do not change. And so, if the frequency (and thus the wavelength) of the antenna's signals change, those wavelength-dependent measurements will change in value.

So, an antenna's radiation pattern will change if frequency is changed. The lobes and the nulls that make up the antenna's patterns may change in both the direction in which they point and in their strength (figs. 1A, 1B, and 1C).

❖ Let's Build One or Two

Here are two incidentally resonant antennas you could make. Fig. 1D shows an antenna system often used at high- or medium-frequency: the tuned-feeder, random-length dipole mentioned earlier. The single-wire IR antenna (fig. 1E) works as well as the dipole, is easier to construct, and doesn't require a separate feed line for receive-only applications: just run the end of the single-wire directly to the receiver.

Both of these antennas are popular with amateur-radio operators because, if used with an antenna tuner, their very wide bandwidths allow them to be used to transmit on any high-frequency band.

For either antenna, you can simply put the antenna up as high, long, and in-the-clear as practical. Use insulators as shown in fig. 1D or 1E. It's best to solder all connections. Any strong wire should work fine; it doesn't have to be antenna wire. Solid copper wire tends to eventually stretch and break.

For any outside antenna don't forget lightning-induced damage protection. When lightning is likely, it's best not to use an outdoor antenna: disconnect it, and ground it.

Do You Need an Antenna Tuner?

For reasons we've covered in the past (received-noise versus a receiver's internal noise on the high-frequency and lower bands), reception on these bands will probably be just as good without an antenna tuner as with one. But for transmitting you will need one. An antenna tuner that accepts an unbalanced antenna is appropriate for the single wire IR antenna. The IR dipole requires the use of a two-wire feed line, such as twinlead, open-wire, or ladder line, and so an antenna tuner that can handle balanced line is required.

There are a number of commercially-manufactured antenna tuners available. Or you can make your own from instructions in sources such as *The ARRL Antenna Book*, or Bill Orr's *W6SAI HF Antenna Handbook*.

RADIO RIDDLES

Last Month:

I asked: "What is an "antenna farm?" (A) a farm where tall trees are grown to use as antenna masts. (B) a think tank at a radio engineering company where new antenna designs bloom and grow. (C) a company in a rural setting that manufactures antennas. (D) none of the above."

Well, it's D, none of the above. An antenna farm is a communications installation with so many outdoor antennas that it almost seems that the antennas are sprouting right out of the ground like vegetables in a farmer's field.

This Month:

So you know what a resonant antenna is, now what is a "magnetic antenna"? For that matter, what is an "electric antenna"?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Marc Ellis
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Wrapping Up the Trans-Oceanic Project

Last month we recapped our Trans-Oceanic B600, substituted a silicon diode for the old selenium rectifier, and verified that the set was in at least nominal operating condition. The goal this month was to reassemble and realign the radio, which would complete the Trans-Oceanic project.

❖ The I.F. and BC Band Adjustments

The first step in realignment is to adjust the intermediate frequency (i.f.) transformers, and I was a bit puzzled when I looked at mine. They had only one adjustment opening – on top of the units. I wasn't able to find the expected second one on the bottom of the transformers or anywhere else.

The factory alignment instructions weren't very helpful, but I found the answer in the much more explicit technical manual for the military version of the radio. One slides the hex end of an alignment tool down to engage and adjust the tuning slug of the primary, then slides it past that slug to engage and adjust the slug for the secondary.

Once I read that, I remembered that a Heathkit ham transceiver I'd once worked on used such a system but – except for that unit – the T-O is probably the newest set I've ever worked on. So I figure I can forgive myself for not being up on the (relatively) new-fangled methods.

The i.f.s are adjusted with the radio out of the cabinet, because otherwise there would obviously be no way to get the alignment tool in position. The service notes suggest that a metal plate be placed under the chassis during alignment to simulate the presence of the batteries normally stowed in the cabinet. However, there would be little chance of this set ever operating again with any kind of a battery pack, so I went ahead without the plate.

I connected the modulated 455 kHz output of the signal generator to the receiver as directed, hooked an a.c. VTVM (vacuum tube volt meter) across the speaker voice coil, and turned everything on. The modulated signal was clearly audible in the speaker and registered on the VTVM scale.

Turning the radio volume control to the max, I reduced the output of the signal generator to the minimum that registered clearly on the meter. This was to prevent engaging the receiver's automatic volume control circuitry, which would prevent observing true maximum readings during the adjustments. As the receiver output increased during the adjustment of the slugs, I kept reducing the signal generator output to minimize the readings on the VTVM.

The adjustment of the i.f.s was accomplished without incident, and the next step was to adjust the oscillator trimmer and padder, as well as the antenna and radio frequency (r.f.) stage trimmers, for the broadcast band. The former are located on the coil assembly behind the band selector switch; the latter are located atop the tuning capacitor.

For these adjustments, the signal generator is connected to a loop of wire that is wrapped once around the broadcast "Wavemagnet" antenna. Of course, the latter is temporarily plugged into the chassis for this purpose. As before, the signal generator signal is kept to a minimum that would register on the output meter.

The oscillator trimmer and padder needed little adjustment to bring in 600 and 1600 kHz signals from the generator at the correct spots on the dial. However, to be perfectly honest, the antenna and r.f. trimmers had absolutely no effect at their adjustment frequency of 1400 kHz. Since, by this time, the radio was picking up a very nice selection of signals on the broadcast band, I simply set each of these adjustments at the halfway point and forgot about them.

❖ Reassembling the T-O

Next on the alignment schedule was the adjustment of the oscillator, detector, and antenna circuits for each of the six shortwave bands. This involves 21 individual adjustments, because one of the bands (4-9 MHz) has a separate set of three for each end. According to the service notes, signal injection for all these adjustments is accomplished with a 3-foot loop of wire from the signal generator placed about a foot away from the radio's fully extended whip antenna (which is the shortwave antenna).

The B600 reassembled and ready to go. Shortwave whip is partly extended.

The only way I could manage a fully-extended whip antenna was to put it, and the radio chassis, back in the cabinet – which meant stopping to reassemble the radio at this point. I complied, but now I wish I had followed the instructions in the army manual instead – which would have made it possible to continue the alignment with the radio out of the cabinet. I'll explain later.

Though reassembly is essentially the reverse of the disassembly process I discussed earlier, a few points are worth mentioning. Don't forget to thread the pilot light bracket (which is wired into the cabinet, not into the radio) over the top of the chassis as you slide it in. Also, I found it helpful to begin reinstalling the front panel before sliding the chassis all the way to the front. This leaves a little extra room for one's hand to get behind the panel and hold the pilot light switch and headphone jack in place as their fasteners are installed.

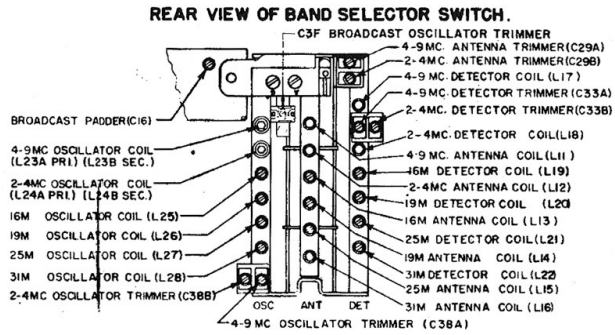
Speaking of the pilot light: it's meant to operate from a special battery down in the battery compartment. The switch is a momentary contact type that conserves battery life, because it has to be held in the "on" position to energize the bulb. I understand that somebody has worked out a mod that lights the bulb when the radio is operating from the power line.

Another possibility is to put a holder for a single "D" cell in the battery compartment and wire it to the pins of the original battery plug. However, I decided that the big slide-rule dial is perfectly legible without additional help from the tiny 1.5-volt lamp. Of course, I left the bulb, switch, and battery plug in place for possible use by some future owner of the set.

To complete the reassembly, I carried out the very satisfying task of installing the spring-loaded power-cord take-up reel provided by reader William Bacon. It slipped right into the spot formerly occupied by my missing one. I didn't even have to search for fasteners, because Bill had thoughtfully included the original screws. Luckily the line cord already on the reel was uncracked and still reasonably flexible. Replacing it on the reel would have been quite a project – probably the reason why my reel had been removed and replaced with a straight cord.

❖ Short-Wave Band Adjustments

Now about those 21 shortwave band adjustments. They are all made at the coil and trimmer capacitor assembly mounted behind the band-



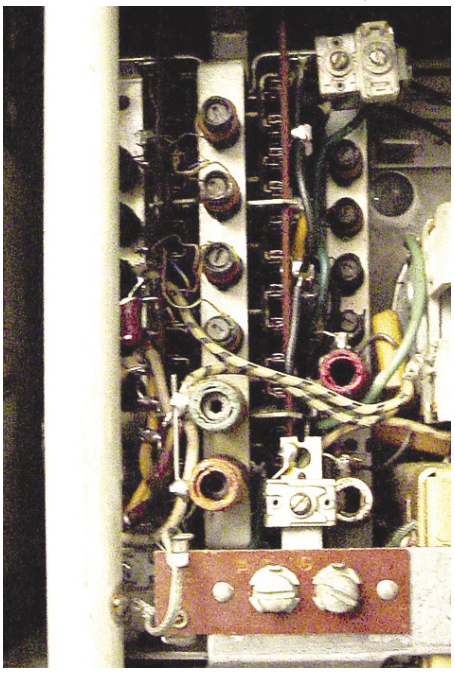
Shortwave alignment is carried out on an assembly behind the bandswitch. Oscillator, antenna and detector adjustments are located on separate stacks. For some reason the assembly is shown upside down.

switches. At first glance, the assembly looks quite intricate and daunting. But take a look at the factory drawing I've included. It shows how the 21 adjustment points are organized. Notice that the oscillator adjustments for each band are in the left stack; the antenna adjustments are in the center stack; the detector adjustments are in the right stack.

Furthermore, note that the adjustments for each band are arranged in the same order on each stack. As you proceed through the adjustment instructions for each band, just keep your head, put yourself in "methodical mode" and be very careful to make sure you are adjusting the correct coil slug or trimmer capacitor each time.

The service notes specify the signal generator, bandswitch and dial setting for each set of adjustments. The oscillator adjustment, which determines where on the dial the signal will appear, is done first.

If the signal is found far from the designated calibration (as happened to me in a couple of cases), it's necessary to *slowly* move the adjustment in the right direction while following the movement on the dial until the signal reaches the right position. Move it too much at one time and you could lose the signal and, in finding it again, you might end up with it in the right place on the dial but the wrong side of the oscillator frequency.



Doing a shortwave alignment with the set reassembled is a bit of a challenge. Note that base of whip antenna is almost directly in front of the detector adjustment stack.

With the oscillator adjusted, the detector and antenna adjustments that follow are routine. Just tweak each one for maximum output on the meter, being careful to keep the signal generator output at the minimum useful setting as you proceed. Be sure to reduce the signal generator output appropriately if your adjustments make a significant improvement in signal level.

These adjustments took some time, but went very well. The oscillator adjustments worked very smoothly; the detector and antenna adjustments peaked nicely as expected. My habit of picking up alignment tools whenever I spot them on a flea-market table served me well. Some of the coil slugs required a certain size of hex shaft; others needed the tiny screwdriver blade from the smallest tool in my collection.

My biggest problem arose from making the adjustments with the set installed in the cabinet. The bottom of the whip antenna was almost directly in front of one bank of adjustment screws. Not only did this make it difficult to access some of them, but placing my hand near – and in some cases, of necessity, on – the antenna base affected reception of the test signal. I would tweak a screw to obtain maximum signal peak only to have the reading decrease as I moved my hand away.

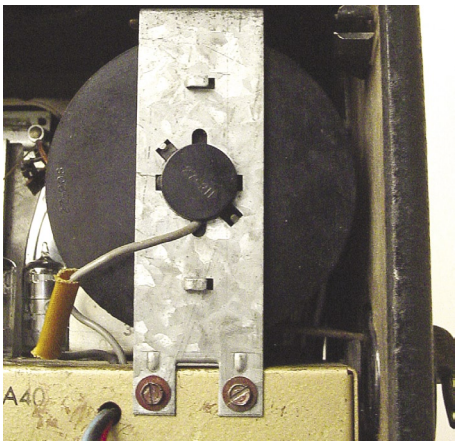
I had to take it on faith that the maximum achieved with my hand in place was at least somewhere near the correct peak point. And, in fact, the performance of the set confirmed this. It showed very nice performance on all shortwave bands.

At this point I thought of checking the army manual again, and found that the shortwave alignments were to be done with the whip antenna disconnected and the signal generator output wired, through a 20 pF capacitor, between the whip antenna tip jack and the radio's ground screw. This meant, of course, that alignment could be done out of the cabinet – which would have been much more convenient and would probably have resulted in sharper adjustments.

❖ The 1L6 Replacement Issue

No article on 500-series Trans-Oceanics would be complete without a discussion about what to do if the 1L6 converter tube is burned out. This rare tube is still available – but at prices in the $50.00 range. One common suggested replacement is the very inexpensive 1R5, which must have pin 5 carefully removed. Unnecessary in the T-O, this pin is internally connected to the filament and would cause circuit havoc if left in place. Reports I have read suggest that the tube does not perform well, or at all, at the higher frequency bands and might require realignment beyond the capability of the adjustments for the bands where it does work.

Another possibility is the use of the 1LA6 Loktal tube – which was the converter used in the T-O before the switch to miniature tubes. This switch seems to have a better prognosis, but requires the construction of a miniature tube-to-loktal adapter. For a very thorough discussion of these issues, visit A. Padgett Peterson's web page **http://bellsouthpwp.net/p/a/padgett46/1l6.htm**



Last step in reassembly was replacement of the missing power-cord take-up reel – supplied courtesy of reader William Bacon.

In my opinion, if you plan to spend the money on a nice T-O and do all the work required to put it into top operating condition, a $50.00 expenditure for the proper converter tube is absolutely justified.

See you next month when, I think, we'll begin to tackle a World War II surplus BC-348 aircraft receiver.

MT REVIEW

MFJ 1025/1026 Noise Canceling Signal Enhancer

Myth or Miracle?

By David Zantow N9EWO

MT looked at this most interesting radio accessory a few years back near its release in the late '90s[1], but here is a fresh look at a product that is even more important these days. With today's barrage of consumer electronics producing more noise in the radio frequency (RF) spectrum, many more world band listeners living in apartments, condos, and tight city situations are experiencing severe interference problems at full force.

The author was experiencing a very serious noise issue being created by a brand new high definition TV receiver in the house (1080i maximum resolution - CRT type). The MFJ-1026 was tested to help deal with the interference. Let's see how well the MFJ 1025/1026 Noise Canceling Signal Enhancer dealt with this and with power line noise, and how it was accomplished.

❖ Theory and Hardware Basics

The whole idea of noise canceling gadgets is to reject local interference by placing the undesired noise/signals out of phase by 180 degrees, thus leaving you with clearer reception. It requires you to have two antennas for use: one for the "Main" antenna, the other an "Auxiliary" antenna. For simpler terminology, we will call this the "aux-noise" antenna.

Both models are housed in an attractive, all-metal dark gray cabinet – top cover of steel, bottom half aluminum. The cover is held in place with six self-tapping screws. Four buttons (three on the 1025) and four knobs actually use set screws, not the push-on variety. All knobs had a very good, above average feel when rotated.

Alas, the cabinet paint job left a little to be desired with our test sample. There were chips, nicks and scrapes on our brand new sample fresh out of the box. Four small "stick on" feet are attached to the bottom. The lightweight box still tended to slide around with use, so we opted to replace these with larger ones that helped to cure this issue.

Size is 8-1/2 x 6 x 2-1/2 inches (not including connectors and knobs) – larger than what MFJ lists in their catalog.

A glass type PC board is used and most components used are of a surface mounted variety. Our sample had a minor amount of small solder "beads" splashed (lightly stuck) across the entire area of the board. This was cleaned up before operation was attempted.

The main difference between these two models is that the 1026 has two additional FETs (field effect transistors) that can be used for the aux-noise antenna. These two pre-amp FETs work with the whip antenna as well. It can also be used as an active antenna (or pre-amp) using the aux-noise input, if noise is nil at your location. The 1026 model includes one additional button on the front panel as well to switch this pre-amp in or out.

Alternatively, either version can be used to create a defacto "phased antenna system" with two outdoor antennas (not tested).

The array of jacks in the rear include three SO-239s for the main antenna, aux-noise antenna, and the third for the output to the receiver (or transceiver). The aux-noise antenna input also has an alternative to use an RCA/phono plug instead. There is also an RCA/phono jack for transmit/receive relay for use with a transmitter. This switches the internal bypass relay for transmit uses.

However, this relay does nothing to protect the "aux-noise" antenna FETs. There is a 12-volt 50ma panel lamp connected (hot glued to the PC board) at the aux-noise antenna input to help give some protection from excessive radio frequency energy from a transmitter. But it's a very good idea to use a separate RX/TX relay here as well. We did not use the product with an amateur transmitter in testing, but there have been reports of this light bulb being burned out from excessive input.

With our test sample, two of the three SO-239 antenna connector threads did not screw on properly, so we were forced to re-thread these by taking an unused PL-259 connector's "outer ring" and working this on and off for awhile before the connectors would screw on properly.

The required connection cables are not included. You may need up to three cables for proper operation.

Either version of this MFJ product requires a 12-volt power supply at about 150 ma of current and it, too, is not included. It should be extremely clean as well, so a regulated supply is recommended. In testing, a regulated 12-volt at 1 amp "wall wart" marketed by Jameco Electronics,[2] part number 170245 (about $16.00 plus shipping), was used.

Alternatively, included in the box is a short color-coded wire that has the proper plug on one end and bare leads on the other for connection to a 12-volt power supply. This is the more standard size power plug being used here and is a positive tip. This cable is not fused.

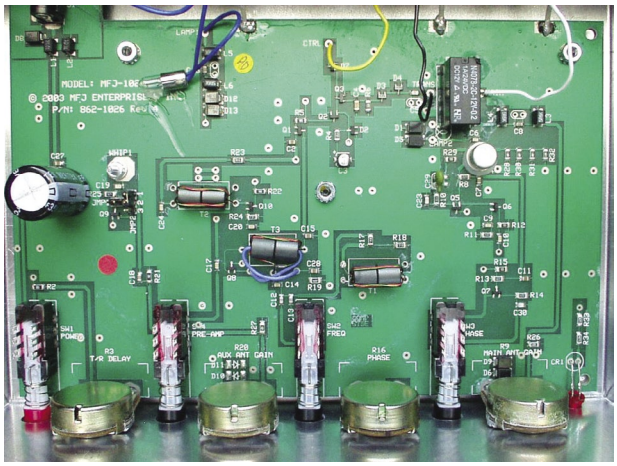
One will find a ground wing nut on the rear panel. Since we did not use this with a transmitter in testing, no extra grounding was used.

❖ Antenna Considerations

If one antenna hears the noise and the other does not, then this system is not going to function at all. The two antennas MUST be receiving the same noise to be effective. In fact, it's even better if the aux-noise antenna is hearing the offending noise a bit more.

One can try using a SW antenna for the aux-noise antenna, but if the interference is very local (and is being picked up by both antennas) then an indoor wire of a longer length (say, 30 feet) can be used. In the case of the 1026 model, there is a telescopic whip antenna included. To counter a local noise-generating device within your house, the whip can work adequately. Or better yet, if possible run an aerial connected by coax cable right up to the device generating the noise.

There is a jumper on the printed circuit board with the 1026 version to select two stages of the pre-amp for use with the rear mounted aux-noise antenna: moderate, maximum and none. Oddly, it was supposed to be in



the "none" position, which was indicated as default in the manual, but with our "factory fresh" test sample, for some reason it was set at "moderate." If you are using the whip antenna with the 1026, both stages are used and the jumper is set open (pins 1 and 2 on JMP2).

Using the 1026 version with any external noise antenna, the owner should try first obtaining the desired null of the phase control without the pre-amp in use (the 1025 version has no pre-amp). When the pre-amp was needed to boost the aux-noise antenna a bit, we found the "moderate setting" to be the most useful and easiest to null. This is going to be dependent on many factors and will vary. For some reason, when Maximum was selected in testing, it was difficult or nearly impossible to find the null.

With the extremely strong TV set noise that we were attempting to null out, the whip antenna on the 1026 version worked as the aux-noise aerial. But for many noise sources this will not be the answer, and the external antenna jack will have to be used with a longer indoor or outdoor noise antenna.

The device behaved itself without any overloading issues. It never hiccupped with any mishmash during testing.

Important Note: Those who use the MFJ-1025 or 1026 with the AOR AR7030 receiver should be certain that the rear mounted "whip" antenna switch is in the NORMAL position. If placed in the "WHIP" setting, the internal whip FET circuit in the AR7030 will give excessive noise.

Both the main and aux-noise antenna inputs have separate high pass filters that cut off signals starting about 1.9 MHz and below. So anyone wanting noise canceling in the medium wave or even 160-meter amateur radio band is going to be disappointed. Four surface-mounted coils can be removed by the owner handy with a soldering iron to remove this high pass filter. Reference is made to this in the owner's manual with no indication on how to do it. On the other hand, if you live near any MW stations, it is not advisable to remove the filter. With the unmodified test sample that still had the filters installed, no local MW intrusions were noted.

In one part of the manual, it indicated that the two antennas should be using the same polarization, either horizontal or vertical. But in testing this, we found it not to be true. We had good results with the two antennas being totally opposite polarities. Later in the same manual, it did say the polarization was not important!

We need to stress again that one needs to have patience, lots of it. It may take quite a bit of experimentation trying different configurations to have success. To come at it logically, one must first ask, where is the interference coming from? If the noise is local within the house, then one might be able to get away with using a simple wire (or just the whip for the 1026 version) for the aux-noise antenna. If it's power line noise, then an outdoor "noise" antenna will more than likely be required.

We tried many different outdoor and indoor antenna configurations, along with different pre-amp settings (using the 1026 model); trying different combinations will be a requirement and not an option here. This is not an accessory for someone who desires plug and play.

❖ How Did It Work?

Now for the main deal here: "Did this gadget make a difference to tame local noise?" Indeed it does, but not without the trial and error of changing knob and pre-amp adjustments and antennas. At first we had no success. It took practice and patience, and plenty of both!

It bears repeating that it takes an equal dose of noise at BOTH the main antenna and aux-noise antenna using the two gain controls. One secret is to keep the main gain control up as far as you can to keep the desired signal up for proper strength. If you are having problems finding the required null, then try turning down the "main" gain slightly after each attempt as covered below.

If you are using an external aux-noise antenna, try it with the pre-amp off first, and then with it on if you cannot match the aux-noise antenna to the main antenna for the noise level.

The "Freq" button needs to be selected as well: "High" for signals approximately higher than 7 to 12 MHz and "Low" for signals approximately lower than 7 to 12 MHz. If that sounds vague, you are right. In general terms, if you have problems finding the desired null as covered next, try the other setting.

We also found that using an actual world band signal for tuning the noise out worked best, but it works just using background noise as well. (Again, this is a suggestion only; nothing is etched in stone.)

Here is the actual procedure we used: Turn the 1025/1026 off (bypassed when turned off). Turn down both gain controls fully counterclockwise. Locate a signal that is awash in the noise or tune to an inactive frequency that also has the noise. Rotate the "Phase" control to the mid "5" position.

Turn power on. Rotate the "Main" antenna gain control to a good level using the S-meter on the receiver (if not all the way clockwise). Make note of the number on the control and turn it back down fully counterclockwise.

Then rotate the "Aux" antenna gain control to the same level (using the S-meter again). Leave it here. Now, go back and rotate the "Main" back to the noted number on the control as done above.

Be sure the "Phase" button is in the normal (pushed in) setting. Now s-l-o-w-l-y rotate the "Phase" control until a null is observed. If you get no null of the noise (or only a null of the desired signal), then try selecting the opposite (invert) position on the "Phase" button. Repeat the "Phase" control adjustment.

It tended to perform better in our tests with local power line noise rather than with the TV set noise. In the case of power line noise, it removed approximately 70 to 100 percent of it. TV set noise was about 50 percent. But even with only half of the TV set "buzz" noise removed, it still enabled enjoyable listening versus turning off the SW receiver entirely. Signal to noise was definitely improved. But no DX was possible, either, even after the MFJ treatment, as some noise still remained.

As we found out in testing, performance of this system will vary with type of antennas used, proper placement, and strength of the noise. The pre-amp with an external AUX antenna on the tested 1026 model was useful as another variable to help with proper operation. The "moderate" preamp setting was the most useful jumper pre-amp position in testing.

When the frequency is moved, one will need to touch up the adjustments, as the noise between the two antennas usually changes as well. So, just as the old SW receivers of the past used manual pre-selection/antenna trimmers, this device operates in that same spirit.

Also bear in mind that this device will only remove *one* noise. If there are multiple noises interfering, this gem can only deal with one of those.

❖ Bottom Line: Try It

This has to be one of the most variable receiver accessories sold in the marketplace, but it can be a lifesaver for someone who is struggling with noise and who has no other options. If one makes the purchase directly from MFJ, they advertise a 30-day money back guarantee, in case it does not solve your specific problem.

There is also a 1-year warranty, but the owner must include a return-shipping fee along with the product.

Pricing: MFJ Direct (**www.mfjenterprises.com**): MFJ-1026 $189.95, MFJ-1025 $169.95 (if ordered from MFJ direct only, 30 day money back guarantee). Other US dealers: MFJ-1026 $169.95~$179.99, MFJ-1025 $154.99~$159.99

1) The MFJ 1026 was reviewed August 1999 *MT* and the MFJ 1025 in May 2003
2) Jameco Electronics , 1355 Shoreway Road, Belmont CA, 94002, tel (650) 592-8097 **www.jameco.com**

By Ken Reitz
kenreitz@monitoringtimes.com

KAITO KA1103

A Surprising, All-Purpose, All-Band, Shortwave Portable

Radio manufacturer Kaito U.S.A. has been developing a wide range of shortwave radios over the last few years to fit just about any budget. The KA1103 is a perfect example. It's small, easy to use, feature packed, and even charges its own batteries.

❖ Retro Look, Modern Appeal

The first thing that's striking about the KA1103 is the faux analog dial. At first it looks like an old fashioned, multi-band analog radio, complete with slide rule indicator. But, closer inspection reveals that this dial also gives a large, precise, digital frequency readout with room for volume and signal level, too. To complete the fake-out, Kaito has outfitted the dial with cozy yellow LEDs that'll make you swear you're looking at an old-time radio shrunk into a 6" x 4" box.

There are a few things you might not expect to see on a radio of this size and price: on AM it tunes in 1 kHz steps, it has full HF coverage from 100 kHz to 29.999 MHz, it has SSB reception and an amazing 268 memory presets. But wait, there's more! It comes with an external power supply, built-in battery charger (four AA NiMH batteries are included) and it has a 32 foot long plug-in, long-wire antenna.

Among its other attributes is four-way tuning. You can access frequencies by traditional dial tuning, direct entry, auto-scan, or memory tuning. It features two alarms and a sleep timer. And, what's this? A line out jack! Hmm, looks like you can record to your MP3 player. This is getting better and better. But, just how does it perform?

❖ Riding the Bands with the KA1103

Thanks to the mini-plug external antenna jack on the KA1103, I was able to test this radio with a number of antennas besides the built-in 36 inch telescoping whip antenna and the aforementioned 32 foot long wire. If you use an external antenna, you'll need to get a mini-plug adaptor so that the radio can accept input from a 50 ohm coax antenna.

An advantage in using an outdoor antenna with any shortwave radio, besides the obvious increase in signal, is that you move the antenna away from the many items inside your house which are generating RF noise. That's a particular problem when you use a portable radio near a fairly noisy computer. On the other hand, a frequent disadvantage in using a big outdoor antenna on such a small radio is that you might overload the front end of the radio and reduce its sensitivity. I found that, no matter what antenna I used or what band I listened to, this didn't happen on the KA1103.

View of KA1103 back panel shows retractable desk stand, built-in, swiveling 36" telescoping whip antenna and battery compartment. Also seen from this view is the main tuning control, clarifying thumb wheel, line out jack, narrow/wide audio selector and front panel light switch (helps save on batteries when not plugged into the wall). (Courtesy: Kaito USA)

Checking out the FM band first, I found that reception was pretty much what you'd expect from a small portable radio. But, that's not the reason anyone would buy the KA1103, though it's nice to have that band. Attached to an external antenna, FM reception was very good, pulling in distant stations as well as any portable I've used.

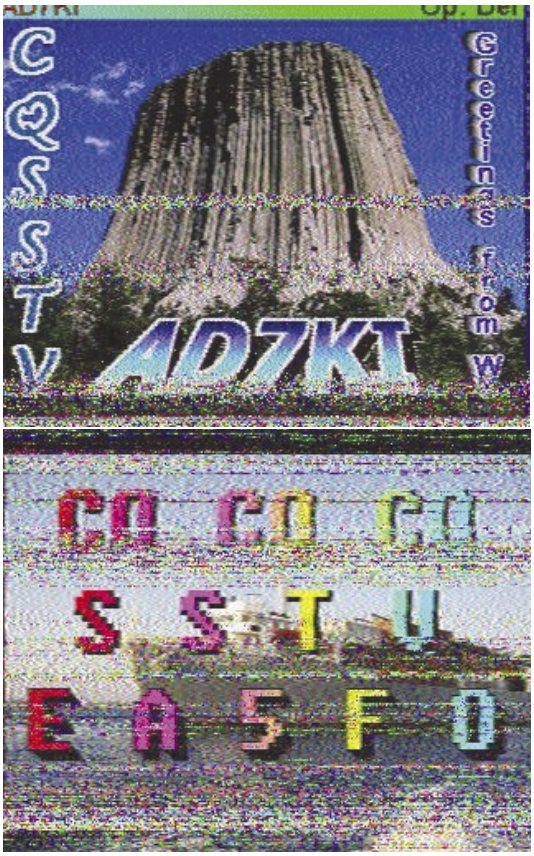
AM reception, while not great, was at least not a disappointment. Usually radios this small have little to offer in the way of DX on the AM band. There's just not enough bandspread to sort out the thousands of stations on AM. The KA1103 uses a built-in ferrite antenna which was of minimal value. However, using the Radio Shack tunable AM loop antenna, I could do some pretty good AM DXing. In addition to the usual AM broadcasters, I could pick up CMIA 560 Radio Rebelde in Cuba broadcasting Cuban baseball.

On HF I was surprised at how well the little telescoping antenna worked. Even sitting next to my computer I was able to tune in some decent DX shortwave catches on the 49 meter band, such as Voice of Vietnam at 6.175 MHz, in addition to the usual powerhouse broadcasters.

The 32-ft long wire did a much better job than the telescoping whip, but as might be expected, I found the most improvement attaching the outdoor shortwave antenna. Marginal signals became real arm chair copy. For instance, listening from 2000 to 2200 UTC I heard Vatican Radio's English service to Europe (5.885 MHz) which came in like a local AMer. BBC's African service on 17.830, 15.400, 12.095, 6.190, and 6.005 MHz all came in very well. Even the BBC 5.875 MHz service to Europe was strong.

Cruising the *MT* Shortwave Guide made my global journey a snap. Punch in the frequency on the KA1103 and there's Albania's 7.530 MHz service to Europe. RCI's service to the EU at 9.770 MHz was extremely strong. Radio Australia's service to Asia at 15.515 MHz was filling out the LCD signal strength meter. OK, so I couldn't get Nepal or Syria, but I couldn't do that on my main SW radio at that time, either!

A modern, digitally tuned, all-band radio, the Kaito KA1103 features retro styling with faux analog, back-lit dial. It's available in two colors: black and silver. (Courtesy: Kaito USA)



SSTV images from the KA1103 on 20 meters. Once the tuning and audio are adjusted, simply turn the clarifier thumb wheel until the image starts to appear. (Courtesy: Author)

One big knock on radios of this size is their audio. It's awful. All highs and no lows. There's an audio wide/narrow switch which is basically a treble/bass switch intended to be used when listening to talk or music programming. I switched the audio to narrow and plugged the line out into the MP3 player jack on a high quality table radio. The audio was noticeably improved. You can use an amplified speaker with the same results, especially if you can adjust the treble/bass on the table radio or speaker.

❖ Tuning into other Modes

Now, it's one thing to use a shortwave portable to tune in world music and news, but this radio features Single Side Band (SSB) reception, which lets you tune in to the world of amateur radio. Using the built-in antenna, I was able to listen to everything from 160 meter insomniacs to 10 meter beacons. Again, the best reception was with an outdoor antenna.

As a ham I've enjoyed operating the digital modes and thought this might be a good test for a little radio like this. For transmitting, I use a Tigertronics SignaLink sound card/radio interface (**www.tigertronics.com**) which utilizes the auxiliary jack on my transceiver, allowing the computer to operate the transmit/receive and VOX functions. But, for SW listening I only needed to connect the output of the radio at the headphone jack to the "mic" input on my computer via a miniplug-to-miniplug patch cord. Now, utilizing HamScope (**ww.qsl.net/hamscope/HamScope.html**) and other digital software, I was set to copy various digital modes such as RTTY, PSK31, MFSK, CW, and SSTV.

The KA1103 worked very well on the digital modes. Even with the telescoping antenna, I was able to tune RTTY and PSK31 ham transmissions on 20, 40 and 80 meters; setting up on the 20 meter SSTV window (14.230 MHz) netted some nice images (as shown). Tuning RTTY and PSK signals is very easy once you press the SSB button on the front panel and the audio level is adjusted. Tuning SSTV is a little trickier. Again, put the radio in SSB mode and, once you find a signal, adjust the volume and then the "clarifier" thumb wheel on the KA1103 until the signal bar on the software screen goes green. The image will start to appear.

❖ The Bottom Line

The Kaito KA1102 and the KA1103 are similar (though the KA1103 is the larger of the two): Both feature dual conversion, PLL synthesized tuning; both have SSB reception; and both have battery charging circuits. So, why would you want the 1103 instead of the 1102 when it's about $20 more expensive? There are a couple of critical points where the 1103 wins out: the 1103 has continuous coverage from 100 kHz to 29,999 kHz (the 1102 has no long wave coverage and a small gap between 1,710 and 3,000 kHz); the 1103 has 268 presets (the 1102 has 190), the 1103 has a real tuning knob (the 1102 tunes via inconvenient + or – front panel buttons), and the 1103 has a line-out *and* a headphone jack (the 1102 combines both in one).

I happened to have access to both the 1103 and the 1102 at the same time. I used the same antenna for both radios and found the 1103 more sensitive. For instance, the 1103 was able to decode weaker SSTV signals on 20 meters that the 1102 could not. Ham SSB contacts were much more readable on the 1103. Similarly, international broadcasters came in noticeably better on the 1103.

The KA1103 is a great first radio for anyone interested in getting started in shortwave and amateur radio monitoring. It's also a very competent portable unit for seasoned SWLers to take on trips where bringing their main radio is not feasible. I think it might also be a very capable receiver for QRP (low power) enthusiasts who want to build their own tiny CW transmitters and take their hobby on the road. Add a transmit/receive switch and you'd have a nice compact station.

The MSRP for the KA1103 is $109.99. I found this radio at a number of retailers including Grove Enterprises and Universal Radio ($89.95), C.Crane ($109.95), RadioLabs.com ($94.95) and Durham Radio ($109). Check each for current pricing and shipping information (some offer free shipping). The KA1103 is made in China and has a one year limited warranty.

MANUFACTURER SPECIFICATIONS

Tuning range
FM: 76.00-108.00 MHz
AM: 100-29,999 kHz

Power Supply
Battery: 4 AA NiMH Batteries (included)
External power: DC input 8v 300mA
Recharging time: 1-23 hours

Dimensions (approx.):
Size: 6.5" wide 4.25" high 1.25" deep
Weight: 13.25 oz. (without batteries)

Ports:
External antenna jack (3.5 mm)
Headphone jack (3.5 mm)
Line-out jack (3.5 mm)
Knobs and Switches:
DX/Local slide switch
Narrow/Wide audio slide switch
Dial light slide switch
SSB fine tuning thumb wheel
Main tuning/main volume side mount knob

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91 Modes of Digital Signal Decoding - Multipsk

No gimmicks! This program, Multipsk, decodes 91 different modes and sub-modes of digital signals. That will keep you busy for a while. For many modes it also has transmit capability.

With the addition of a freeware program, Multipsk can initiate the control of a number of receivers and transceivers. What's more, it includes a logging database function. And it's free.

Sound good? Read on, we've just scratched the capabilities of this feature-rich program.

❖ 91 Modes!

Multipsk boasts that version 4.1.2 is capable of 91 modes and sub modes. Here's a partial list of receive modes: BPSK31, QPSK31, CHIP (64/128), BPSK63, QPSK63, BPSK125, QPSK125, PSK63F and PSK220F with DIGISSTV ("Run" protocol), PSK10, PSKAM10/31/50, PSK-FEC31, CW, CCW, CCW-FSK, THROB(X), MFSK8, MFSK16 (with SSTV capacity) , OLIVIA, RTTYM, CONTESTIA, VOICE, DominoF DF ("Default mode"), DominoEX, MT63, RTTY at 45, 50 (+ SYNOP), 75 or 100 bauds, ASCII at 110 bauds, SITOR A, AMTOR ARQ LISTEN, SITOR B/ AMTOR FEC/NAVTEX, PACKET 110, 300 and 1200 bauds (+APRS) with DIGISSTV ("Run" protocol), PACTOR 1, PAX/PAX2 (+APRS), FELD HELL, FM HELL, PSK HELL, HELL 80, SSTV and HF Fax.

Approximately 75 percent of these modes can also be generated (transmitted) by Multipsk. The program's Help file has a wealth of details on each mode, its form, origin, technical specifications, and Multipsk's commands, displays and operation.

PC requirements vary depending on the mode you are using. The program says that at bare minimum a Pentium 166 MHz or more running Windows 95, 98 or NT with a 100% Sound-Blaster compatible sound card will work. This hardware just gets you the basics.

A 450 MHz PC will do a better job of handling the computational and display loading. The program's very extensive and informative Help file indicates that a PC "…2000 MHz or more with a graphical resolution of 1024x768 and 24 bits colors, is the optimum for Multipsk."

A 400 MHz Pentium II laptop and a 1000 MHz Pentium III desktop were employed and both had usable results. However, in my opinion, a 1GHz PC or faster is needed to take full advantage of Multipsk's capabilities. For some modes a sound card with full duplex capability is also a necessity.

Since Multipsk uses the PC's soundcard input and output, no added hardware interface needed. For receive only, just a simple connection between the soundcard input and the radio's audio output is required.

❖ Getting and Installing Multipsk

We have Patrick Lindecker, F6CTE, of France to thank for this very versatile decoding program. The program can be downloaded from **www.F6cte.free.fr/index_anglais.htm** for English speakers. Multipsk German and French sites are also on the web.

If you go to the website, you will see that the program comes in a freeware version and a registered version which costs $40 or 30 Euros.

In case you think I lied about being free, no, I didn't. The freeware version decodes all modes and transmits many modes as well. It is a true full and complete program.

However, for the cost of the registered version, the user gets twenty-five very useful additional features. These include: SYNOP/SHIP meteorological messages decoding, playing and recording sound files, CW (Morse) panoramic decoding 23 channels simultaneously, RTTY (45 bauds) panoramic decoding 8 QSOs simultaneously, to name a few.

In addition, a dual trace oscilloscope (0-20 kHz) and spectrum analyzer software instruments are included in the registered version. See the Multipsk website for a complete list of features exclusive to the registered version. For this column we used the registered version.

Download the 4Meg zipped Multipsk version 4.1.2 file from the above site. It is in a Zip format

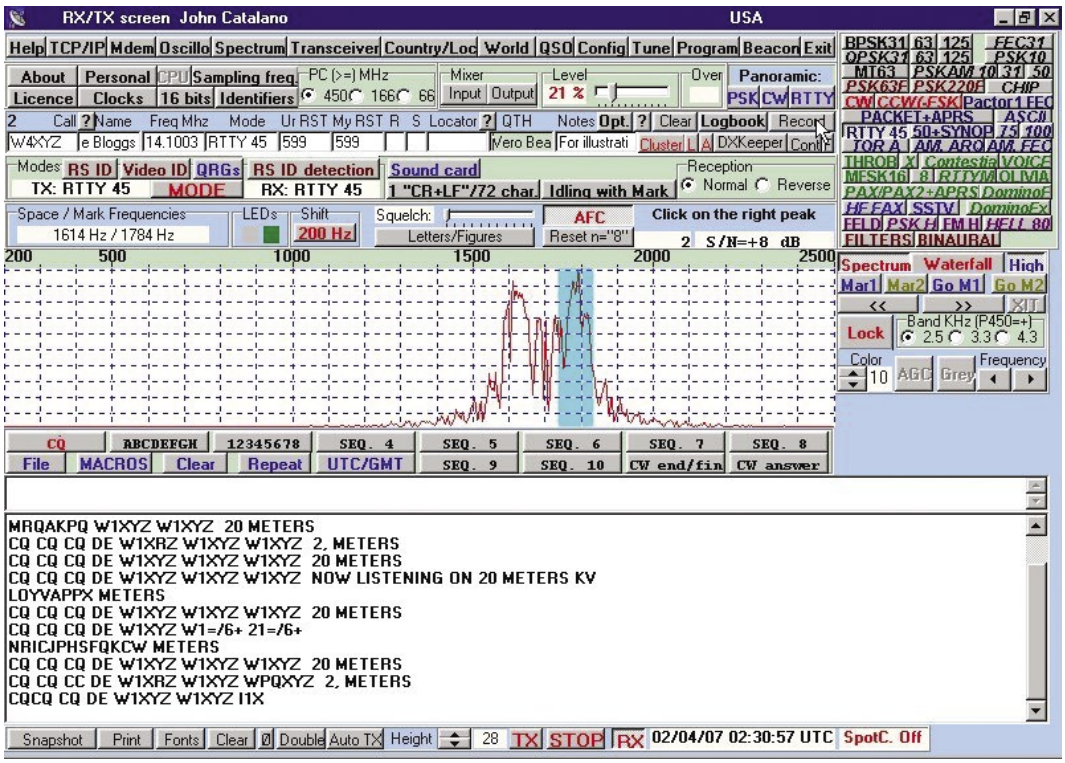


Figure 1 – Multipsk's RX/TX screen decoding RTTY 45 Baud

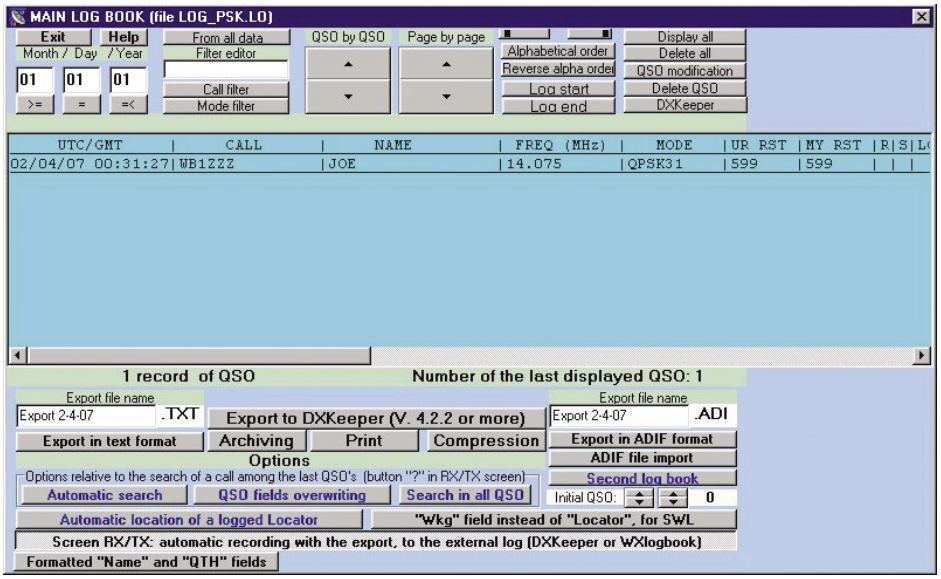


Figure 2 – Logbook screen. Useful for both ham and SWLers

and you will need WinZip or a similar unzipping program. Unzipping the file results in 98 files totaling about 13.5Meg. Clicking on the "Instal.exe" file installs the program. In about 20 seconds it's ready for use.

❖ Before Using

To control a receiver or transceiver via the PC's serial port, we must first download and install a freeware program called Commander. This controls Kenwood, Icom, TenTec, Yaesu, FlexRadio or K2 radios from a PC running Windows 95, 98, NT, 2000 or XP. This 2.7 Meg self-extracting zipfile can be downloaded from **www.dxlabsuite.com/commander**. Be careful to ***exactly*** follow the installation instruction found on this web page. Version 5.1.7 or newer must be used with Multipsk.

The list of radios that Commander controls is impressive in its own right. It includes: **Alinco** DX77-T, **Elecraft** K2, **FlexRadio** SDR-1000 **Icom** IC-271, IC-275, IC-375, IC-471, IC-475, IC-575, IC-703, IC-706, IC-706MKII, IC-706MKIIG, IC-707, IC-718, IC-725, IC-726, IC-728, IC-729, IC-731, IC-735, IC-736, IC-737, IC-738, IC-746, IC-746Pro, IC-751, IC-756, IC-756Pro, IC-756Pro II, UC-761, IC-765, IC-775, IC-781, IC-820, IC-821, IC-970, IC-1271, IC-1275, IC-7000, IC-7800, **Icom** R10, R71, R72, R75, R7000, R7100, R8500, R9000, **Kachina** 505, **Kenwood** TS-50, TS-440, TS-450, TS-480, TS-570, TS-690, TS-711, TS-811, TS-850, TS-870, TS-940, TS-950, TS-2000, **TenTec** OmniV.9, Omni VI, Argonaut V, Jupiter, Pegasus, Orion, Orion II, **Yaesu** FT-100, FT-736, FT-747, FT-757, FT-767, FT-817, FT-840, FT-847, FT-857, FT-890, FT-897 FT-900, FT-920, FT-990, FT-1000D, FT-1000MP, FT-1000MP MARK-V, FT-2000, FT-DX9000.

Commander is also an excellent program and can be used as a standalone radio control program. Commander must be running before you start Multipsk.

❖ Running Multipsk

Multipsk displays information in a number of different screen methods. The main operational screen is the RX/TX (receiver/transmitter) screen, shown in Figure 1. Due to space and time constraints we will only cover a few of the many features and functions of Multipsk.

Figure 1 shows Multipsk actually decoding a RTTY 45 Baud signal. To get a basic understanding of what is going on in Figure 1, let's break up the screen into different sections. The bottom of the screen is where the user selects Multipsk's function: Transmit, Pause or Receive. You can see that we are in RX (Receive).

The top left side is where the Mode to be decoded is selected. In Figure 1 we have chosen the RTTY 45 mode. Below this Mode section is the Signal Display selection. As seen in the center of Figure 1, we have chosen the "Spectrum" display. The two tones – mark and space – of the RTTY signal can be clearly seen on the spectrum display as two peaks at 1614 and 1784 Hz.

A mouse click on the right peak, tunes Multipsk to the signal as indicated by the blue shaded area. The decoded text can then be seen in the large area below the Signal Display, "CQ CQ CQ DE …." It's that simple for all decode modes.

Logging Too (2)

The third row above the Signal display is where station log data is entered. Here the user enters the "Call" and "Name" of the station being monitored or contacted. In some modes Multipsk does have an auto callsign read feature. The Frequency that the radio is set to is entered or displayed in the next box. This is linked to radio via the Commander program.

Clicking on the "Record" box saves the received station's data to the logging database. Figure 2 displays our logbook with that single station entry. The "buttons" to the right of Figure 2 are used to sort, modify and delete log database records. The bottom of this screen has access to more file search functions, exporting and printing of logbook files. Multipsk's internal logbook files can be shared with DXKeeper and wxLogBook, two popular freeware-logging programs.

Don't Forget the Hams

With the FCC's recent removal of the Morse code requirement for amateur licenses, the number of hams may see a surge. Since Multipsk has transmit capabilities of many of the modes, ham operators take note! Little more than an audio connection form the soundcard output to the microphone jack on your transceiver is needed. Now you're on the air in lots of digital signal modes.

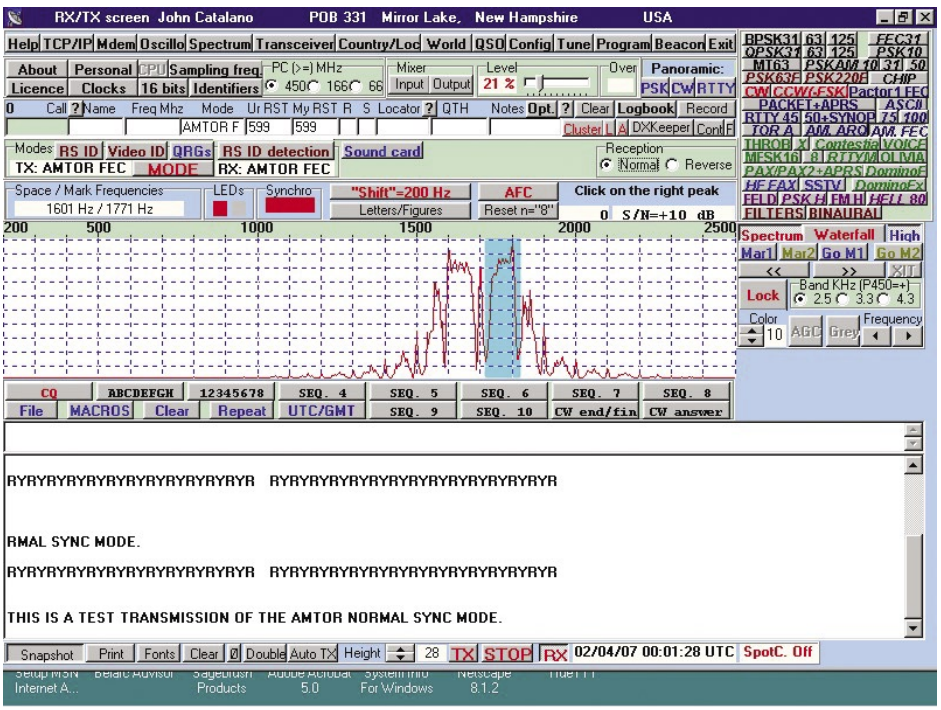


Figure 3- Decoding AMTOR-FEC with Multipsk. Quick synchronization!

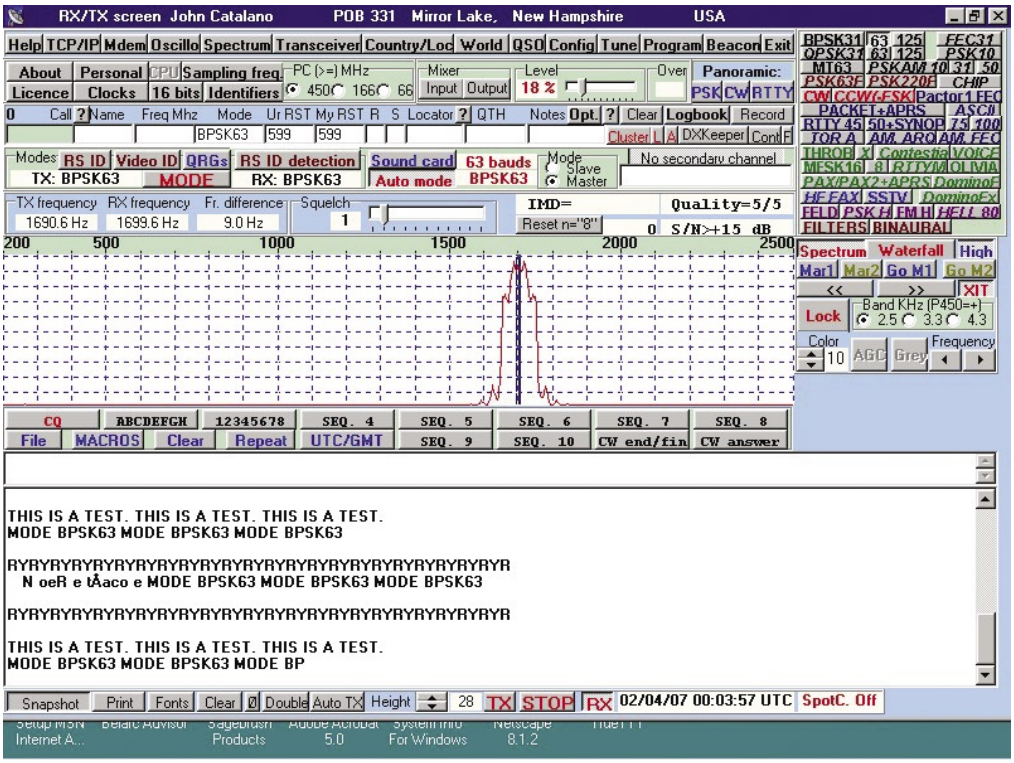


Figure 4 – Decoding a new mode - BPSK63

The RX/TX screen and logbook include ham-friendly features and data fields such as automatic QTH (location) identification and user defined and saved personal information including call, name, QTH, web address, rig, antenna, computer, software and four additional fields of data. This information can automatically be entered in logbook fields and/or selected for transmission. There are other similar "script" features in the program

"A La" Modes

We put Multipsk through its paces decoding common modes such as RTTY shown in Figure 1. We also decoded CW and AMTOR-FEC shown in Figure 3.

Then we tried a few new modes, including QPSK31 and BPSK63, a digital ham mode, as shown in Figure 4. BPSK63, created in 2003 by AE4JY and KH6TY, uses a Baud rate of 62.5 and a speed of between 74 to 102 words per minute.

❖ How Did It Work?

As I first began this column, propagation on the shortwave bands was very poor. Therefore, for testing, we used digital audio files of each mode as the input. These test files were created using a number of different programs including Multipsk and TrueTTy and saved to disk. The files were then loaded and "played" by Multipsk via the controls on its Configuration screen. Later off-air signal tests resulted in similar results.

My initial reaction, after using many, many decoder programs and hardware units over the past 30 years, was that Multipsk *appeared* to synchronize to signals faster than most others and hold a tighter lock. By this, I mean that the time from tuning a signal until readable decoded characters were obtained was very quick. This was observed in most modes using a 1GHz Pentium III, which is less than the suggested optimum hardware (2 GHz). Once it did start decoding text, it seemed to hold the lock. It did not often fall out and start producing "garbage" text.

In operation, tuning of a two-tone mode such as RTTY (see Figure 1) is accomplished by clicking on the right peak (higher frequency) on the RX/TX spectrum display. For other modes, clicking on the major peak (see Figure 4) does the job. The Help file indicates that Multipsk has an auto tune mode for some modes. However, we did not try this feature.

Once locked, significantly reducing the signal level still resulted in solid decoding. Of course, this is a function of both Multipsk's decoding algorithm's efficiency and the dynamic range/signal to noise performance of the sound card. I used a tried and true Turtle Beach Santa Cruz sound card.

These results were repeated when off-air decoding of RTTY, AMTOR and CW were available. The CW mode seemed to take the longest time to generate readable text. This may be due to a number of factors. The variability of the human-sent CW, band noise (QRN) and the nature of the unstructured CW mode (as compared to digital modes) may all contribute to this slower initial decoding of CW.

❖ Features Not Tried

To discuss all of Multipsk's features would take many pages of *MT*. Due to space constraints, we did not cover many useful features in Multipsk including:

* Digital Audio filters (lowpass, bandpass or band rejection) for audio signals received from the receiver.
* Binaural CW reception which generates a different audio channel for each ear. Theoretically improves perceived signal-to-noise ratio.
* Countries, world map, locator, automatic reception and location and search for a country by prefix or call sign
* Automatic detection of BPSK modes.
* Dual trace oscilloscope (0-20 kHz) and spectrum analyzer functions.
* The Panoramic display modes for PSK, CW and RTTY sounds like a very interesting operation. As the Help file explains, "For example, by adjusting the receiver on 7035 KHz USB, the user will see all RTTY transmissions from 7035.2 to 7037.5 KHz. Automatic reception and location is done in panoramic mode." This is a unique and interesting topic for another *Computers & Radio* column!
* Additional Add-On Programs such as Multidem for use with direct conversion receivers.
* And much, much more!

❖ What Do I Think?

Although its screens look complex and a bit confusing, there is a tremendous amount of capability crammed into Multipsk! Decoding of all the modes we tried was quick, easy and accurate. What more can I say?!

Mulipsk's interface to the rig-controlling Commander was tested with FlexRadio, Icom, and Kenwood radios and worked smoothly without problems.

The logbook works quite well and will be useful to both hams and SWLers. The station-mapping feature has limited display accuracy but is a nice touch.

Generation (transmission in Multipsk-speak) of a mode to a radio, or saving to a file, was also a simple task. The Help file gives instructions and wiring diagrams for interfacing Multipsk to ham transceivers.

The English wording in the Help file is a bit confusing at times and could benefit from a re-work by a native English speaker. But compared to my French, it's perfect!

I have a beta version of Multipsk (4.2) that includes limited ALE decoding capabilities. This mode has gained widespread popularity. Watch for details of its operation in a future *C&R* column.

If you are interested in sharing info on Multipsk with other users, a good place is Multipsk Yahoo Group, whose moderator, Andy, is a very helpful gentleman.

In summary: Anyone – hams and monitors alike – looking for digital signal decoder capability should definitely give Multipsk a try. The free version is great, and for $40 the registered version adds a number of excellent and very useful features. Tell Patrick you saw Multipsk in the *Computers & Radio* column of *MT* where it received a great review!

Now, let's see: I was up to trying mode number …

This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

Solar Power for Eton and Grundig Cranks

By Thomas Marcotte, N5OFF

With all the buzz about crank radios these days, I thought I'd share with the readers a modification I made to my Eton FR-250, that is, the addition of a solar charger. This same modification can be made to several of the Eton and Grundig radios in this class.

I bought the radio because I thought it might come in handy during hurricane season. I quickly examined it and found that it was powered by a three-cell cordless phone type battery with the option of adding in three AA batteries (the AA batteries are not charged by the crank). Not wanting to wear out the crank in case I needed it in a storm, I decided that the addition of a solar charger would help preserve the crank generator (and save me some work).

I purchased a small solar panel that produces 7.3V open circuit. I soldered to it the appropriate DC connector and plugged it in to the radio. With the available light from a window or lamp, the radio's charging LED glowed brightly. Success. I attached the solar panel to the radio with Velcro.

I soon became dissatisfied with the capacity of the internal rechargeable battery, however, so then took the next step of jumping the power wires for the rechargeable over to the connections for the additional AA batteries. With this done, I was able to use high capacity nickel metal hydride batteries instead of the little stock rechargeable battery. (Caution: one must not connect the solar charger or crank the generator if AA alkaline batteries are ever installed.)

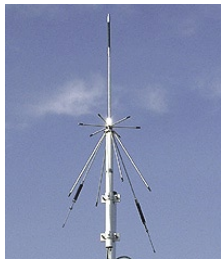
The loaded voltage provided by the solar panel is 4.5V, while the charging voltage to the batteries is 3.8V, so there is evidently a regulating charger circuit connected to the DC input jack.

In conclusion, I never have to crank the radio. The light from my end table lamp and natural light on the windowsill keep the radio charged. If it ever runs down, then I'll crank it, but that has not happened yet. The LED charge indicator on the radio lets me know if there is sufficient light to charge the batteries. The panel I use will even run the radio without batteries in direct sunlight.

73 DE N5OFF

AOR DS3000A Wideband Discone Antenna

By Bob Grove W8JHD



Following the discontinuation of their previous model, AOR has announced the release of a newer, extended-frequency-range discone antenna. The DS3000A is designed to cover 75-3000 MHz (that's 3 GHz!) for those new, wide-coverage scanners and VHF/UHF receivers.

For transmitting purposes up to 50 watts at 50 ohms impedance, the elements are factory-pruned to favor the 144, 430, 904 and 1200 MHz ham bands, and the antenna can be used on close land-mobile frequencies for that purpose as well.

The elements are composed of strong stainless steel and are threaded for reliable insertion into the center hub; lock washers and nuts are provided to assure rugged attachment.

The antenna is only 2.9 feet high, making it ideal for inconspicuous or confined-space mounting. U bolts are included for attachment to any mast pipe 0.8-1.5 inches diameter. Weighing a mere 1-1/2 pounds, the rugged discone is built to withstand winds of up to at least 80 miles per hour.

A 32 foot length of low-loss RG58A/U is provided as well, and is affixed with N connectors for the best signal continuity at these high frequencies.

The AOR DS3000A is available from *MT* advertisers, and from Grove Enterprises for $124.95 plus shipping (**www.grove-ent.com**; 800-438-8155).

No-Sweat Antenna Radials Installation

By Alan Bosch/KO4ALA

If you have been thinking about installing a ground-mounted vertical with radials for SWL or hamming, but don't want to have people tripping over them (or getting them ground up by your lawncare company) here is the way to go – while saving yourself an awful lot of spadework.

Rent one of those little Mantis 2-cycle tillers with an edger blade. Lay out your radial pattern with twine and tent stakes, follow the lines with the Mantis, and then stuff the radials down into the slits thus created.

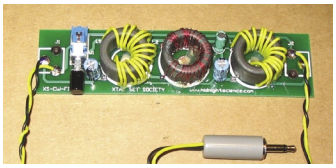
Since the Mantis edger blade will make the cuts about 4-5" deep, it is a much better tool than one of those electric edgers usually used for lawnwork. And the machine itself is very light and easy to use.

What's NEW

Tell them you saw it in Monitoring Times

Crystal Kits

The Xtal Set Society has been busy lately, with three new kits just recently announced! The first of these may be the circuit one of our readers was looking for – a passive CW filter, XS-PCWFK. This filter features a ~400 Hertz bandwidth with 750 center frequency and requires no battery or supply. The kit includes a bonus of sorts: it may be configured as an SSB rather than CW filter with a change in components.

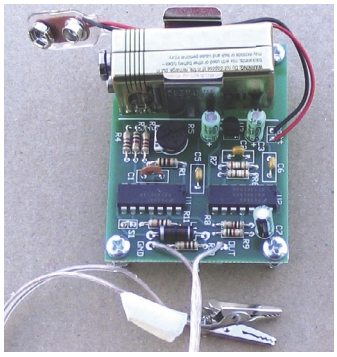


It goes between your receiver or rig – audio output – and 8-ohm speaker or phones, and accommodates old-style hi-z headphones too, such as Baldwin's. The kit is assembled on a 1.25 x 5.0-inch printed circuit board. Jacks, plugs, and cables are not included. An assembly manual is provided, and solder assembly is required. For most hobbyists, kit assembly is about one-half hour. A completed assembly is shown in the picture.

The XS-PCWFK "Passive CW Filter Kit" is $19.95 plus $4.95 shipping/handling.

With hopes of inspiring more building and experimenting with radio electronics, the Xtal Set Society also introduced the AM BC-Band Test Generator, XS-TGK. This generator produces a low-level AM signal with a 1 kHz tone for testing your crystal sets and other gear; it tunes from 550 to 1600 kHz. The kit includes assembly manual, 2 x 2.7-inch PCB, two ICs, voltage regulator, RC components, and 9-V battery clip with wires. Battery and cabling not included. Assembly time is ~45 minutes. Price $19.95 plus $4.95 shipping/handling.

Another new accessory from the Xtal Set Society is the Crystal Ear-Piece Transistor Amplifier Kit, XS-EAK. This amp is designed specifically to drive a crystal earphone, which is capacitive. Maximum gain is set at 14x. The input is capacitively coupled and includes a 100K pot, ideal as a load for a crystal set and as a volume control. All components mount on the 2 x 2-inch PCB, including 9-volt battery holder and 9-volt clip with wires. Battery and audio cables/connectors are not included. Interconnect wiring can be soldered directly to the PCB pads. Assembly time is ~45 minutes. The XS-EAK "Ear Piece Transistor Amplifier Kit," is $19.95 plus $4.95 shipping/handling.

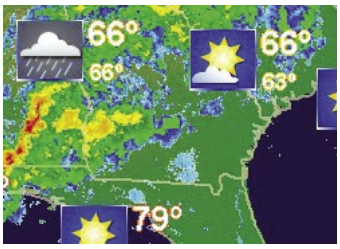


Orders may be placed via the Xtal Set Society website catalog at **www.midnightscience.com** (or from P.O. Box 3636, Lawrence, KS 66046, 405-517-7347). For additional information, visit the site or email them at *xtalset@sunflower.com*.

Weather Tracking Software

The same tools available to the avid storm chaser are now also available to the consumer who wishes to stay ahead of deadly weather and keep families protected with advance warnings – even before the weatherman makes public announcements. SWIFT Weather Co. released an incredibly comprehensive weather tracking software tool called SWIFT WX Professional (**www.swiftwx.com**).

Using SWIFT WX Professional, the consumer has access to more than 1,100 weather maps and analyses, weather radar down to the street level, GPS tracking, perimeter alerts/first alerts, and up-to-the-minute data feeds from 140 weather service offices. In fact, SWIFT WX provides the same technology used by U.S. government agencies for less than 50 cents per day. All that is required is an internet connection, since the program pulls its data from internet sources. If you are mobile, this will probably mean connecting via a cell tower.



The software can only be purchased on line: You can also download it and try it for free for two weeks. After that, it's $14.50 per month or $159.50 yearly from **www.swiftwx.com**; you can cancel at any time.

SWIFT WX is a welcome product for those who want to be prepared well in advance for twisters, hurricanes, mud slides, flash floods, ice storms, blizzards - and other Mother Nature nasties. And what if the power/internet connection goes down? Well, then I guess you already know where the severe weather is!

Tac-Comm Tactical Radio Carrier

Tac-Comm introduces the TRC-1 Tactical Radio Carrier. The TRC-1 provides a simple and convenient method to protect, package, and organize most any mobile radio for portable, tactical, or emergency communication operations.

The rugged aluminum carrier is designed to adapt almost any mobile radio into a stand-alone base station. Multiple TRC-1s can be stacked or used side-by-side to provide an impromptu, on-scene, multi-agency communications center.

In addition to providing protection to the radio, the carrier keeps all parts of the radio together. Fastening the microphone and power cord to the carrier prevents loss and assures the radios will be available when needed. Radio channel/frequency information could also be attached to the TRC-1.

For more information please visit **www.Tac-Comm.com** or write Tac-Comm, 1050 W 105 N, Orem, UT 84057; 801-224-0299.

NASCAR Nextel FanView

It's race time again, but if you don't have a scanner of your own, you can still tune in to the race from the stands. FanView is a hand-held scanner that not only includes audio, but video and data as well. You can catch the race telecast but still hear the live audio feeds of the drivers. You can priority scan for up to four drivers, catch up to seven in-car camera channels, and replay audio on demand. Meanwhile, it will display graphic-rich data such as lap times, speeds, position and point standings, updated every lap; information and statistics on drivers, events, and tracks; and real-time statistics for multiple drivers on the same screen, so you can compare your favorite drive's performance to other drivers on each lap.

The device will transmit data over the 2.5 GHz wireless broadcast spectrum. It will be available on a rental basis for $50 per day or $70 per race at the FanView hauler and at all Track Scan locations during NASCAR NEXTEL Cup Series. Other accessories include battery, charger (available only for weekend rentals), headset, and carry bag. See **www.nextel.com/nextelcup**

Books and Equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC, 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com.

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Attention all those wanting to know what's going on with ham radio in the New Orleans area, check out: **http://groups.yahoo.com/group/GNOAmateurRadio/**

WANTED: Working Radio Shack D.S.SP 40 D Digital Signal Processor. Richard WA0KKC 913-432-5136

Blogs offer an opportunity for columnists to share information that does not make their columns. The news might be too timely for deadline, too short, confined to a small geographical area, too far away to be heard in North America, or even off the columnist's regular "beat." Bookmark these blogs for frequent visits!

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