

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

25th
Anniversary



Monitoring Times

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WRNO: Can This Station Be Saved?

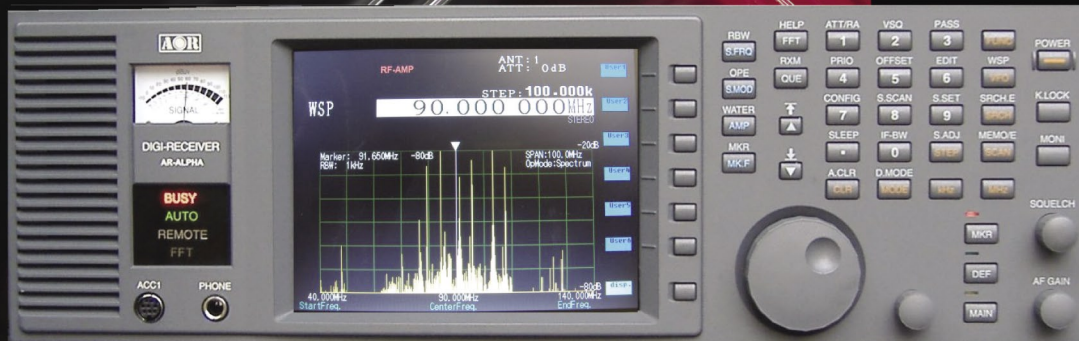


In this issue:

- Are You Prepared for a Natural Disaster?
- An Inside Look at Broadcasting Analysis
- HD Radio Rules and Radios

AR-ALPHA

Communications Receiver



- Multi-mode unit capable of receiving AM (synchronous), ISB, RZ-SSB, USB, LSB, CW, WFM including FM stereo, NFM, APCO-25 digital, and TV in both NTSC and PAL formats
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Lead Story

WRNO: Can This Station Be Saved?

By Dan Brown

Off the air since the late 1990s and sold to the Good News Outreach group in 2001, monitors began to suspect that restoring WRNO was just a pipe dream. But stay tuned: Dr. Mawire's pipe may yet get lit before the end of this year.

WRNO is a station with a colorful past remembered with fondness by many. Attempts to revive the station were impeded by Hurricanes Cindy and Katrina. If the transmitter site can avoid further damage this hurricane season, the old girl may find new life as a religious station broadcasting to the Middle East.

Story starts on page 8.

ON OUR COVER: Dan Brown surveys a broken feedline during his visit to the transmitter site in 2006. Photo by Bob Dunn

C O N T E N T S

Are You Prepared for a Natural Disaster? 13

By John C Harr

The time to prepare for a crisis is before it happens, not when you finally realize it is unavoidable.

What about radios? Power? Antennas? What channels will you monitor to get information? Here are some ideas to get you started planning for the worst while times are still the best.

Putting It All Together 15

By Ernie Franke

To assess the impact of a particular broadcast, one asks two basic questions: "Can they hear us?" and "If they can hear us, do they listen?" But how do you go about getting the answers to those questions?

Ernie Franke, chief engineer of Trans World Radio, thought our readers might find it interesting to see how the combination of engineering and audience research could create a picture of TWR's mediumwave audience in Venezuela. Who is within reach of their Bonaire signal and who actually listens? And how did they figure that out?

Radio Tourist in Guyana 18

By Michael Lijewski

"Any trip I take ends up as a radio expedition," begins the author. His trip to the relatively undeveloped South American country of Guyana provided an excellent, if challenging, opportunity to listen to broadcast, utility, and VHF/UHF traffic from a tropical wilderness.

Reviews

Too rushed to read the review? We'll cut to the chase: "The POLK AUDIO I-SONIC is the most ambitious, most accomplished, best sounding and most expensive of the HD Radio tabletop sets." (Page 66)

Have you thought about putting an HD Radio in your car? Mobile HD radios lag slightly behind home models, but now on the market are the SONY

XT-100HD, KENWOOD KTC-HR100TR, KENWOOD KDC-MP2035, KENWOOD EZ500RB, and DIRECTED "CAR CONNECT" tuner. (Page 68)

Tracking satellites and helping us monitor their radio signals is the function of a program called NOVA FOR WINDOWS, from Northern Lights Software Associates. (Page 72)



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COMMUNICATIONS

DISASTER PREPARATIONS

Amateur Radio

Amateur Radio clubs and Emergency Management Agencies along the coastline of the US, as well as those in areas prone to flooding, wildfires, earthquakes, mudslides, and potential terrorism, have been ramping up their emergency readiness. Of particular concern is how to get information out to the public if phone lines are down and power is out.

Amateur radio nets rehearse on a regular basis, as well as participating in regional emergency exercises. Hams provide eyes and ears in the field and back-up communications for emergency services, including hospitals, which may not have as robust a back-up system as fire and police departments.

If you are a ham, or want to become one, check in with your local club to see what you can do to help.

2007 Atlantic Hurricane Season

At a press conference held at the start of the hurricane season, top officials from NOAA, FEMA, the Air Force, and Homeland Security all communicated the same message:

We are now in an active hurricane cycle,

with 153 million people – 53% of our population – living in coastal areas. A very effective partnership has evolved between emergency management, local government officials, and the media, to prepare for potential emergency response. It's now time for individuals to join in that partnership by taking more responsibility for their own safety.

Said Secretary Michael Chertoff: "It is the preparation of individuals, families and businesses that makes the difference between survival and disaster when a hurricane hits. That means preparing yourself with the necessary tools, preparing yourself with food and water to sustain you for up to 72 hours, having a plan about what you do, and, most important, listening to the guidance of your local officials about when to get out in advance of a storm..."

"So my view is, it's kind of a civic responsibility for everybody who's in the zone of danger to take the steps necessary and to listen to the instructions given so that we can allow our responders to attend to those people who can't help themselves."

Dave Paulison, FEMA administrator, added, "If you're in an evacuation zone, if you're going to ride out a storm, make sure you have your three-day supply of food, water, flashlight, batteries, medicines, taken care of your pets, making sure you have supplies for your children, all of those types of things you're going to have to have to survive for

the three or four days before help can truly arrive."

QuikSCAT

The seven-year-old QuikSCAT satellite, which is beginning to showing signs of failure, measures ocean surface vector winds as an aid to hurricane prediction. It indicates not only wind speed, but also wind direction and gives an estimate of the size of the tropical storm or hurricane winds. Until a new satellite can be designed, built, and launched (a minimum of 5 years), NOAA has been planning to use the conical microwave imaging scanner to provide the vector windfield data – about a 16% loss in accuracy.

The greater uncertainty in hurricane path prediction could result in larger-scale (and more expensive) evacuations.

Emergency Broadcasting

All communities struggle with the best way to disseminate emergency information, but one solution does not fit all situations. In Maine, broadcasters have emulated the 2005 model of United Radio Broadcasters of New Orleans – an ad hoc group which formed in response to Hurricane Katrina. Clear Channel Radio, Cumulus Broadcasting and Maine Public Broadcasting have formed the United Radio Broadcasters of Eastern Maine (URBEM).

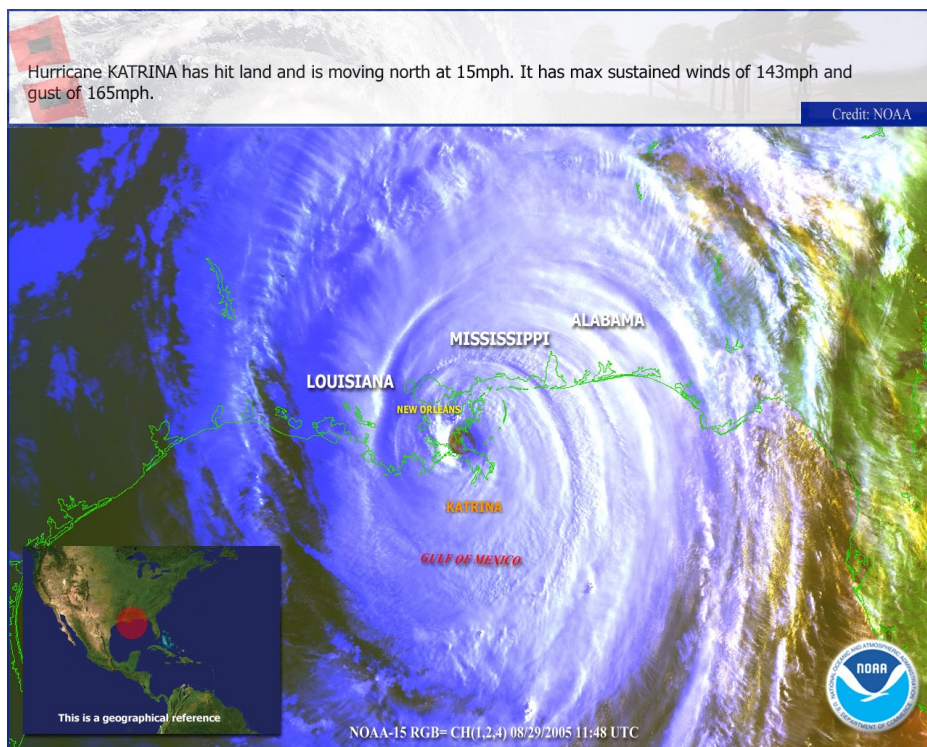
The Maine Emergency Management Agency has told URBEM members that as they plan for emergencies, they should assume that no public information would be forthcoming from the government within the first 72 hours after a disaster. Maine Public Broadcasting is the Emergency Alert System (EAS) entry point (initiated by the governor or emergency officials) for the Bangor region, but other emergency-related programming can be aired from any of the participating stations.

The Maine Broadcasters Foundation has also given the go-ahead for a \$7,800 grant to be spent on a satellite phone and two-way communications gear for coordinating communications and sharing information among the cooperative broadcasters.

The city of Napa, California, started its own radio station: Radio Napa is a low-power AM station that will have the latest information when a disaster, such as flooding or earthquake, strikes. At 10 watts, the station should reach anyone living within four miles of City Hall.

In non-emergency times, the station would play disaster preparedness tapes or possibly community service announcements.

Previously, the city has relied on a com-



mercial AM radio station to broadcast disaster news, but there have been frequent glitches. The City Hall station will have its own emergency power and will be outside flood zones. "We have to be self-reliant," said Graham Wadsworth, a city engineer. In a major earthquake, Napa could be cut off from Bay Area radio and TV stations for days, he said. Some coastal cities in Florida have similar stations for providing information along evacuation routes.

This month's editorial report on page 7 investigates some incidents that highlight one of the weaknesses of the radio alert system: who initiates the alert and do they know how to use this effective public information tool?

FCC Strengthens EAS

The FCC has adopted an order that will strengthen the Emergency Alert System (EAS). The Commission plans to promote developing "fully digital Next Generation technologies and delivery systems" to better serve the American public.

The FCC order requires EAS participants to accept messages using Common Alerting Protocol (CAP), the groundwork for the next generation EAS delivery systems, no later than 180 days after FEMA announces its adoption of standards. The use of CAP is expected to ensure efficient and rapid transmission of EAS alerts via text, audio and video through broadcast, cable, satellite and other networks.

The EAS enhancements also will assist in access for the disabled and non-English

speaking people. The FCC order also requires EAS participants to transmit state and local alerts originated by their governors.

FCC Petitioned to Allow Jamming

Jamming equipment maker CellAntenna has filed a petition with the Federal Communications Commission to allow first responders the right to obtain and use radio frequency jamming equipment. The use of such technology by any state and local government and their law enforcement agencies is currently prohibited by FCC regulations – even when used to prevent remote-controlled improvised explosive devices from being detonated by a cell phone signal.

The 11th Circuit Court of Appeals ruled that such a challenge needed to have been made within the first six months after the regulations went into effect. We presume they mean more recent regulations than the 1934 Communications Act, which states that only the federal government has the right to interfere with radio frequency communication.

HOBBY NEWS

FMedia! Takes Sabbatical

Owner/Editor Bruce Elving announced he is discontinuing the *FMedia!* newsletter until January 2008 at the earliest. *FMedia!* was inaugurated in 1987, and Elving has been writing on FM topics since the early 1970s.

Computer problems connected to upgrading to Windows XP and time constraints led Elving to take the sabbatical and to start looking for a computer-savvy FM hobbyist to take over the reins. Elving invites anyone interested in publishing *FMedia!* to contact him at FmAtlas@aol.com or at PO Box 336, Esko MN 55733-0336.

Hurricane Special Event Station

On September 15, tune in to the second annual special event station, K5R, commemorating the anniversaries of Hurricanes Katrina and Rita. The station is sponsored by the Southeast Louisiana Amateur Radio Club (SELARC) of Hammond, LA. Hours of operation are 1400-2000 UTC on 14.250 and 7.250MHz, +/- QRM. Certificate available by S.A.S.E. SELARC (K5R) P.O. Box 1324 Hammond, LA 70404. <http://groups.yahoo.com/group/K5R>

Madison-Milwaukee DX GTG

The 14th annual Madison-Milwaukee Get-together for DXers and Radio Enthusiasts will take place on Saturday, August 18 beginning at 1 PM CDT at the home of Bill and Nina Dvorak in Madison WI. This is an all-band event. For more information, please e-mail Bill at dxeak@aol.com, write (3358 Ridgeway Avenue Madison WI 53704-4327) or phone 608-244-5497. We hope to see you in Madison on August 18!

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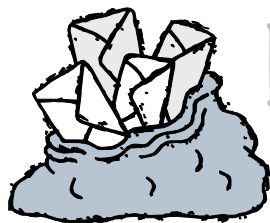
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LETTERS TO THE EDITOR

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

The World According to Emmitt KE5KZC

Editor Rachel Baughn recently carried on a running email conversation with Emmitt Jackson of Sinton, Texas. What follows are excerpts from some of Emmitt's observations of the radio world in his neck of the woods and elsewhere.

Scanning Corpus Christi

As a new transplant to this fair city, I was delighted to see the Jan issue with the article, *Scanning Corpus Christi*. When I moved here last June I was excited knowing there was a host of new stuff to hear on my scanners. Much to my dismay at not finding a *Police Call # 7* on the store shelves, I was further dismayed at finding almost all of the comms down here are on 800 MHz trunking networks, then add the fact that all EMS, fire depts, are bunched in with the police agencies.

I live in San Patricio County, city of Sinton, and though owning two triple trunking scanners, I could not hear the digital radios of my town and county, which is EDACS. So I went to Radio Shack and got one of their new multi channel table top scanners that was on sale. Lo and behold, I still could not hear them here as they are encoded, though I was able to track them! The comms are ProVoice and encrypted, so that is out.

All I can hear is the Sinton fire dept dispatch on 154.145, with tap outs; no police, no EMS or fire to hear, though here and there the fire channel will offer open transmissions on the old VHF. I went to the Sinton fire dept and noticed that the desk held two radios, one marked 'VHF old system' the other, 'new 800 system.' Also the DPS down here also use a trunked ProVoice 800 MHz, though here and there they also offer open chatter on the VHF dispatch channel.

I think they keep the old radios as the weather creates havoc here and the 800 systems seem to fail a lot.

The Ingleside base is cited for closure next year and they are shutting down the base and going to turn it over for public use, so very little coming out of there nowadays. Aransas County is pretty much gone on the VHF channels also. The city of Rockport still is current, but after radioing out they use the 800 channels for DMV checks and such and I've never been able to locate them. My freq counter keeps showing freqs in the restricted bands of my scanners, where the cellular bands are at each time they key their radios. Not sure what's going on there, only know they keep changing when the radio's keyed, far too much to be images.

Dysfunctional Gulfside Scanning

I am glad I am going back to Oregon soon. Scanners here you can't give away, Radio Shack

sells none; I had to order mine on line. They don't offer freq lists like back home; it's not good hobby land here. I think there will be a day soon, that the weather will beat this land to death. As the crow flies, I am about 4 miles from the Gulf. It will be sad for those who live here, the cops won't work with the hams, no one can hear their radios, but perhaps their radios will crash and they will have to go back to the old ones - they still keep them. Talk about faith, huh?

I can't understand how we Americans seem to stand by and let these fools make new laws and govern our lives, telling us what we can listen to, what we can/cannot do with our radios. As taxpayers it's our right to know how our money gets spent. I wonder how much cash gets spent on radio systems that won't work, can't talk to each other, this mode won't tie in with that mode, all the different trunking systems, and in the end, at a time of tragedy, none of it works right and they have to resort to the old ways of tried and true? What was the point? (*That's exactly what we tracked in last month's MT - ed*)

They have so any agencies and so few repeaters down here: digital won't talk with analog. It's not "if," it's "when" it all falls apart - I, for one, think this year will be a major killer. We had no real storms last year. Texas was spared, so the housing was just built up along the water fronts, huge plate glass windows; now there they're not even putting shutters on any more. ...A huge storm surge can take out Corpus, Ingleside, Portland, Rockport, Aransas Pass, and of course Port Aransas. Then massive flooding can ruin Sinton, Taft, Gregory, and many other smaller towns for many miles inland. I wonder what the law enforcement agencies will do then.

You know I've found that even towns using UHF and counties using VHF up north seem to have interop issues. Imagine Bee, Rufuro, Jim Wells and the other counties here that are poor and can't afford 800 MHz triple tracking, more power (sorry, Tim Allen), or trunk tracking networks. I am glad I won't be here then, but I've many friends and people I care about here. It's tragic; because of stupid minds and greed, many can die over their dumb mistakes.

Meaningless Service Bands

I find it amazing how the world we know has changed. I still have five old xtal Regency scanners and one old Rat Shack analog tuner for high band. When I compare those to my BC 780, and other multifunction/multichannel scanners I have sitting here, I can only shake my head. Here they offer me nothing other than air comms and the marine band, and I do that one with a marine radio, with a bit of railroad added.

Surprisingly I've not heard anything on MURS, nor on the dot and star freqs. FRS is

busy and a bit on GMRS. I was talking to a shut-in friend, who I helped get his ham ticket. He was saying that he and his wife own two pairs of FRS/GMRS radios in their run and grab bags, but he found it tough to justify \$50 for a GMRS license for the cheap walkie talkies from Wal-mart.

It got me to thinking that, yeah, those are on every corner, yet, the marine band has 88 ch radios with 25 watt transmitters and they sell them every place here. These are restricted freqs, but you don't need a ticket for those, only for the HF marine bands. ...In Newport, Oregon, a big fishing fleet town, they didn't sell marine radios any place except Englands Marine; go figure.

There is a lot of traffic on marine radios here, other than marine. There's a huge amount of farming here; Mexicans seem to use them as CBs along with, sigh, ham radios. They tend not to go on the repeaters, but use simplex.

147.08 is our Sky Warn; it's here in Sinton and a very good relay, but of late I am hearing much traffic on the backside on simplex, as I do most freqs down in 144 and lots up in the 148 areas. Surprisingly CB is pretty dead here, though Mexico booms in most of the time. We have a net on LSB36; the truckers use 19 and dirt haulers use ch 3, but for most part it's dead.

- Emmitt ke5kzc

More on HD Radios

Gary Kinsman wrote to ask for some additional or missing information in the HD Radio reviews from the June issue of *MT*. Author Ken Reitz replied as follows:

Hi Gary -

Thanks for your questions. The presets on the Acurrian were inadvertently left off (there are 24 presets: 12/AM 12/FM). Inputs, tone controls, antenna connections, performance are all given in the reviews.

There are many HD Radio table-top sets and we're trying to review as many as we can, but space is at a premium. The importance of HD sets is, "How do they sound?" That's the whole point of HD Radio.

At \$200 to \$600 it's doubtful that many *MT* readers will buy more than one HD Radio, so I'm trying to give readers a sense of how the radios sound and whether or not the "features" work as well as they're intended before they buy. The design of the HD Radio is that the unit will automatically switch back to analog when the digital signal drops out. That's considered a "good" feature and can't be overridden. As we present more radios you'll have more of a comparison. Thanks again for writing.

- Ken

You can see more of Ken Reitz's HD radio reviews in the July and August issues - ed.

Evaluating the Emergency Alert System

A Guest Editorial by Myles Mustoe

The failure of available communications systems to notify an entire community of an impending disaster has been much on the public mind since Hurricane Katrina. Could the activation of the Emergency Alert System (EAS) have been of value? Is the system “broken”?

I did some investigating into the importance commercial radio plays in public warning, in particular, the role of radio in responding to the derailment of a Canadian Pacific train carrying anhydrous ammonia near Minot, North Dakota, in January 2002. In that case, a glaring misconception emerged regarding the operation of the Emergency Alert System (EAS).

A nearly universal preconception exists today that the “failure of the EAS” during the Minot event was due primarily to the consequences of deregulation and corporate radio. My research on the Minot event and two additional derailments conclude that problems with the activation of the EAS had nothing to do with deregulation and everything to do with the relationship that exists between private radio stations and public emergency management organizations, and some confusion as to the purpose of the Emergency Alert System.

An Unfunded Federal Program

The intended use of the EAS has always been as a “national network” for the dissemination of a presidential announcement during a “national emergency.” But this use has never been realized. Even during 9/11 (identified as an event having no threat to the entire country) the system was not activated. Most disasters are local or regional in nature. Since the advent of the Emergency Broadcast System (EBS) and now the EAS, the only use these systems have ever seen has been for emergencies at the local/regional level.

Every radio station must maintain an EAS decoder. An unfunded FCC mandate sees to that. However, the station’s only legal obligation is to broadcast EAS test messages and that elusive, nationally derived presidential announcement. Thus, EAS activations that send out an Amber Alert or a severe weather announcement are all optional and voluntary. During 9/11, local and network news coverage of the event was deemed adequate by the Chairman of the FCC to “...supplant those original conceptions of a senior leader’s need to talk to the people.”

People Fail, Not the System

Time is money in radio and carrying EAS announcements eats up time. But, it’s not necessarily the cost of an EAS box or the time it takes from programming that produces prob-

lems with the EAS. Most stations are happy to carry the EAS, as well as local emergency programming. But privately owned radio stations act only as conduits for emergency information, they do not generate it. The information must originate with public emergency management officials. What happened with the EAS (and emergency messaging in general) in Minot, ND, is an example of how both these private and public entities must work together to make the technology work.

Clearly, poor interpersonal communications existed between KCJB radio (Clear Channel Broadcasting, CCB) and local emergency managers in Minot. But, it was also apparent that emergency personnel were unfamiliar with EAS activation procedures. For example, 911 phone dispatchers informed callers to listen to the “EBS” system on their radios. (The EBS system was superseded by the EAS system in 1997.) More telling, however, is the fact that KCJB’s digital EAS system could have been activated that morning by emergency managers themselves through the National Warning System (NAWAS), a dedicated phone line that existed with Minot emergency managers.

Other derailments point to similar problems. At the derailment of tank cars in Macdonia, Texas, in June 2004, a plume of chlorine gas spread all the way to Sea World in San Antonio. Three people died in that event and 50 people around the San Antonio area were hospitalized. A civil emergency message (CEM) was never issued by emergency managers, nor was the EAS activated. Essential emergency programming during the event came from the news departments of local San Antonio corporate radio stations (WOAI, CCB, and KKYK Cox Radio Inc.). Their knowledge of the event came by monitoring scanner traffic!

In line with the Minot model, a similar incident occurred in January of 2005 with the derailment of chlorine tank cars at Graniteville, South Carolina. This event killed nine people, injured five hundred, and caused 5400 people to evacuate. Although an EAS activation *did* take place, it was still two hours after the event occurred. (A problem was found with the routing of the activation signal to primary local radio stations.) However, even without an EAS activation, within minutes of the initial local reports of the accident, corporate radio stations (WBBQ, WZNY, CCB) carried live news and emergency information about the event. National Weather Service radio provided a public alert in adjacent markets, but it could not act as a news outlet.

The intent here is not to vindicate the practices of corporate radio, but rather to re-

direct the perception that somehow corporate radio is inherently doomed when it comes to serving a local audience during times of crisis. The problem is much bigger than this. Studies have shown that the effective delivery of the EAS is complicated by a compendium of problems: convoluted state emergency management plans, complicated audio networks and poor links, bad reception from primary stations, stations not linked to the system, stress on unpaid volunteers involved in emergency communications committees, untrained personnel, poor communications between public officials and station managers, and a lack of government support.

Some public preparedness organizations are calling for the integration of the EAS into a variety of media: cell phones, televisions, the internet, etc. No doubt this will come, but following Katrina, phones, the internet and e-mail were all down in New Orleans. For that matter, major radio stations in the hardest hit areas of Katrina were off the air. But in the post-initial stage of the disaster, in Houma, LA, just outside New Orleans, KJIN part of the Guaranty Broadcasting group, simulcast live emergency programming (not just an EAS) through their cluster, around the clock to anyone with a battery operated radio.

The EAS needs critical evaluation from the bottom (local level) up. Many of its problems originate in the human interface that exists between EAS suppliers and consumers. In addition, taking the threat of human and natural disasters seriously in any size market is an integral step in honing this system.

In an interview I had with Lieutenant Fred Debowey of the Minot PD, he said, “Training is essential for dispatchers and people on the radio side. Radio stations need to get to know their local emergency management people and it is critical that the emergency management people get familiar with their media outlets.”

Commercial radio stations are ubiquitous and effective messengers. Radio receivers are inexpensive and simple to operate. But unless we raise the value we place on informing the public and seriously consider the messenger’s needs, we will lose a vitally important link in emergency communications to the public.

Editor’s Note: Miles Mustoe’s complete study can be found at: www.eou.edu/~mmustoe/easpapera.html

A Government Accountability Office report on the state of the ES system was released in March 2007. You can read the report highlights on the Monitoring Times reader’s website at www.monitoringtimes.com/mtsubscriber.



WRNO Worldwide Shortwave Radio

Can this station be saved?

By Dan Brown

WRNO, the ground-breaking shortwave station from New Orleans, has been off the air for about ten years, though it came under new ownership in 2001. More than year ago, it was announced that WRNO would begin broadcasting soon. When the signal still did not return, many in the radio hobby anticipated an admission of defeat. But don't give up on WRNO yet!

Now owned by the Good News World Outreach group based in Fort Worth, Texas, WRNO Worldwide Shortwave Radio is key to Chairman of the Board Dr. Robert Mawire's vision to promote global evangelism via shortwave. Whenever it does come on the air, WRNO will transmit on 15420 kHz during the daytime and 7355 or 7395 kHz in the evenings. Their main target audiences are the Arabic-speaking populations worldwide, including the Middle East and Europe.

The background behind this difficult road to reviving WRNO's signal makes an interesting story.

My interest

My interest in WRNO Worldwide began when I was a young shortwave listener living in New Orleans, where I paid close attention to the creation in the early 1980s of the first commercial US shortwave station, WRNO Worldwide, which beamed to a domestic audience. I found the idea of a local shortwave station exciting.

I moved to Boston in 1987 (I even remember listening to the station while traveling on the New Jersey Turnpike when I was moving) and then did not hear the station on the air for many years.

My current interest was rekindled while on vacation in New Orleans in July of 2006. I had not heard WRNO on the air for some years and wondered if the transmitter site was still in use. I tuned a portable shortwave radio across the bands and did not hear any local signal.

One day a ham radio friend Bob K5IQ drove me to the WRNO transmitter site on the west bank area of New Orleans, where we discovered some damage to the transmitter

building from hurricane winds. No one was home, and the feed line to the antenna was laying on the ground. I knew they could not be on the air.

Once I got back to Boston, I looked on the Internet for any new information on WRNO Worldwide. There I discovered the Good News World Outreach group's web site and found out the new ownership was based in Fort Worth, Texas.

I also discovered a news story that aired July 16th, 2006, by Tiani Jones of KTVT-TV (CBS-11) in Fort Worth, stating WRNO was "currently broadcasting a message of peace to the Middle East." Having viewed the transmitter site and antenna, I knew they could not be on the air! Ironically, a week later, WRNO Worldwide's web site was updated with new information for the first time in several years.

So, I called the owner Dr. Mawire and he

confirmed they were not on the air, but said they had plans of going on the air very soon. He gave me the contact information for the two engineers involved with the project, who gave me more of the new and the old WRNO Worldwide story. First, the old...

WRNO's early development

Because I grew up in New Orleans and had been interested in broadcasting from an early age, I was familiar with the fact that Joseph Costello had started a small group of FM radio stations in southeast Louisiana, beginning with WRNO-FM (which originally stood for "Westbank Radio New Orleans") in 1967. Their on air slogan was "We are the Rock of New Orleans."

This FM station was popular with the local crowd (including me), and Joe soon purchased other stations in the area, including KXOR-



Bob Dunn K5IQ surveys the state of WRNO's transmitter site in 2006.



Contrary to the story by KTVT-TV, this station was definitely not on the air in July 2006!

FM in Thibodaux, LA. With the acquisition of other FM stations, Gulf South Broadcasters was formed. In speaking with a past engineer of the FM station, I learned that Mr. Costello, who had become a millionaire and was also a ham radio operator, wanted a privately owned, domestic rock and roll shortwave outlet and had the money to start the venture. However, the FCC only allowed US based broadcasters to beam outside the country at that time.

In the late 1970s Joe Costello fought the FCC and won a precedent-setting decision that gave him the right to obtain a license to be the first domestic commercial shortwave station with a US market. Once the FCC gave him a license, Joe started building his shortwave

station. This change in the FCC licensing rules opened up the gate for stations such as KUSW, WWCR, WBCQ, and many others to later be created and to broadcast commercially from and for the US. Previously, all domestic shortwave stations (such as the VOA, WYFR, WINB and others) were non-commercial and had their target audiences in other countries.

Joe Costello wanted a North American audience and he expected to make a lot of money playing rock music and selling such things as Coca-Cola and fast food. He could now do so.

Learning of the construction permit in the early 1980s, I waited for a “big-time shortwave station” to go on the air in my town. Well,

WRNO finally went on the air in 1982 and beamed its signal to the north and northeast. Their main audience was the United States and Canada, but the fact that WRNO reached other countries was an added benefit. Initially their programming consisted of then-current album rock music, local jazz music shows, the New Orleans Saints, and Louisiana State University football games. WRNO also had a studio in the 1984 New Orleans World’s Fair that fed Joe’s FM and shortwave stations.

However, listening to WRNO’s music on shortwave was often a disappointing and painful experience to the ears with the limited audio bandwidth, distortion, interference and selective fading of shortwave.

Later, as money did not quite “roll in” as he had expected, Joe ran out of the funds to pay for independent programming to be created for the shortwave outlet. He then simulcasted his local WRNO-FM station on shortwave, allowing distant listeners to hear local DJ talent and cheesy commercials for bars and concerts that someone far away could not take advantage of. Eventually, Joe sold air time to religious broadcasters and pretty much anyone willing to pay for the air time. Any real format was gone.

As Joe was extremely cheap with his money, maintenance of the Harris 100kW transmitter was avoided, and the transmitter, which initially did a great job and was power efficient, eventually became no longer usable because of its rundown condition.

Joe then purchased a 50kW transmitter from a manufacturer that had never made a dual band shortwave transmitter until Joe placed the first and only order. The manufacturing company, CCA, had a very difficult time in delivering a fully working transmitter, and the manufacturer’s engineers were still trying to get the bugs out after it was delivered.

Because of increased competition on FM radio, as well as the losses incurred in running the shortwave station, Mr. Costello eventually had to sell WRNO-FM, his flagship station in the Gulf South Broadcasters group. In 1994, WRNO-FM was sold to EZ communications and has changed hands many times since then. The FM station is now a talk station owned by



I learned a lot from the engineers I interviewed, Larry Thom and Chris Baum. The new owners have installed a new Elcor 50kW plate modulated transmitter which was built in Costa Rica. They will be using the existing TCI Log Periodic Antenna, which provides about 9dB gain to the north and northeast and which hopefully will reach Europe and the Middle East.



Feeding the transmitter will be a T1 phone line (or a satellite link) providing audio delivery from their studio in Fort Worth. The audio will be processed by the existing Orban Optimod HF audio processor at the transmitter, one of the few items still working from the original days.



The new studio in Texas is equipped with an Audioarts console and Scott Systems automation.

As hurricane Cindy took down the feed line last year, some antenna feed line parts were made by TCI and installed by Larry



Thom. Recently, a new transmitter ventilation system was installed and a fence surrounding the property is planned for RF safety.

Being cheap...

Larry Thom has been working as a transmitter engineer for WRNO for about 15 years, and has been through all three transmitters at the site. The original Harris SW-100 transmitter died due to little preventive maintenance; Joe Costello would not spend the money to keep the transmitter in tip-top shape. According to Larry, if half the money it took to buy the new CCA transmitter had been spent on the old Harris transmitter, the Harris would have given much more life.

To save money, Joe also had the trans-

mitter operator distill their own transmitter cooling water, and often did not run the full 100kW that the license required. Joe also did not own or believe in a test dummy load. This led to difficulty in testing the main transmitter while the backup was on.

When Larry was first asked to work on the Harris transmitter, it was only making 6kW out of the normal 100kW. Larry and fellow engineer Danny Miller worked for days on it, got it to a power level of 60kW, then later to the full 100kW. According to Larry, the transmitter was not dependable, since the cooling system not being kept clean. The dirt in the cooling system caused arcing of the 30 kilovolt power supply, causing premature wear in the Teflon hoses in the Harris transmitter. Instead of buying new hoses, Larry was forced to cut back and re-use the old hoses.

Harris also had determined there were design and headroom issues with the original set of 4CV50,000 tubes. Harris offered an upgrade kit using the 4CV100,000 tube, but Joe was reluctant to spend the money to upgrade the transmitter to handle these new tubes. So, as the Harris was not reliable, a new transmitter was needed.

Larry wanted a replacement Continental transmitter, but never got it. Again, Joe saves money.....

We never made a big shortwave transmitter before!

According to Larry, CCA gave Joe \$150,000 for the old Harris and sold him a transmitter before it was built. CCA's experience was more in AM and FM transmitters, but they had built 10kW shortwave transmitters in the past for WWV. They had not built a dual band 50kW shortwave transmitter before, and came up with a design that had 7 MHz and 15 MHz RF cabinets, a common power supply, and a common modulator.

This transmitter, which was really serial number 1, was finished on site. They had much difficulty in getting it to work properly at full power. A major mistake in the process was that the new CCA was delivered as a 50 ohm output transmitter, but WRNO needed a 75 ohm output, as they already had a Kintronics 75 ohm fixed frequency balun to convert the signal to the 300 ohm open wire line that the TCI antenna used. So, CCA modified the completed transmitter on site to match the balun, and also modified the balun for variable frequency operation – a very difficult assignment.

Smoke on the Bayou

One day the FCC called and complained to the WRNO receptionist about their signal interfering with other stations. The transmitter was operating abnormally. Soon the transmitter operator called Larry and said smoke was coming out of the CCA transmitter. The operator turned the main



breaker off, but smoke still came out.

When Larry drove out to the site, he discovered the transmitter power supply and control cabinet were totally smoked and wiring harnesses had vaporized. There was soot on most parts of the transmitter. The important control cabinet was a total loss. The modulator high voltage wires had burned up and the RF cabinets had soot damage.

Naturally, with that much damage, even if it was repaired, the integrity would be questionable. So the new owners elected to purchase an Elcor transmitter. As the old balun also did not really work well, Larry bought a TCI 150kW balun for the new Elcor.

Backing up

In the Joe Costello days, the backup transmitters were ham radio style Johnson Viking 2's and Valiant transmitters (a whopping 120 watts!) originally made for ham radio service in the 1950s, as well as a military surplus T368 transmitter (even better at 400 watts!).

Today, Larry has a backup ham style radio – a Globe King 500D Sn#1 which can make 300 watts. After buying the Globe King, of which only a few were made, he had to modify it extensively just to get it to work. They had previously tried Henry RF power amplifiers without full success.

Clear Channel, but seems to have little local appeal today.

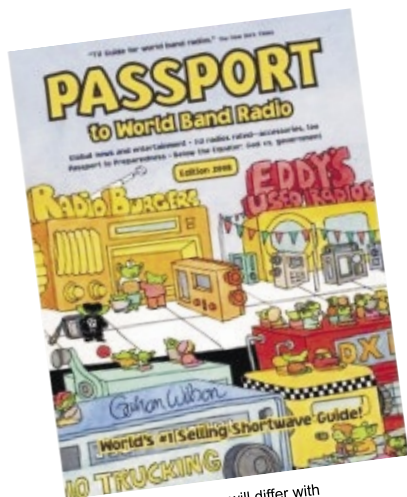
In April of 1997, Mr. Costello died at age 56 of complications from diabetes. His death led to family lawsuits over his estate which included the shortwave outlet. His family was not in the will! Joe had stipulated his entire estate be given to Loyola University in New Orleans, where he had attended college (he also attended Harvard Business School). All of Joe's stations went up for auction and the proceeds were given to Loyola.

While WRNO Worldwide was up for sale, it eventually left the air when the CCA transmitter burned up (see the technical sidebar story). Because of this major failure, the price of the station was drastically reduced. In 2001 the Good News World Outreach group purchased WRNO Worldwide for one half of the asking price.

The new owners now intend to use the facility to broadcast religious programming. This is totally the opposite of what original founder Joe Costello had planned for!



Dr. Mawire seated in the new studio in Fort Worth, Texas. Photo courtesy Janet Mawire.



Cover will differ with new edition

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The Good News (and the bad)

From the web site (www.wrnworldwide.org) WRNO's new mission is:

"To take the Whole Gospel to the Whole World in This Generation. As an international short wave radio station, WRNO Worldwide is transforming the world through the airwaves as it launches its worldwide mission. This vital mission is to reach 4 billion listeners, through 1.6 billion short wave radios, located all over the world with the gospel of Jesus Christ. With frequencies located at the 'top of the dial,' WRNO Worldwide is positioned to transmit the full spectrum of Christian educational materials 24 hours a day, 7 days a week in multiple languages, especially to countries with restricted access to the gospel."

The Good News Outreach group's purchase of the station included: the license to broadcast commercially on three frequencies, a transmitter site with a dead transmitter, and a good TCI log periodic antenna. Dr. Mawire (pronounced *mah-wir-ray*, not *may-wire*) immediately began raising money for a new transmitter and had a modern studio with full automation built in Fort Worth, Texas. All this effort took a few years.

The group kept FCC STA's (Special Temporary Authorities) extended while money was being raised and a new transmitter purchased and installed. Because of RF radiation laws and the fact that a new residential neighborhood has grown up immediately to the rear of the transmitter site since it was built, their new license is for the use of 50kW of power instead of the original 100kW power level.

Hurricane delays

In 2005, Dr. Mawire had almost completed the installation of a new 50kW Elcor transmitter, when hurricane Cindy hit in July, bringing down the feed line to the antenna. A month later, hurricane Katrina arrived in August, damaging the transmitter building slightly because of a falling tree. Fortunately, the new Elcor transmitter was not damaged, and the TCI antenna was largely intact. But final transmitter installation and test-

ing would now be delayed for over a year.

Hours and Watt-Hours

In June of 2005, WRNO Worldwide obtained about 3,000 hours of recorded Christian testimonies, Bible teachings, and music recorded in Arabic. Their studio in Fort Worth can operate un-manned for weeks via automation if needed. Most of their air time will be in English, but two to three hours per day will be in Arabic. As needed, they will broker time and broadcast commercial shows.

A new problem emerged when Louisiana electric supplier Entergy Corporation went into bankruptcy due to their losing 60% of their customers after Hurricane Katrina devastated the area; Entergy wants to increase its electricity fees by 25% or more. This may have a major impact on WRNO's transmitter operation, as high power transmitters use a lot of electricity. The Good News Outreach group may not be able to afford to operate their transmitter full time as they had hoped.

On the air yet?

After more than a year since I first contacted them, WRNO is not on the air yet. Speaking recently with Janet Mawire of WRNO Worldwide, I learned that they plan on returning to the airwaves by the end of this year. They initially will broadcast for 8 hours per day split into 4 hours per day on their day frequency and 4 hours on one of their two night frequencies. Their daytime frequency will be 15420 kHz and the night time frequency will be either 7355 kHz or 7395 kHz.

At the beginning of each hour, news updates will be given in English, then programming in English or Arabic will follow. As financial resources grow, they hope to expand to 24 hours operation. In planning for the future, they are studying investing in new technology such as

the internet, podcasting and television. They are always looking for cash donations. They even take Visa and MasterCard on their web site!

The return of WRNO Worldwide is possibly a bright and interesting future for this once ground-breaking, commercial rock and roll station from hurricane-battered New Orleans. Dr. Mawire and the Good News World Outreach group are providing a strong investment into the station and seem to be doing things correctly, albeit slowly. I am hoping for the best and will be tuning my shortwave receiver to hear the new signal from New Orleans once again, even though it's minus the rock and roll music.

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The proximity of a new housing development near the transmitting site limits WRNO's new license to 50kW of power.

Are You Prepared for a Natural Disaster?

By John C Harr

Each summer, as the oceans' waters warm up from the more direct rays of the sun, the Atlantic Hurricane Season begins again. This results in higher risk for the coastal regions of the eastern United States and the Gulf of Mexico for tropical cyclones.

During the summer, parts of the country experience extended periods of drought each year, and the chances of damaging and life-threatening wild fires increase. Other areas experience torrential downpours for days on end, resulting in water levels rising in rivers and creeks which then flood acres of populated areas. The Midwest's "Tornado Alley" experiences outbreaks of tornadoes that are unpredictable and a danger to life and property, especially during the spring and fall.

And disasters are not limited to any particular time of year. Blizzards and ice storms can wreak havoc during winter and earthquakes can occur at any time without warning.

When your hometown is the unfortunate recipient of one of these rages of nature, will you be ready to monitor all the activities, hear all the action, and receive all the information you need to keep your property and loved ones safe? Unfortunately, most of us do not think to prepare for events such as these until the event occurs or is eminent.

A little preparation and planning can

ensure that you will be ready to receive all the information and possibly receive valuable communications during a time of crisis.

Prepare Before the Disaster

There are several key elements that need to be addressed when attempting to prepare for any natural disaster. The first and most important element is a plan. Establish a plan of action that will ensure your personal safety and the safety of your loved ones. No monitoring activity is worth endangering your life or the lives of your family.

So, the first part of your plan should be to make the decision whether to stay in the threatened area or to evacuate to a safe location as early as possible after notification of the disaster. Your plan should then include a list of items to be taken care of in the event you decide it is safe to remain. Some of these items can be accomplished at any time before the need arises, and some must be done immediately before the disaster occurs, if you are lucky enough to have prior warning.

All the equipment in your collection of scanners, CB radios, amateur radio equipment, and other communications devices depend on one thing – electrical power. Therefore, if you plan to do any monitoring or communicating you must have a dependable source of backup power.

Almost all disasters impose the very real risk of losing commercial power, perhaps for an extended period of time. The best solution to this is a generator and a supply of emergency fuel. This may be a small, portable unit or a permanently installed, auto-start model that powers your entire house. However, not all of us can afford such a luxury. It is not practical for apartment or condominium dwellers to have a generator and a place to store it convenient to their home.

So what alternatives are there? There are several rather inexpensive solutions to the emergency power problem.

An Uninterruptible Power Supply (UPS), such as is used to back up computers, can provide power in two important forms. First, the 120 volts AC output can power a scanner or other small radio using a "wall wart" type power supply for hours using a larger capacity UPS.

Second, many of these supplies are powered by 12 volt DC batteries. Even with a small degree of electrical expertise, you can modify the UPS to provide direct access to the 12 volt DC output from the batteries and attach the appropriate connector to power your radio. You can sometimes purchase used or inoperative UPS units at yard sales, flea markets, or thrift stores and replace the batteries to restore their functionality for a fraction of the cost of a new unit.

Another more recent technology can be used to power small radios and scanners. You can purchase a solar panel that is capable of providing 12-14 volts DC and use it to charge a small lead acid battery. The battery could be a motorcycle battery or a sealed lead acid type as is used in emergency lights and UPS units. As long as there is sunlight, this source of energy is renewable for as long as the commercial power is out.

Another source is the use of one of the small weather radios that is powered by a hand-crank charger and a rechargeable battery. Many of these have cell phone charging jacks that may provide enough power to keep your scanner operating in a pinch. Even if you don't use a radio like this for power, it is a practical piece of emergency equipment any home should have.

If none of the previous solutions is possible for you, there are rechargeable batteries that you can keep charged on a rotating basis for use during an emergency. The newer rechargeable Nickel Metal Hydride (NiMH) batteries, available in up to 3000 mAh ratings, could provide power to your radio for up to 12 hours or more. You may want to keep as many as a dozen or more of these batteries on hand, along with a large charger that can charge several batteries at the same time.

Your Radio Inventory

What communication devices do you need to keep up with the action when it occurs? This varies depending upon the type of communications you wish to monitor and the type of communications used in your area. Generally, the same radios you use every day



Solar panels connected to charge a 12 volt battery can be used to provide power to radios in an emergency



A UPS unit may be modified to provide 12 VDC from the batteries to power your radio in a power outage

to monitor your local first responders are the radios you will need during a disaster. However, in many cases, responders from other areas may be called in to assist. The federal or state Emergency Management Agency may send in personnel to assist in recovery efforts. Other counties or states may send volunteer responders to aid the local force.

Attempt to contact your local emergency management organization and determine where assistance will be coming from in time of a disaster. Be sure to find out what communications equipment would be in use if and when that happens. This may result in your having to obtain additional radios to monitor bands or modes of transmission such as trunked or digital systems that are not normally used in your area.

Set up a list of agencies you want to monitor and the frequencies and modes of transmission for each. Using your computer is good way to set this up, but be sure to print out a hard copy. The computer may not be available during an emergency due to power outages. If you can, preprogram your radios with the frequencies in a logical arrangement and become familiar with how to activate each bank or system. You may find a need to use more than one radio so you can monitor multiple agencies simultaneously.

Last but not least, your radios are not of much use without an antenna. If you live in an urban environment, the “rubber duck” or small telescoping antenna that came with your radio may be sufficient to bring in all the signal you need. However, some of us have at least one external antenna mounted on the roof, a mast, or somewhere in an elevated location to bring in more of the signals in our area. During disasters such as tropical storms, hurricanes, ice storms, and blizzards, external antennas can succumb to the elements and wind up on the ground, in the neighbor’s yard, or just missing.

Therefore, if you have warning, be sure to lower or remove the antenna before the storm hits. You can restore it to its normal configura-

tion after the storm has passed. In addition, it is a good idea to locate an antenna in the attic or some other location protected from the elements. It may not be as good as the outdoor antenna, but it could survive the disaster and provide the reception you need.

During the Disaster

During the actual storm, quake, flood, or other disaster, safety is the first consideration. If you were afforded no opportunity to flee or you chose to remain in the disaster zone, seek the safety of a suitable shelter. Be it a basement, inner room on the first floor of the house, or storm shelter, this is the place you want to be until the immediate danger has passed.

Lack of monitoring at this time will not result in your missing much, because the responders are doing the same thing you are – seeking shelter. Only after the storm or other threat has passed will the radio come alive with the activities that you are interested in monitoring. So, your plan should have provisions for where to spend this critical time, and how to determine when it is safe to leave and return to a less protected location to monitor the radio.

After the Threat Has Passed

The real action begins after the immediate threat subsides. Law enforcement, fire crews, emergency medical services, damage assessment teams, utility workers, search and rescue teams, and many more responders will be performing their duties. And all will be using their radio resources to report damage, dangerous areas or situations, and injuries, as well as to request additional resources to assist in the recovery operations.

Patience is required to get the full picture of what is going on during this time. It may help you to keep a log or journal of what you hear and when you hear it. By writing the events down, you can check back to see if pieces of information can be placed together to get a better picture of what was happening. This also will produce a keepsake of your experiences and could be used to improve your monitoring techniques for use during future emergencies.

There will likely be confusion, and many communications systems may have been damaged in the disaster. Be sure to check for alternative radio resources that may be used, such as Family Radio Service (FRS) channels, General Mobile Radio Service (GMRS) frequencies, CB channels and any amateur

radio frequencies in regular use in your area. Power company frequencies, highway maintenance channels, parks and recreation frequencies, and city and county government channels, which are normally considered boring and are routinely ignored, may be the most interesting to monitor during this time. Even the animal control frequency may be extraordinarily busy!

Civilian and military air frequencies may be in use by aircraft being flown to survey damages and report stranded survivors. If you live near the coast, the Coast Guard and any of the marine channels may be active with information on beached, damaged and missing vessels. Be sure to have those frequencies or talk groups programmed in your radio.

Unless you are a trained first responder, as tempting as it might seem, avoid traveling to the scene of any of the operations. You will most likely just be in the way and may hinder rescue or recovery operations. Stay where you are and put the pieces together as you hear them.

Hope for the Best, but Prepare for the Worst

Certainly no one wishes a natural disaster on their hometown. But to be prepared in the event one does indeed occur, requires preparation well ahead of time. With a little thought and some careful planning, you can be ready for disaster if and when it strikes. Undertake the task seriously, and you will be rewarded with the satisfaction of knowing you are well prepared to monitor the action when it occurs.



External antennas such as this one must be taken down to survive a storm threat.

Putting It All Together Engineering and Audience Research

By Ernie Franke, Chief Engineer
Trans World Radio

In order to assess the impact of a particular broadcast, a radio station asks two basic questions: "Can they hear us?" and "If they can hear us, do they listen?"

Let's sharpen our monitoring skills as we apply these questions to the mediumwave broadcasts from Trans World Radio (located on the tiny Dutch Caribbean island of Bonaire) to Venezuela, 50 miles to its south.

We must gauge the strength of our signal and the size of our listening audience. It's not enough to provide a listenable signal, but we also need to determine if the delivery media is still viable and the message remains on-target. The first task is concerned with signal level and possible interference, while the second task is more closely related to the quality of the programming and the use of AM mode.

By graphically overlaying studies of signal-strength coverage, population density, and listener-response, one discovers answers to these questions and also gains insight into clever ways of improving coverage. The "proof of the pudding" is in the agreement of our predictions with measurements, and of our effectiveness with affirmations, as we tackle real-world, information-gathering, problem-solving for a 100 kW AM station. So, let's begin to put it all together!



TWR-Bonaire is situated on the southwest coast, adjacent to a solar-salt company, giving it excellent ground conductivity.

Trans World Radio (TWR) at a Glance

Trans World Radio is the most far-reaching Christian radio network in the world. Programs in over 200 languages and dialects are aired from more than 2,800 outlets around the world, including 14 international broadcasting loca-

tions, as well as local medium-wave (MW), shortwave, long-wave and FM radio stations, direct-to-listener satellite broadcasts, cable audio systems and the Internet. Every day, TWR's broadcasts reach millions in over 160 countries. TWR-Bonaire is a part of that larger network of radio stations.

TWR started broadcasting from Bonaire in 1964 with 500 kW on 800 kHz, which at the time was the largest transmitter in the Western Hemisphere. Today we use a Nautel solid-state, 100 kW (NA100) with an efficiency of over 85 percent. With the increasing price of fuel, efficiency becomes a key parameter. With four, 500 ft towers forming a parallelogram antenna array, the Bonaire station switches between an Omni pattern covering the Caribbean, a North pattern beamed to Cuba and the Dominican Republic, and a South pattern pointed to Brazil and Venezuela.

All of the programming arrives from studios belonging to TWR's partners in the target countries. Portuguese arrives via satellite (Brasilsat-B2) from Radio Trans Mundial (RTM)-Brazil in São Paulo, Spanish from RTM-Dominican Republic and from RTM-Venezuela in Maracay, and English from the Caribbean Gospel Network in Miami and from multiple broadcasters scattered across the US, with all but Portuguese delivered via File Transfer Protocol (FTP) over the Internet. The role of our RTM partners varies in each country, but typically it includes program production, as well as airing local broadcasts and listener follow-up.

Before we start, let's review our broadcast schedule, focusing on time-of-day, language,

transmitter power, and antenna pattern. TWR-Bonaire broadcasts on 800 kHz for more than 12 hours per day. We start broadcasting to Venezuela at 5 a.m. with 100 kW sky-wave. Programming stops at 8:30 because of the reduced audience. We continue in Spanish from 5:00 to 7:00 p.m. with ground-wave, for a total of 5-1/2 hrs of broadcasting to Venezuela each day.

Venezuela at a Glance

Venezuela means "Little Venice" in Spanish, a name given by early Spanish explorers when they found Ameri-Indians living in houses built on stilts. Venezuela, located at the most northern part of South America, is about twice the size of California. Venezuela's population is 26 million, with about 85 percent living in urban areas in the northern portion of the country. Venezuela is the world's fifth largest oil producer, providing three million barrels per day.

Although Spanish is the official language, English is second, and is taught in schools and universities.

Because they work so well together, it seems that two items were invented just for radio: baseball and drama. Baseball is the number-one team sport in Venezuela, closely followed by soccer and basketball. Radio-drama still captures the hearts of Venezuelans.

A vast percentage of Venezuela's population lives within 50 miles of the Caribbean coast, between the sea and the Cord de Mérida mountain range that runs from the southern tip of Lake Maracaibo to the capital of Caracas, greatly reducing the ground-wave signal from Bonaire.

Atlantic Standard Time (UTC-4)	Language			Antenna Pattern	Coverage	Power Level
	Sunday	Monday-Friday	Saturday			
03:00-to-04:45	Português (Portuguese)			South	Brazil	100 kW
04:45-to-05:00	Macuxi	Português	Baniua		Amazon / Brazil / Amazon	
05:00-to-07:00	Español (Spanish)			Omni	Venezuela & Caribbean	
07:00-to-08:30				South		
8-1/2 hr break						
17:00-to-19:00	Español (Spanish)			South	Venezuela & Caribbean	50 kW
19:00-to-20:30	English			Omni	Guyana & Caribbean	
20:30-to-22:00	Español (Spanish)			North	Cuba & Dominican Republic	
22:00-to-00:00	English			Omni	Guyana & Caribbean	
00:00-to-00:15	--	English	--			

TWR-Bonaire's 800 kHz medium-wave schedule shows 5-1/2 hours of broadcasting to Venezuela each day.



The Cord de Mérida Mountains tend to shield Venezuela's central plateau from TWR-Bonaire's ground-wave (day-time) broadcasts.

Venezuela is "Radio-Active," in that the AM-band is chock-full, as one can clearly hear every 10 kHz channel (10 kHz spacing in N/S America, 9 kHz elsewhere). Thus, TWR-Bonaire needs both a potent signal and "top-notch" programming to compete for attention.

AM Propagation and Frequency Management

As listeners know, MW signals act differently during the day, following the curvature of the earth (ground-wave), as well as reflecting off the ionosphere at night (sky-wave). This makes the AM-band ideal for both local and country-wide service, depending on the time of day. During the day a listener in the coastal region is able to receive reliable signals from TWR-Bonaire 250 miles away using ground-wave propagation. The ground-wave travels easily over the highly-conductive sea-water separating Bonaire from Venezuela, but rapidly diminishes after hitting the coastal region. Ground-wave, day-time propagation is heard along the populated coast, starting after 7 a.m., as the "D" layer absorbs any sky-wave.

After sunset, changes in the ionosphere cause AM signals to travel by sky-wave, enabling radio stations to be heard much farther than is normal during the day. Early-morning broadcasts from TWR-Bonaire are relatively strong, as we regularly receive mail from listeners inland.

Frequency management (coverage, frequency and power) for Venezuela is governed in much the same manner as in the US. Continental-coverage stations broadcast with maximum power (50-to-100 kW) and are placed at the lower end of the AM band (<800 kHz), where long-distance propagation is greatest. National-coverage stations are granted medium power (10-to-25 kW) and are placed in the middle of the AM-band (800-to-1200 kHz). Local-coverage stations are granted low-power licenses (1-to-10 kW) and reside at the top of the band (>1200 kHz), where propagation is decreased. Frequency re-use is repeated three times at low-frequencies (higher power) across the face of Venezuela, dictated both by distance and mountain isolation.

Can They Hear?

Enough background – Let's get on with

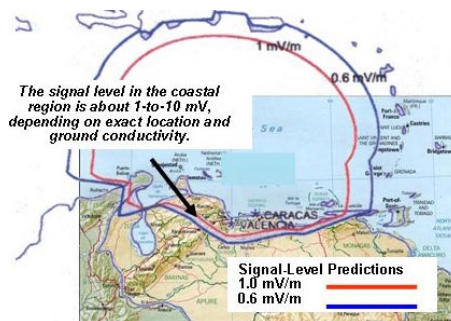
answering the first question, "How do we know they can hear us?" We have three ways of answering that question.

First, by using computer software we can predict the signal strength.

Software Predictions of Antenna Coverage

We use 1 mV (1 mV/m) as the standard criteria for acceptable listening in the AM-band over a moderately-priced receiver or car-radio. Below this level the signal competes with electrical noise (nature and man-made) and adjacent-channel splatter and is not as enjoyable. It is approximately the level that scanning functions halt or "lock" onto a station.

Kintronic's computer-prediction of the Omni antenna pattern coverage was over-laid onto a geographic map to gain a feel for the cities covered and the effects of mountains, and onto a population density map to gain a feel for the number of potential listeners.



Computer-predicted day-time, ground-wave coverage (100 kW) using the "Omni" antenna pattern.

"Postulated" Reverse-Signal Coverage

The second method of answering the question was clever, in that, by measuring hundreds of AM signals from Venezuela using a field strength meter in Bonaire, we could postulate the signal strength that would occur in Venezuela from Bonaire without ever setting foot inside the country.

AM transmitters in Venezuela served as multiple test signals, at various frequencies, distances and power levels. With propagation being twice as great at the bottom of the AM-band, compared with the top-end, the levels were normalized to the same effect at 800 kHz. After normalizing the omni signals according to power and frequency, we plotted the level of our signal that we would be broadcasting back to Venezuela.

With over 240 stations on the AM-band, we built a good database, including call letters, popular IDs, frequencies, locations, and power levels. Station identification and co-channel interference filtering was aided as we rotated the loop antenna atop our Potomac FM-41 field strength meter. We then validated the actual power level by telephoning each station. This is where the popular name helped, in that most stations don't use call letters with the standard "YV" prefix, but prefer popular titles such as "Nueva Esparta, Fe y Algeria" or "AM 1090."

We noticed good agreement between software-predictions and reverse-signal measurements. In the same manner that we can only hear AM stations in Bonaire almost exclusively from the coastal regions, the reverse is true also. TWR-Bonaire covers the littoral region of Venezuela with a potent signal.

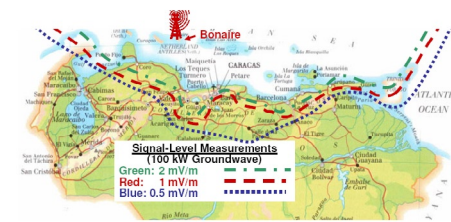
Based on listener response, Internet references from DXers, and remote-receiver monitoring (via the now-defunct **dxtuners.com**), we knew that adjacent-channel splatter from a 50 kW station (YV KC) was interfering with our listeners in the Caracas area. Other possibly interfering stations appeared to be silent or appear as marginal references. Otherwise, TWR-Bonaire has a relatively "interference-free" channel.



Signal-levels from over one hundred AM stations in Venezuela were monitored from Bonaire and normalized to 100 kW on 800 kHz.

This reverse-signal technique allowed us to use several stations in the same city, on different frequencies, or to use several stations scattered across Venezuela, agreeing with antenna pattern predictions showing 0.5-to-1 mV in the Maracaibo/Barquisimeto region and 1-to-3 mV in the vicinity of Valencia/Maracay.

Almost half of Venezuela's land area lies south of the Orinoco River, but it contains only 5 percent of the population. Because 85 percent of the population lives in urban areas in the northern coastal regions of Venezuela, this means that over 50 percent of the people can receive a listenable (≥ 1 mV) signal from Bonaire.



Measured Levels during monitoring trip: 100 kW "South" pattern, favoring eastern and central coastal regions.

On-the-Ground Measured Coverage

Finally, we increased our confidence in the coverage of coastal regions with a monitoring trip to measure actual signal-levels. A trip of 2,000 miles gave us readings every 100 miles. Based on the measured coverage, we were able to propose and validate an alternate antenna pattern to better service the coastal regions.

Over 40 local FM stations in central and western portions of Venezuela have been willing to carry RTM-Venezuela programs due to their reputation in those areas. The graphic of FM coverage doesn't tell the entire story because it is impossible to display the fact that each station carries programming for differing lengths of time and differing presentation times relative to "prime time."

Working together, TWR-Bonaire and RTM-Venezuela strategically examined the larger picture to discover that by switching from the Omni antenna pattern to the South pattern, we could augment the FM coverage of central and western regions, with the 800 kHz coverage concentrating on the eastern and central coastal regions.

AM signal levels in the West were already low and plagued by co-channel and adjacent-channel interference in the two major cities of Maracaibo and Barquisimeto. Because the South antenna pattern re-directed unused energy from the Caribbean side, the signal-level doubled (+6 dB) in central and eastern coastal regions.

Do They Listen?

The answer to this question determines the effectiveness of AM radio. Trans World Radio is constantly examining alternative delivery methods to discover the best means for program delivery, whether it be by satellite, TV, or pod-casting. With 15 national newspapers, 77 regional newspapers, 89 magazines and weekly journals, 34 representatives of foreign media outlets, 47 national and international television and radio news agencies, 344 commercial and over 450 FM and AM community radio stations, 66 television channels, and 50,000 Internet hosts, Venezuelans are inundated with entertainment/information alternatives and must make choices. Most AM and FM stations also have audio streaming available over the Internet.

We sampled listener-response (letters, cards, e-mail, text-messages) for a single, week-day program "Despertar," a Wake-Up

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Totals
2002	90	78	56	56	49	20	40	35	29	25	19	21	518
2003	92	67	73	72	37	42	47	50	54	51	50	49	684
2004	86	56	70	36	48	41	54	80	86	120	116	182	975
2005	177	104	56	46	113	148	140	224	282	326	370	236	2,222
2006	280	464	384	180	297	307	268	322	231	276	227	226	3,462

Total response (letters, telephone calls, e-mails, text messages) to Despertar (All radio outlets: 800 kHz AM and Local FM).

program in Spanish. We see that listener-response to *Despertar* is steadily increasing. One can't help but notice a step-function in letters in August of 2005. That was the exact time when the modulation was properly bumped up to 125 percent, and the audience doubled.

Approximately 15 percent of the listener-response to this program could be directly traced to transmissions from TWR-Bonaire. Once we determined that the upward bump in listener-response was due to the increase in AM modulation, we could state that half of the total listener response comes from AM listeners.

By plotting the location of confirmed respondents to TWR-Bonaire over a one-year period (Sept '05 thru Aug '06) on a geographic and population density map, several interesting things emerged. The greatest response was naturally in the coastal region, with a clear correlation between signal-level and listener-response. We also saw that the morning sky-wave was still active until 7a.m. for this sample program, reaching deep beyond the coastal mountains.

coastal region, while the response inland indicates early-morning sky-wave.

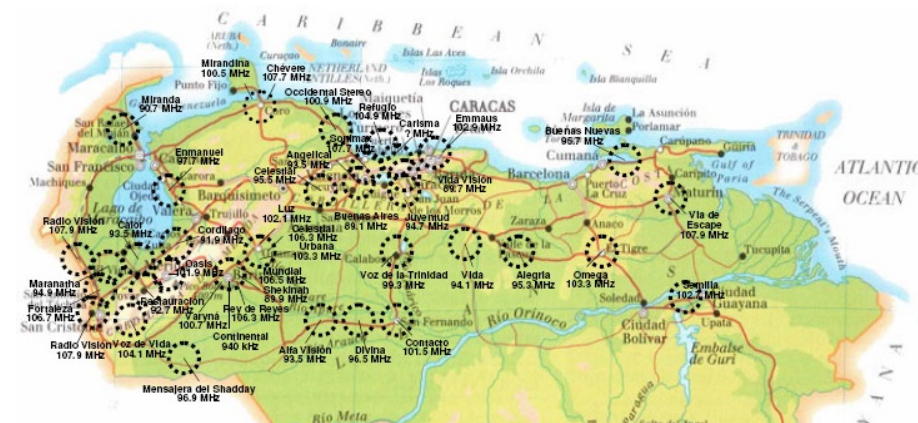
Putting It All Together

TWR-Bonaire is performing an effective service to Venezuela. AM signals reach a potential audience of half the population with a listenable signal of 1 mV. We have seen good agreement between computer-predictions, reverse-signal monitoring, and actual monitoring trips. We have shown that reverse-signal measurements are an effective tool for predicting signal-strength coverage. By tracking listener-response we have observed early-morning sky-wave and engineering changes in modulation. Listener-response also confirms both effective programming and signal-level.

Finally, by using the South antenna pattern, we have combined the region-wide coverage of AM from TWR-Bonaire with the local coverage of FM by RTM-Venezuela. The excitement of the study was "putting it all together" as a graphical story. Previously everyone suspected the answer, but couldn't really pin it down. Now we know.



State-by-state listener-response to a single, week-day program Despertar on 800 kHz matches signal-level predictions in the



RTM-Venezuela distributes Christian programming to over 40 FM local stations throughout Venezuela, mainly in large metropolitan areas in western and central regions.

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Radio Tourist in Guyana

By Michael E. Lijewski

Any trip I take ends up as a radio expedition; so when I was offered the chance to observe the religious practices of the Akawio Indians of Guyana a few years ago, I packed my bags *and* my radios. I had heard of Guyana and that was about all.

A little research revealed it to be a small country on the Northeast coast of South America. Modern Guyana started out as a Dutch colony, was taken over by the British, and is now an independent nation. The culture is rich and diverse with the majority of the people being of African or Indian (India) descent, followed by Native Americans (called Amerindians in Guyana), Chinese, Portuguese, English and Dutch. Most of the country is tropical rainforest, and the vast majority of the population lives on or near the coast.

A large portion of our work would be undertaken deep in the country's interior, traveling by light plane and dugout canoe, and I had to pack accordingly. I chose a handheld Yaesu VR-500 communications receiver as my main radio and a Yaesu VR-120 as a back up. These radios are versatile, rugged, run a long time on a set of batteries, and are very small. Along with the stock "rubber duck" antennas, I added a telescoping antenna, a small reel antenna, and a Grove "Active Duck" amplified antenna to the collection. A small Optoelectronics frequency counter, a set of Radio Shack mono headphones, a couple of GPS receivers, two Palm handheld computers, and scores of batteries rounded out my "tech pack."

What is there to hear in a small tropical country? Plenty. The capital, Georgetown, is home to the Voice of Guyana broadcasting

on 3290 kilohertz, and I have never seen a harder working radio station. The VOG makes the best of its limited resources and very few events take place in or around Georgetown without a visit from their mobile broadcast van. I heard everything from large national events to a boy's sports banquet. It was a novel thing to hear the obituaries over the radio. The government-owned station has made a good effort to be non-partisan and provides a real service to the citizens of Georgetown and beyond.

There are also plenty of opportunities to scan the local police, military, mining corporations, ship traffic, and a lively host of cab drivers. There is a bit of a learning curve regarding scanning: although the Guyanese are an English speaking people, it takes some getting used to. I found the time spent in scanning improved my ability to understand the local vernacular.

Broadcasting in the Bush

After a few weeks in the capital, we took a small plane to the upper Mazaruni region of the country. This region, like most of the country, features thousands of square miles of dense rainforest crisscrossed by rivers and punctuated by the occasional Amerindian village.

We landed in Kamarong, the region's capital, presented our papers, and settled in. Along with being the regional capital, Kamarong is next to an Amerindian village. It also serves as the base for many of the region's gold miners, who are known as "pork knockers." These men work gold and diamond deposits, either with dredges or by the old method of panning. A gold or diamond discovery is called, for obvious reasons, "a shout," and small gold rushes are not uncommon. There is a certain amount of tension between the miners and the Amerindians, due to the pollution



The internet is everywhere

caused by the larger mining operations.

We were put up in a bunkhouse reserved for travelers, and I was happy to see that it was next to the building that housed the village radio transmitter. After a hilarious battle with my jungle hammock, I set out to discover which frequencies the village radio operator was using. I took out my stealthy frequency counter and started to work. After a few minutes I got bored and walked over to the village headquarters and asked the operator what frequencies she most commonly used!

The radio operator was a young Amerindian woman who said she had been trained by the Government for her job, liked what she was doing, and gave me a list of frequencies from memory.



Antenna work in Jawalla



Guyana Broadcasting Corporation



(My inquiries into Guyana's scanning laws were ignored by the Government and, though I didn't run into any problems, I don't want to give out any utility frequencies in deference to local government sensibilities and the fact that I plan on returning.)

Every Amerindian village has a radio and an operator, and they are used heavily. Medical calls take precedence, with village business and important personal messages taking up the rest of the radio technician's time. Rag chewing is frowned upon. One of the more interesting transmissions was made by a local official trying to place a "help wanted" ad in the Georgetown paper; it was an exasperating thing to do on a small transceiver, in single side band, over hundreds of miles, on battery power!

Kamarong also hosted a private shortwave utility service owned by one of the local merchants. I did not listen in on those calls as they were of a private nature and I was very far from home. While many of the region's citizens owned small analog receivers and listen daily to the

BBC, VOA, and RNI, they cannot get the Voice of Guyana; sadly, the government does not have the funds to transmit their fine service to the entire country.

In the town of Jawalla, several hours up river by motorized dugout, we ran into a crew of workers who were drilling a well at the village. They had a government issue Yaesu transceiver (Yaesu and Icom are very popular brands there) and I got to observe them setting up their rig. The antennas were hoisted with saplings and they had made insulators out of PVC pipe. I made sure to get a close-up picture of the insulators for my own future reference. Their antenna seemed to be made entirely of shielded cable (RG58), which I didn't think of as a good way to get a signal very far, but I was a guest and without an antenna manual, so I held my tongue.



The shortwave listening in such an isolated place is a real joy. There is simply no local interference, and with Brazil and Venezuela right next door, there was no shortage of Latin music.

My small reel antenna and "active duck" did the trick and got me every station I needed to hear, both broadcast and utility.

On returning from the rainforest, Georgetown looked like Paris shining in the distance and I was never so happy to enter a restaurant in my life. I took one of the many local cabs on a site-seeing tour and the driver even found the Guyana Broadcasting Corporation compound for me to photograph. The modest, weather beaten installation once again attested to the challenges of being a tropical broadcaster and to the pluck of the VOG.

Editor's Note:

The MT center section lists VoG's schedule as follows, although it's unknown if they are active for all those hours.

Time UTC	Frequency kHz
0000-0700	3291 do (domestic)
0700-1100	3291 do 5950do
2100-2200	3291do 5950do
2200-0000	3291do

Gayle Van Horn says that DXers report hearing occasional broadcasting on 3291, but the 5950 frequency may not be active.

An internet search for Voice of Guyana turns up instead an unconnected, private enterprise called Voice of Guyana International with link to streaming audio at <http://voiceofguyana.com>. Interesting listening, though it's not directly from Guyana.

For more recent news on Guyana, visit the author's blog at <http://www.falmanac.com/search?q=guyana>

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Buying a Dedicated Weather Radio

We're about to enter the peak of the hurricane season, and even if you don't live on the East Coast or along the Gulf Coast, most of the country is experiencing various degrees of bad weather. It's a good time to have a radio capable of tuning the NOAA Weather Radio (NWR) frequencies.

If you have a hand-held scanner, hand-talkie 2 meter radio or even certain CB radios, you probably already have weather radio reception available. No doubt you've found them handy when you needed to know if it was going to rain on your weekend hamfest or fishing trip. But, those weather radios and the ones built-in to portable shortwave radios can't wake you up in the middle of the night with a severe weather warning. That's the job of a certified Specific Area Message Encoding (S.A.M.E.) weather radio.

❖ Emergency Alert System (EAS) and SAME

The old Emergency Broadcast System was replaced in 1996 by the Emergency Alert System (EAS) using the SAME alert protocols. In May of 2002, EAS was further updated to include various civil emergencies and alerts which also use protocols similar to SAME. While motivated by the terrorist attacks of the previous six months, these alerts also expanded weather related events to include Tsunami watches and warnings, non-weather related emergencies such as nuclear power plant warnings, volcano warnings, Amber Alert child abduction notices, and cell phone outages. Public Alert certified radios allow reception of these alerts as well. Older SAME certified radios which were produced prior to May 2002,



Midland's WR-100 sells for \$39.95 at the Weather Connection.com. (Courtesy: Midland Radio)

may be triggered by these alerts. The display on these radios will state that the emergency is "unknown," but the voice message will still get through.

NOAA has set out a list of guidelines that manufacturers must meet in order to receive Public Alert approval. When a manufacturer meets the criteria, they are allowed to use the special NOAA Public Alert logo, which is displayed on the radio. NOAA's Weather Radio (NWR) Dissemination Branch personnel test the various units for operational evaluation prior to earning the Public Alert certification. NOAA and the Consumer Electronics Association (CEA), the nation's biggest consumer electronics trade group, have agreed on the requirements for such receivers and here are what these radios must be able to do:

Receive NOAA SAME Transmissions

SAME messages allow the user to program the radio to turn on when specific messages are sent by the local NWR station covering your area. While all radios allow you to program 20 or more counties, your local NWR station will only send county codes for the counties in its alert coverage area. But, if you travel to other locations, such as a beach house or mountain home, you can program the receiver to turn on for those counties as well.



Radio Shack 12-262 desktop weather radio with alarm clock and SAME operation is overpriced at \$69.99. (Courtesy: Radio Shack)

Front Panel Color Coded Alert Lights

NOAA has devised an ascending alert color code: yellow (advisory) orange (watch) and red (warning). When an alert is transmitted by your local NWR station, a small LED on the front of the radio will light corresponding to the alert level when the radio is turned on by the 1050 Hz tone transmitted by the NWR station. This gives the consumer a visual clue as to the nature of the alert. While small, these alert lights are easily seen, especially at night.

Built-in Back-up Power Supply

Public Alert certified radios must have a battery back-up power supply. In the event of ice storms, high winds or other severe weather, commercial power is often the first thing to go. This allows your weather radio to still function. The problem I've seen with some units is that the batteries (usually AA's) last only a few days at the most. You need to have a ready supply of back-up batteries to keep the SAME functions operating for the duration of the power outage.



Reecom's R-1630 claims 170 hours of battery operation when power fails. Available directly from Reecom Electronics 770-641-9228 or via www.reecominc.com (Courtesy: Reecom Electronics)

Audible Alert Capability

These radios sound alert tones, triggered by the NWR station, which will definitely pull you out of a very deep sleep. As a result, you should make sure you've programmed only the county and the alert types you really want. Otherwise you could be awakened by the radio's pulse-pounding tones only to find that there's something happening somewhere else.

Provide Digital Visual Display

All Public Alert certified radios have a scrolling LCD display which spells out the nature of the alert. If there's a tornado alert triggered for your county, the radio will wake up, sound the tone, turn on the red light and spell out "TORNADO WARNING" on the display.



Sima Products First Alert Weather Radio WX167 sells for \$59.95 from Electronic Express.com. This unit has a built-in charge circuit. (Courtesy: Sima Products)

Brand	Model	Price	Battery	Ext. Ant. Jack	Ext. Alert Jack	Warranty
First Alert	WX-167*	\$59.95	5AA	Yes	Yes	90 Days
First Alert	WX-150*		4AA	Yes	Yes	90 Days
Midland Radio	WR-100	\$39.95	3AA	Yes	Yes	One Year
Oregon Scientific	WR103NX	\$39.99	3AA	No	No	One Year
Radio Shack	12-262	\$69.95	6AA	Yes	Yes	90 days
Reecom Electronics	R-1630	\$59.99	4AA	Yes	Yes	One Year

*has built-in battery charge circuit

While not required for Public Alert certification, the following features are recommended:

External Antenna Jack

Despite efforts from the National Weather Service, there are still areas of the country which have marginal NWR coverage. If you're in one of those locations, you could benefit from being able to add an external antenna to your radio. There are several which offer this feature. It's also possible that the location of your radio where you want it in your home doesn't offer reliable reception. An external antenna might change that.

External Alert Capability

Consumers with hearing problems could benefit from an optional pillow vibrator which is placed under the pillow. Other external alerts include remote sirens and strobe lights. If your weather radio is in your bedroom, a flashing alert light in your living room could warn you of a pending weather emergency of which you would otherwise be unaware.



Flashing strobe light can signal a weather alert to another part of the house. This unit works with several Public Alert certified radios and sells for \$24.95 at Weather Connection.com. (Courtesy: Midland)

❖ This Is Only a Test

All NWR stations transmit tests of their alert systems between 11 and noon on Wednesdays local time. Public alert radios will store the reception of such a test in the radio's memory. The alert light will stay lit for six hours after the alert. Following the instructions in your manual, you'll be able to find out when the last test was sent. If your radio has not received a test in over 10 days it will indicate on the text display "check ops," which means the test has not been received. More than likely this is because of a weak signal. Add an external antenna. If that doesn't help, it could be a defect in the product. Return it for exchange.



❖ Weather Radio Shopping

Here's a look at selected brands and models of Public Alert certified weather radios. I've not included ones with built-in AM/FM radios, because they tend to be

External Antenna for weather radios equipped with an antenna jack sells for \$19.95 at Ambient Weather.com and comes with 16 feet of lead-in cable. (Courtesy: Ambient Weather.com)

more expensive and there are better emergency AM/FM radios available. I've included the more important features for each. Only the Oregon Scientific portable had a non-volatile memory, which stores your SAME data and alert codes.

❖ Other NWR Products

There are a number of other radios on the market which are considerably more expensive and intended for radio stations, cable TV systems and broadcast TV. Among these are Emergency Alert Radio from MTS, Inc. which sells for \$149.95 (www.emergencyalertradio.com); CRWS from Gorman-Redlich for \$540 (www.gorman-redlich.com/crw.html); AF610 from Dayton Industrial Corp. \$299.95 (www.daytonindustrial.com); Computer Automation Technology's WX-200 for \$399 (www.catauto.com/wx200)



First Alert's portable WX-150 was found at Circuit City for \$69.99 is wall mountable and has battery recharge circuit when using rechargeable batteries. (Courtesy: First Alert)

❖ Last Word

Most people will need only a desk-top weather radio to sit on the bedside table or on the kitchen counter. But, if you're an outdoor person, bicyclist, hunter, hiker, or boater you should consider one of the portable versions. If the weather looks a little nasty you can quickly find out what's in store and when. Weather radio reception offshore should be good for at least several miles. NWR stations on U.S. coasts

include marine weather and tidal information with their broadcasts.

One of the most important features on a weather radio is a battery charge circuit. Of the brands and models I looked at, only First Alert had such a feature, which is a switch built into the battery compartment on both units. The reason this feature is important is that your batteries may be weaker than you think. If your power goes out and an emergency happens, will your batteries be strong enough to allow your radio to function properly? They will if they've been charged up during the time when commercial power is operating normally. Both the WX167 desk-top model and the portable WX150 from First Alert have a built-in battery charger.

In my opinion, this feature should be built-in to all portable radios. It's important for manufacturers and consumers to start thinking about the mountains of dead batteries sitting in the nation's landfills and what part each can play in reducing this growing problem.

❖ NOAA Weather Radio Resources

To find a complete state by state list of NOAA Weather Radio stations go here: www.weather.gov/nwr/nwrbro.html. You may not recognize the location of the NWR station you listen to by its listing on this site. So, look for the call sign which is given on the air.

Coverage maps for all operating stations are found here: www.weather.gov/nwr/usframes

SAME county codes are found here: www.weather.gov/nwr/indexnw.htm#sametable. When you click on your state, you'll see a listing for all of the counties in your state. In addition to your SAME county code, this list also gives the frequency, call sign and power output of each station. You can also call the NWS automatic response number to receive your SAME county code. Call 888-697-7263 (888-NWR-SAME).



Oregon Scientific's WR103NX portable, hand held SAME weather radio sells for \$39.99 at Crutchfield.com. (Courtesy: Oregon Scientific)

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Q. Why do scanner manufacturers make high end receivers for government use only which include cellular frequencies, but not the ability to demodulate cellular? Why would an authorized user be listening to in the cellular bands if the radio doesn't have the necessary mode? (Peter Semenick, Coeur d'Alene, ID)

A. There are three reasons that I can think of:

- (1) Some of these receivers go into test laboratories where a signal (not necessarily cellular) must be received and analyzed, even if not demodulated;
- (2) There are still some analog FM phones out there that can be monitored without special demodulators;
- (3) The receivers can be used with demodulation accessories (GSM, CDMA, TDMA, etc.) and cooperating cellular service providers for authorized digital telephone monitoring.

Q. Can I use our old rooftop TV antenna as a scanner antenna? (Chris Oldham)

A. A TV antenna will work for a scanner antenna (that's how we first designed our famous Scanner Beam – by using old TV antennas to experiment with!), but you need to turn its elements vertical for best reception.

Q. I rarely make mobile calls, but wanted a cell phone for emergency use, so 5 years ago I joined a pre-paid cell program (now discontinued) and purchased an Ericsson LX-700 phone. I recently ran across a company that offers a 3-watt linear amplifier that connects to a cell phone's external antenna jack.

Is there a pre-paid plan which will allow me to use my existing phone? One company says that my phone is not compatible with their system and hence I need one of theirs. Is this true, or just another way of getting more \$\$\$ out of my wallet? (Jim Skladany,

San Bernardino, CA)

A. Good question, and here is a good answer from my son Bill who follows the cellular industry:

Any cell phone can make 911 calls without a service plan; this is a requirement of the FCC. If you are looking for a phone for emergencies only, you already have one. The fictitious service plan requirement is a myth propagated by the cell phone companies to try and get you into a low-end contract.

However, if you want a contract for full cell-phone usage, you need to find a provider that uses the same technology as your phone, and your phone will need to be "unlocked" (which it probably is).

The basic phones out there are CDMA (Verizon) and GSM (Cingular and pretty much everybody else); Sprint uses a proprietary technology.

Your phone uses the well-supported DAMPS signal, so it should continue to work just fine as an emergency phone. You might try to find a carrier to give you a small-minute package, or a company which will give you a "free" phone (free with contract). You can also call 611 for free on your current phone to see which carrier you're talking with. When AT&T answers the phone, simply say, "I thought this phone didn't work on your service anymore!"

Q. Will four eight-foot copper rods in a 15-foot-diameter circle, fed with 6 gauge copper wire, be an adequate ground for shortwave receiving only? It is clay soil close to a septic tank drain field. (Tony Slafta, email)

A. More than adequate. Grounding for receiving purposes is not as critical as grounding for transmitting, because we aren't looking for a low SWR for maximum power handling efficiency. A ground may not even be necessary if you don't have electrical noise interference without it. Moisture will improve the grounding characteristics. Wet, mineralized soil is best; dry sand is worst.

Q. Would one of the Grove-catalog active antennas work well for distant AM-band reception, even if I have a nearby 2.4 GHz uplink antenna? (Jeff McInnish, email)

A. Our active antennas are pruned for the LF/HF spectrum (up to 30 MHz or so) and

have designed-in attenuation of higher frequencies. 2.4 GHz (2400 MHz) devices are so low in power, and so removed in frequency, that any likelihood of overload interference is very remote.

Q. I have two portable radios connected to outdoor wire antennas, each wire in a different direction. At night I hear a prominent hum interfering in my AM broadcast band reception. Is there a device that can remove that? (Gordon Deal, Jr., Vale, NC)

A. If the "hum" is actually a raspy "buzz" sound, I would suspect that you are getting power-line noise from nearby. Does it go away if you've had a rain? That would pretty well cinch that answer. If that's the case, you would need to drive around using your AM car radio to see where the interference peaks and report it to your utility company.

There is also a condition known as an "AC hum loop" which may result from improper grounding; are you using a ground? Try connecting and disconnecting the ground to see if it changes the noise level.

Check to see if you still hear it with the AC adaptor unplugged and the radio operating on its batteries; that would indicate whether the noise is coming in through the AC lines, or may even be generated by the power supply (switching-type power supplies or notorious for this).

Do you hear it on both radios? Is there a difference in noise level if you switch antennas? That, too, would suggest that the noise is coming in through your antenna(s).

Do you hear it without the external wire antenna connected? If so, does it change level as you rotate the radio on its base, changing its directivity? This would also indicate reception of a nearby noise source, including a household appliance. You can carry the radio around using battery operation to locate such a household-appliance noise source.

One possible alternative would be to try the indoor Select-A-Tenna which is carried by Grove Enterprises and other MT advertisers; they work very well with portable AM radios. By experimenting with its position, you might be able to null out the electrical interference while peaking the desired signal.

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.)

Q. I have an Icom R-75 that I purchased from your company (Grove Enterprises) sometime ago. I would like to listen to the COTHEN HF radio system and the US Coast Guard. The ALE burst seldom is followed by voice, so the R-75 goes directly to scan again and I miss the voice comms.

I am trying to find a software package to decode the ALE transmissions. I have my Icom connected to my computer. Do you sell any software that will decode ALE burst?

What antenna do you sell for utility reception that you would recommend? (Calvin Springs - Myrtle Beach, SC)

A. Grove does not sell any software that decodes ALE. I am only aware of one package available on the internet. A quick Google search produced the following link to Charles Brian's PCAL program at www.chbrain.dircon.co.uk/pcal.html.

As for antennas, I strongly recommend an outdoor antenna such as the PAR or Grove Skywire antenna. I do not recommend active antennas for utility work. The weaker signals that are transmitted by utility stations need some reasonable antenna capture area that only a wire antenna can provide. Active antennas just don't have a lot of capture area.

And a follow up question or two from Calvin...

Q. I have heard nothing on the USCG/COTHEN networks. I used to use a very large VHF antenna mounted high up. My PAR antenna is also high up. Where have all the conversations gone or am I doing something wrong? I have 40 channels programmed in my radio. Surely one or two should have activity, but I am not even hearing 5696 or 8393 kHz conversations at anytime during the day or night, and those used to be very active.

Finally, could you help me with the solar x-ray and geo field values and what should those be for the best listening possible? Thanks in advance for your help. I love the

magazine, also, great stuff!! (Calvin Springs - Myrtle Beach, SC)

A. The COTHEN network uses the following frequencies. These are the only ones that should be programmed.

5732.0 Scan 1	15867.0 Scan 7
7527.0 Scan 2	18594.0 Scan 8
8912.0 Scan 3	20890.0 Scan 9
10242.0 Scan 4	23214.0 Scan 10
11494.0 Scan 5	25350.0 Scan 11
13907.0 Scan 6	

The Coast Guard uses a wide variety of frequencies, way too many to list in this column. Keep a sharp eye on the *MT Milcom* column, as we list those frequencies from time to time.

As far as hearing activity, you should hear the ALE burst (voice activity can be problematic most of the time on COTHEN, since a lot of scrambling is used). If you still aren't hearing anything, try WWV on 5/10/15 MHz. If you aren't hearing WWV with a loud signal, then you have an antenna/receiver problem (most likely antenna or coax). It is impossible for me to troubleshoot this sort of problem without being at your home QTH, so this is as far as I can take you.

As for the best propagation conditions for reception, now that is a really loaded question for which I really can't give a definitive answer. There is no easy answer or formula to your question. Conditions change every second; every frequency, transmit and receive station location, transmit/receive equipment, and power used is dynamic and affects reception. Discerning propagation conditions is a trait learned by listening and comparing current prop numbers with solar conditions.

But there is still no guarantee that for a given prop condition you will hear what you think you will hear. These are utility stations, and unlike SW broadcasters, they may or may not be transmitting and have no set schedules. Bottom line: welcome to the world of HF radio! That is why we listen, because you never know from minute to minute what you are going to hear.

Q. I am looking at the new *Monitoring Times* Air Show Guide and also Tom Kneitel's *Top Secret Registry of US Government Frequencies* and I have some questions about the various search ranges.

I know that the civil air band tops out at 137.000, and according to the *MT* article, you suggest a search range of 138-144 MHz. Kneitel suggests 137-144 MHz. What is in the range of 137-138 MHz?

Kneitel splits up the Federal UHF VHF band as 162.000-173.200 and 173.400-174.00. What is between 173.200 and 173.400?

One other question, if 137-144MHz is a mixed mode band (e.g. AM & FM), which mode would be more useful to search at an air show where both modes may be used? AM or FM? (B52hbuff - Los Altos, CA)

A. The 137-138 MHz band is what is left of the VHF satellite subband. While I see some reports from time to time of milair activity in this band, it is very sporadic. The primary users here are orbiting satellites (mostly weather).

As for the 173.200-173.400 MHz subband, it is primarily used for civilian assignments. The frequencies below are from the Grove Master Frequency File CD. (A spectrum hole is a valid frequency for which there are no known assignments.)

173.2000	[Spectrum Hole]
173.2125	[Spectrum Hole]
173.2250	Civilian Assignment: Video Production/Press Relay (Newspapers)
173.2375	[Spectrum Hole]
173.2500	Civilian Assignment: Power and Water Utilities
173.2625	USA Anniston Army Depot (AL)
173.2750	Civilian Assignment: Video Production/Press Relay (Newspapers)
173.2875	[Spectrum Hole]
173.3000	Energy Department and Civilian Assignment: Power and Water Utilities
173.3125	[Spectrum Hole]
173.3250	Civilian Assignment: Video Production/Press Relay (Newspapers)
173.3375	Forest Service (NC)
173.3500	Civilian Assignment: Power and Water Utilities
173.3625	USCG Otis ANGB/Cape Cod CGAS (MA)
173.3750	Civilian Assignment: Video Production/Press Relay (Newspapers)
173.3875	[Spectrum Hole]
173.4000	Experimental Testing

As you can see, most of the assignments in this range are non-government (power/water utilities and movie video production/press relay - newspapers). That is why it is left out of Tom Kneitel's book.

As far as your question on which to use, AM or FM in the 137-144/148-150.8 MHz bands during an air show, I recommend FM. Since base aircraft are not operational during an air show, and all of the main aero demonstration teams frequencies are known, you will probably get a lot more results monitoring the land mobile service (FM mode) on the base. That is what I scan when I go to the air show.

Interoperability on a Smaller Scale

Interoperability continues to be a driving consideration in the purchase and installation of new public safety radio systems. The ability for first responders to quickly communicate with each other and with nearby organizations is just as important for smaller agencies as it is for large cities and states. This month we take a look at how some of these smaller organizations are working to provide reliable interoperability for their local areas.

❖ Steuben County, Indiana

Steuben County is located in the northeast corner of Indiana, on the border of both Michigan and Ohio. The Indiana Toll Road and Interstate 69 both pass through the county. More than 30,000 residents live in this mostly rural area, with about 7,000 residing in the county seat of Angola.

In May, Steuben County officials voted to take the next step on the path to accepting a \$5.6 million proposal from M/A-COM for a new OpenSky radio network to replace their 15-year-old 800 MHz system. The county hopes to be able to provide additional capacity for existing users, track police vehicles in real-time with Global Positioning System (GPS) receivers, and eventually support more than one simultaneous large-scale emergency.

The new network is intended to replace the existing EDACS (Enhanced Digital Access Communications System) trunked radio system, currently operating from three primary repeater sites, located in the towns of Angola, Hamilton and Stroh. The system uses the following frequencies, listed here in Logical Channel Number (LCN) order:

LCN Frequency

01	860.1125
02	859.1125
03	858.1125
04	857.1125
05	856.1125
06	868.5250
07	868.1125
08	866.1625
09	851.5375
10	851.3875
11	861.4125
12	862.4125
13	863.4125
14	864.4125
15	865.4125
16	860.2125
17	859.2125
18	858.2125
19	857.2125
20	856.2125

❖ Logical Channel Numbers

Because of the way control messages are transmitted by an EDACS repeater, each of these frequencies must be entered in the proper location in your scanner. EDACS control messages refer only to LCNs, not actual radio frequencies, so your scanner must be able to convert each LCN to its corresponding frequency.

Most EDACS-capable scanners will look for a frequency in the memory location identified by the LCN. For instance, an LCN of 1 should be placed in memory location 01, LCN 2 in memory location 02, and so on. Memory location 00 is typically not used. If you miss an LCN or put the frequencies in the wrong locations, your scanner will not properly track EDACS conversations.

❖ EDACS Talkgroups

EDACS talkgroups are organized by agency. Each agency has a number of fleets, and each of these fleets has some number of subfleets. The Agent-Fleet-Subfleet (AFS) identifier is usually shown in the format AA-FF-S where AA is the Agency, FF is the Fleet and S is the Subfleet. Trunk-tracking scanners that support EDACS usually default to displaying talkgroups in AFS format rather than a simple decimal number. The AFS format makes it easier to identify relationships between talkgroups by separating the Agency, Fleet and Subfleet numbers.

Some AFS talkgroups have a special function. The first talkgroup in the system, 00-000, is known as "System All-Call." Every radio in the system will hear a message sent to this talkgroup. Similarly, an "Agency All-Call" is the first talkgroup in an Agency, where the Fleet and Subfleet both have zero values. For instance, a transmission to talkgroup 03-000 would be heard by all radios assigned to Agency 03. As you've probably guessed, there is also a "Fleet All-Call" which is the first talkgroup in each fleet. A transmission to talkgroup 04-080, for example, would be heard by every radio in Fleet 8 of Agency 4.

The Steuben County EDACS system uses a number of talkgroups, including the following:

Decimal	AFS	Description
449	03-081	Mutual Aid (Countywide)
451	03-083	Parking Enforcement
452	03-084	County Jail
457	03-091	Emergency Medical Service (Dispatch)

458	03-092	Sheriff Administration (Encrypted)
466	03-102	Marine Division
469	03-105	Courthouse Security
470	03-106	County Jail
473	03-111	Sheriff (Dispatch)
474	03-112	Indiana Data and Communications System
475	03-113	Sheriff Channel 1 (Traffic)
476	03-114	Sheriff (Car-to-Car)
477	03-115	Sheriff (Special Events)
477	03-115	Sheriff Channel 5 (Tactical)
478	03-116	Corrections
481	03-121	County Fire (Dispatch)
482	03-122	Fireground 1
483	03-123	Fireground 2
484	03-124	Fireground 3
485	03-125	Fireground 4
486	03-126	Fireground 5
487	03-127	Fireground 6
488	03-130	Fire Operations
496	03-140	Mutual Aid (Countywide)
500	03-144	County Highway Department
501	03-145	County Emergency
503	03-147	County Emergency Management
504	03-150	County Building Inspectors
505	03-151	County Planning Commission
506	03-152	County Land Surveyors
507	03-153	County Health Department
508	03-154	County Commissioners
510	03-156	County Fairgrounds
646	05-006	School Bus Garage
695	05-067	Regional Emergency
793	06-031	Metro School District
883	06-143	School District Operations

Note that there are some talkgroups dedicated specifically for mutual aid and coordination among agencies. Different departments operating on this system, when their radios are all programmed with these mutual aid talkgroups, are able to communicate directly with each other.

❖ Marion, Indiana

Further to the south in Indiana, between Fort Wayne and Indianapolis, Marion and other towns in Grant County are working on ways to improve communication between their emergency services. The county itself has more than 70,000 residents, with the county seat of Marion home to nearly half of that total.

The eventual plan is for public safety agencies in Grant County to join Indiana Project Hoosier SAFE-T (Safety Acting For Everyone - Together), a statewide 800 MHz trunked radio network. The SAFE-T network will eventually

operate from more than 125 sites across the state, including one in Grant County.

Like large radio networks in other states, planners for SAFE-T network hope that county and local agencies across Indiana will choose to join the system. So far, more than 700 agencies have signed up.

The problem for Grant County, in the near term, appears to be money. Because radios are a constant and critical tool, county and local law enforcement agencies have already moved, or are in the process of moving, to SAFE-T. Police officers are training on the new radios and finding out where the coverage "dead spots" are in the county. However, fire departments remain on the older analog radios while they wait for funding.

Because county and local fire departments do not currently share a common radio frequency, communicating during mutual aid operations is difficult and time-consuming. Messages have to be passed through dispatchers in order for firefighters from different agencies to communicate with each other. This takes time and leads to delays in passing critical information during an emergency.

Conventional analog frequencies for Grant County are listed below. As law enforcement transitions to SAFE-T, the conventional frequencies may eventually fall silent. However, during the transition there may be duplicate traffic on SAFE-T and the old channels.

Frequency	Description
151.0175	County EMS (Dispatch)
153.740	County EMS (Tactical 2)
153.875	County EMS (Administration)
154.190	Marion Fire
154.250	County Fire (Dispatch)
154.280	County Fire (Mutual Aid)
154.385	Fairmount Fire
154.725	Marion Police
154.785	Sheriff (Dispatch)
154.845	Gas City Police
154.890	Sheriff (Car-to-Base)
155.100	Fairmount Police
155.130	Sheriff (Base-to-Car)
155.370	Base-to-Base (Statewide)
155.475	Indiana Law Enforcement Emergency Network
155.820	Fairmount Water Department
155.940	Gas City Fire
158.820	County Emergency Management
159.060	Juvenile Detention Center
159.195	Marion Streets
453.675	Fairmount Civil Defense
453.925	County Highway Department

On the SAFE-T network, the Grant County repeater site has five licensed frequencies: 860.9625, 866.4875, 866.9625, 867.3875 and 867.8625 MHz. These frequencies will carry statewide activity as well as the following local Grant County talkgroups. Since the SAFE-T network is intended to operate primarily with the digital APCO Project 25 standards, you will need a digital-capable scanner to monitor these talkgroups.

Decimal	Hex	Description
38096	94D	Sheriff (Dispatch)
38112	94E	County Emergency Medical Service (Dispatch)
38128	94F	Marion Fire (Dispatch)
38144	950	County Emergency Manage-

38240	956	ment Agency
38256	957	Sheriff (Administration)
38272	958	Courthouse Security
38288	959	Marion Police (Dispatch)
38304	95A	Marion Police (Detectives)
38320	95B	Gas City Police
38336	95C	Fairmount Police
38352	95D	Gas City Fire
38368	95E	Fairmount Fire
38384	95F	Marion General Hospital
		County Emergency Medical Service (Administration)
38400	960	County Drug Task Force
38416	961	County Drug Task Force
38432	962	Countywide Operations 1
38448	963	Countywide Operations 2
38464	964	Countywide Operations 3
38480	965	County Announcements
38496	966	Countywide Operations 4
38512	967	Countywide Operations 5
38528	968	County Fire (Dispatch)

❖ Fulton County, Illinois

Fulton County, Illinois, has a population of about 38,000 and is located to the west of Peoria. Public safety radios there operate mainly on conventional VHF frequencies, with each agency using only those frequencies it was directly licensed to use. Until last May, there was no common frequency that different agencies could use to communicate with each other. This made mutual aid operations difficult, requiring messages to be relayed through dispatchers or on-scene personnel sharing and borrowing radio equipment.

In May the Fulton County Sheriff provided a VHF radio channel for interagency use within the county. A repeater site in the town of Canton will host the channel for local, county and state agencies, including the Illinois State Police and local hospitals. By making this frequency common among cooperating agencies, mutual aid operations should be much easier to manage.

Fulton County uses VHF and UHF frequencies, including the ones listed below:

Frequency	Description
153.890	Mutual Aid Box Alarm System (Fireground)
154.070	County Fire (Marietta, Table Grove)
154.130	County Fire (Countywide)
154.160	County Fire (Avon, Canton, Lewiston, Marietta, Table Grove)
154.175	County Fire
154.190	County Fire (Avon, Marietta)
154.250	County Fire (Astoria, Table Grove)
154.265	Interagency Fire Emergency Radio Network (Statewide)
154.370	County Fire (Fairview, Farmington)
154.415	County Fire (Astoria, Table Grove)
154.740	Countywide Interagency Mutual Aid
154.830	Sheriff
155.010	Canton Fire
155.025	Emergency Services Disaster Agency (Statewide)
155.055	Illinois Radio Emergency Assistance Channel (Statewide)
155.310	Canton Police
155.880	Canton Public Works
159.330	Canton Police (Dispatch)
453.100	Sheriff (Dispatch)
453.850	Sheriff
453.950	Sheriff

❖ Louisville, Kentucky

Louisville is the largest city in Kentucky, located in Jefferson County on the Ohio River across from Indiana. It is home to one of the most famous horse races in the world, the Kentucky Derby. In 2003 the City of Louisville and Jefferson County merged, creating a combined government overseen by a Metro Mayor and a Metro Council. The combined Metro area has nearly 700,000 residents.

To help protect and serve these residents, the combined city/county government is working to implement *MetroSafe*, a comprehensive public safety communications capability. It includes consolidated radio and public safety answering point (PSAP) facilities as well as a new digital radio network. As part of *MetroSafe*, the Metro government is currently working on a \$23 million contract with Motorola to install a new radio network infrastructure. This set of repeater sites and microwave interconnection links will eventually serve the 1,300 officers of the Louisville Metro Police Department and more than 600 full-time firefighters and Emergency Medical Technicians from Louisville Fire and Rescue.

Outside of the urban area, the new system will also link the 1,000 Jefferson County Fire personnel and another 100 county Emergency Medical Technicians. Suburban agencies are also expected to join the system, allowing for much better interaction during mutual aid operations.

Construction of six new towers and the installation of equipment may take up to two

Race Scanning

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years. The total cost for the MetroSafe project, including as many as 5,000 portable and mobile radios, is expected to exceed \$70 million.

Besides providing sufficient voice communication, the network is designed to support still photograph and video transmissions between dispatchers and fire responders. Police officers will be able to call up mug shots, firefighters can review building plans, and emergency medical technicians will have the ability to transmit comprehensive health information while enroute to the hospital.

Louisville and Jefferson County public safety agencies currently make use of a large number of conventional (non-trunked) channels in VHF and UHF.

Frequency Description

155.340	Louisville EMS (Ambulance to Hospital)
154.250	County Fire (East)
154.370	County Fire (South)
154.160	County Fire (West)
154.400	County Fire (Tactical)
154.445	County Fire (Dispatch)
154.010	County Fire (Incident Command)
154.295	County Fire (Mutual Aid)
154.740	Suburban Police Dispatch (South and West)
154.830	Suburban Police (Car-to-Car)
154.860	Suburban Police Dispatch (Far West and Far East)
155.070	Suburban Police (Command)
155.160	Rural/Metro Emergency Medical Service (Dispatch)
155.265	County Fire - Hazardous Materials
155.325	Rural/Metro Emergency Medical Service
155.580	Suburban Police Information
158.775	Public Schools
453.025	County Emergency Medical Service
453.075	County Emergency Medical Service
453.125	County Emergency Medical Service
453.175	County Emergency Medical Service
453.200	University of Louisville Police
453.275	Transit Authority of River City
453.325	Transit Authority of River City
453.375	Animal Control
453.400	Sheriff
453.575	Louisville Police (Link to Suburban Police)
453.675	Sheriff (Dispatch)
453.875	Housing Authority
453.970	Sheriff (Dispatch)
460.025	Louisville Police (Dispatch for 1st and 2nd Divisions)
460.100	Louisville Police (Command)
460.150	Louisville Police (West)
460.200	Sheriff
460.225	Louisville Police (Car-to-Car)
460.250	Transit Authority of River City
460.375	Louisville Police (South)
460.475	Louisville Police (Information)
460.550	Louisville Fire - Operations (Primary)
460.575	Louisville Fire - Operations (Secondary)
460.600	Louisville Fire - Operations (Investigators, Inspections)
460.625	Louisville Fire (Dispatch)
462.950	Louisville EMS (Dispatch)
463.100	Louisville EMS (Tactical)
462.950	County Emergency Medical Service (Channel 9)
462.975	County Emergency Medical Service (Dispatch)

463.000	County Emergency Medical Service (Channel 1)
463.025	County Emergency Medical Service (Channel 2)
463.050	County Emergency Medical Service (Channel 3)
463.075	County Emergency Medical Service (Channel 4)
463.100	County Emergency Medical Service (Channel 5)
463.125	County Emergency Medical Service (Channel 6)
463.150	County Emergency Medical Service (Channel 7)
463.175	County Emergency Medical Service (Channel 8)

The Metro government currently operates a Motorola Type II/i (Hybrid) trunked radio system. The hybrid means that the system can support both Type I and Type II radios. Scanner listeners will have to program in the correct Fleet Map for this system, which looks like this:

Block 0:	S0
Block 1:	S0
Block 2:	S4
Block 3:	S4
Block 4:	S4
Block 5:	S4
Block 6:	S4
Block 7:	S4



The system uses five repeater sites, four in Louisville and one in Jeffersontown. Frequencies licensed to the system are:

856.2125, 856.2625, 856.4625, 856.9375, 857.2125, 857.2625, 857.4625, 857.9375, 858.2125, 858.2625, 858.4625, 858.9375, 859.2125, 859.2625, 859.4625, 859.9375, 860.2125, 860.2625, 860.4625 and 860.9375 MHz.

I would expect these frequencies to be used for the new digital system as the MetroSafe build-out nears completion.

Decimal	Hex	Description
16	001	Airport Snow Removal Operations
160	00A	Airport Fire and Rescue
176	00B	Airport Maintenance
192	00C	Airport Security 1
208	00D	Airport Security 2

Fleet-Subfleet	Description
300-00	Motorist Assistance Program
400-00	Animal Shelter
600-03	Parks Department
600-04	Parks Department
600-06	Parks (Events)
600-08	Public Works (Channel #1)
600-09	Public Works (Channel #2)
700-01	Metro Sanitation
700-05	Refuse Pickup (Channel #1)
700-06	Refuse Pickup (Channel #2)
700-07	Metro Sanitation Talk-Around

❖ Port Hope, Ontario, Update

In the May Scanning Report column, Darren in Ontario asked:

Hi there,

Is there away around encrypted frequen-

cies? Our local police forces kept the same frequency but now sounds like something out of the movie Star Wars. I'm in Port Hope, Ontario, in Northumberland County. Port Hope Police, 142.250 is the frequency.

I found a report that indicated the Port Hope Police are actually operating on 142.245 MHz. I recently received the following report:

I am in Niagara Falls, New York, about 65 miles southwest of Port Hope, Ontario. I have a Radio Shack PRO-2050 with an inside antenna. I can hear noise on 142.245 MHz, possibly information being sent.

Dave in Niagara Falls

Are there any other listeners in the area that might have additional information on Port Hope activity?

❖ Hawaii Recordings

Dan,

I have a request for contact. I am looking to establish letter mail contact with any scanner person in the state of Hawaii to get a 60-minute audio cassette tape of police, fire or airport taping.

Charles via the Internet.

Although many states and municipalities have live scanner feeds streamed onto the Internet, I did not find a listing for public safety radio traffic from Hawaii. If you'd like to check out what's available, the following web sites have consolidated lists:

www.police-scanner.info/live-police-scanners.htm
<http://livepolicescan.homeworldnet.com/>
www.scannermaster.com/Online_Scanners_s/197.htm

For help with Hawaii scanning, Yahoo! Groups offers a electronic mailing list dedicated to monitoring in the Aloha State, which you can check out by going to <http://groups.yahoo.com/group/Radio-Monitoring-Hawaii/>

This group has more than 100 members and someone there should be able to provide a source for recording. The group is operated by David Cabatu in Honolulu, who has his own radio-related web site at www.qsl.net/ah7e/

In the meantime, if any readers in Hawaii are able to provide a cassette tape of public safety radio activity, send me an email and I'll put you in touch with Charles.

That's all for this month. Enjoy these days of summer, and when you're inside cooling off you can send me electronic mail with your questions, comments, and latest frequencies and talkgroups to danveeneman@monitoringtimes.com. You can also find frequencies and links on my web site at www.signalharbor.com. Until next month, happy scanning!

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



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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:

25,000-512,000 MHz., 764,000-775,9875 MHz., 794,000-823,9875 MHz., 849,0125-868,9765 MHz., 894,0125-956,000 MHz., 1240,000 MHz - 1300,000 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.



Bearcat® BC246T Trunk Tracker III

Suggested list price \$399.95/CEI price \$214.95

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

Frequency Coverage:

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

About a year and a half ago, utility radio listeners in Europe began hearing a mysterious new station. All it ever sent was the cryptic identifier of "XSS" in the Automatic Link Establishment (ALE) digital mode popular with many of the world's militaries. At first, the transmissions were always link-quality soundings on an ever-growing list of frequencies. Starting last year, there was also the occasional appearance of 600-baud data communication.

Since then, XSS has been heard throughout Europe and the US East Coast, and even once in Australia. Listeners in the United Kingdom (UK) and Germany seem to have the best and most consistent reception. Often, XSS soundings come at 15-minute intervals.

XSS remained a mystery until early 2007. Now, it has been determined – as conclusively as anything is ever known in this hobby – that it is the UK's fancy new defense radio system. Descriptions found in British contractor press releases and Ministry of Defence (MoD) statements fit very well with what's been heard.

More evidence came when someone found the identifier "UKE306" being used on the net. This is known to be an RAF E-3D Airborne Warning and Control System (AWACS) aircraft out of Waddington, with tail number "ZH106." We don't know why this one plane did this, but hopefully it's the first of many.

XSS, then, is most likely the first audible high-frequency (HF) manifestation of what is a complete overhaul of UK military communications, from the proverbial DC to daylight. Its HF component integrates all three UK armed services in a modern ALE system with voice, real-time secure data networking, and injection to or from secure or public Internet Protocol systems. It's also intended to interoperate with the new version II of NATO's BRASS (Broadcast And Ship to Shore) network. It's obviously a huge project.

❖ Alphabet Soup

This is a military radio system, so, as always, acronyms come first. In 2003, the MoD commenced a 15-year program called Strategic Terrestrial Radio Systems (STRS), to replace, among other things, the aging STCICS (Strike

Command Integrated Communications System) used by the Royal Air Force (RAF). Conceptually, it continues in the flexible design mode of the "Scope Command" upgrade done by the US Air Force. However, it adds more data channels.

The lead contractor is the British VT Communications. VT used to stand for Vosper Thornycroft, the original shipbuilding company, but now it doesn't stand for anything. This particular corporate division was originally created to privatize operation of the BBC World Service transmitting sites. It's grown rapidly into a major world radio provider.

In a slight aside, VT is also the company that recently took over the British standard time station. In a move which was not entirely popular with users in the south of England, VT closed the venerable Rugby transmitter and moved the station to a lower-coverage facility at the company's transmitting site farther north in Anthorn.

The HF component of the STRS program is called the DHFCS, for Defence High Frequency Communications Service. Its control point is at Forest Moor in North Yorkshire, England. The alternate control station is at the Kinloss RAF base in Scotland. Other UK ground sites are at Crimond, Inskip, Penhale Sands, and St. Eval. Overseas sites are at Gibraltar, Cyprus, Ascension Island, and the Falkland Islands. The previous ground-based transmitters will be retired or converted to other uses.

Of major interest to us is a DHFCS component being called Terrestrial Air Sea Communications (TASCOMM). To quote VT's press release, "TASCOMM is a ground-air-ground, ship-shore, and ground-to-ground HF radio communications service designed for NATO and National use."

This sounds roughly similar to the US Air Force's upper-sideband (USB) voice HF-GCS (High Frequency Global Communications System), which is available to any US Department of Defense assets, plus NATO and other autho-



rized users. In the same way HF-GCS directly replaced two Air Force nets, and ultimately also a Navy command system, TASCOMM seems intended as a replacement for STCICS. In the jargon, it "rationalizes" UK military communications into an interoperable network with expandable capabilities.

So what is XSS? Is it DHFCS, TASCOMM, or both? We don't know. For now, this column will keep calling it the UK DHFCS.

❖ Frequencies and Calls

The DHFCS has changed its frequencies at least once, but currently it is using the 25 frequencies shown in Table 1. One of these, 7535.0 kilohertz (kHz), has not been reported in three weeks at press time. However, it is still presumed to be active. The mode is Automatic

Link Establishment, in upper sideband (USB).

The best way to find activity is to scan all of these with a program such as Charles Brain's PC-ALE. The latest version will also show when the ALE callup is followed by 600-baud data, though it won't decode it. This net has never been heard at all in the Western US, but hopefully just because of lousy conditions.

"XSS" is by far the most commonly copied address (the ALE version of a callsign). It

might be the control station(s) we mentioned above. Other stations call XSS, or vice versa. So far, no one has heard the other stations working each other. The use of multiple sites would possibly explain why signal strengths and bearings sometimes change abruptly. Keep in mind that most monitors who consistently receive this net are fairly near the transmitters.

As noted, every call has consisted of letters beginning in "X," expect for that one airplane. Good hunting until next month.



MINISTRY OF DEFENCE

Table 2. DHFCS/ "XSS Net" ALE Addresses

(Found as of early June, 2007)

XAS	XAX	XBC	XBE	XCA
XDB	XDV	XEJ	XFT	XFV
XFY	XGF	XGJ	XGP	XGV
XGZ	XHJ	XHK	XHZ	XJF
XJK	XJP	XJX	XJV	XKA
XKD	XKP	XKP	XKW	XKY
XLE	XLG	XOP	XSA	XSS
UKE306				

Table 1. DHFCS/ "XSS Net" Frequencies (kHz)				
All USB ALE				
2216.0	3226.0	4168.5	4239.5	5268.5
5295.0	6251.0	6416.5	6873.5	7535.0
8107.0	8182.0	9019.0	10233.5	10344.5
10575.0	10893.5	12230.0	14485.5	14508.5
16402.0	16411.0	16606.0	20168.5	20328.5

ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
CAMSLANT	Communication Area Master Station, Atlantic
CAP	US Civil Air Patrol
CW	On-off keyed "Continuous Wave" Morse telegraphy
DEA	US Drug Enforcement Administration
E06	Russian numbers in English, hour and half hour
E07	Russian numbers in English, 20-minute repeats
E11	Unknown agency, in English
EAM	Emergency Action Message
EOC	Emergency Operations Center
FBI	US Federal Bureau of Investigation
FEC	Forward Error Correction
FEMA	US Federal Emergency Management Agency
HF-GCS	High-Frequency Global Communication System
LSB	Lower Sideband
M08a	Cuban 3-msg CW, ANDUWRIGMT = 1-0
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFSK16	16-tone Multiple-Frequency-Shift Keying
NASA	US National Aeronautics and Space Administration
NCS	US National Communications System
NS/EP	National Security/Emergency Preparedness
NTCN	US National Telecommunications Coordinating Network
PACTOR	Packet Teleprinting Over Radio
PSK220F	Phase-Shift Keying, 220 baud
SHARES	Shared Resources (US Government)
SITOR-B	Simplex Telex Over Radio, FEC teleprinting mode
SK01	Cuban "numbers" in PSK teleprinting
STANAG	Standardization Agreement
Unid	Unidentified
US	United States
USCG	United States Coast Guard
UK	United Kingdom
V02a	"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 ().

3389.1 Cuban AM Spanish female voice "numbers" (V02a), in progress at 0117. (Tom Severt-KS)

4018.7 AAR7AT-US Army MARS, informal SITOR-B net with AAR7FE, at 0127. (Severt-KS)

4149.0 WPE-Crowley Marine Service, Jacksonville, FL, radio check with seagoing tugboat Seabreeze and others, at 0520. (Allan Stern-FL)

4449.0 Kilo Whiskey-US Navy, tracking net with Kilo and Papa, at 0400. (Mark Cleary-SC)

4469.0 Mockingbird 994-CAP, MS, southeast region net at 2353. (Severt-KS)

4506.0 Red Cloud 11-CAP net control, NE, sent everyone to frequency "Alpha Alpha," at 0036. (Severt-KS)

4518.6 AFA3VP-US Air Force MARS, Emporia, KS, Region 3 net control in MFSK16, then voice on 4517.1 as AFF3C. No time given. (Severt-KS)

4521.5 T12-US Army, ALE sounding at 1319. (Jack Metcalfe-KY)

4562.0 VAB-VA National Guard, Virginia Beach, ALE sounding at 1725. (Ron Perron-MD)

4585.0 043MERCAP-CAP Middle East Region, ALE sounding at 0915. (Perron-MD)

4604.0 Red Robin-CAP, MI, net control working stations at 1306. (Metcalfe-KY)

4724.0 Platinum-US military, with a 28-character EAM, simulcast on 8992 and 11175, at 0200. (Jeff Haverlah-TX) Andrews-US Air Force HF-GCS control, MD, EAM "for Scotchman," at 1317. (Metcalfe-KY)

4780.0 Brazil-IN National Guard, working Columbus, Logansport, Rockville, Terre Haute, and Tyndall on the Indiana Joint Forces Headquarters Emergency Radio Net, LSB at 1733. (Metcalfe-KY)

4926.0 Angspringfield-OH National Guard, ALE sounding at 1329. (Metcalfe-KY)

4991.0 SF-FBI, San Francisco, CA, calling SD1, San Diego, CA, ALE at 0959. (Cleary-SC)

5058.5 CL1-FBI, Cleveland, OH, calling OM2 (FBI, Omaha, NE), ALE at 0614. NF1-FBI, Norfolk, VA, calling RH1 (FBI, Richmond, VA), ALE at 2150. (Cleary-SC)

5066.0 USAFC1250-US military, working USAIS1012, ALE at 1343. (Metcalfe-KY)

5066.5 USACE1010-Possible US Army Corps of Engineers, ALE sounding at 1344. (Metcalfe-KY)

5125.0 PRT-VA National Guard, Portsmouth VA, ALE sounding at 2025. (Perron-MD)

5399.5 Echo Whiskey-US Navy tracking net with Golf, Juliet, and Hotel, at 0040. (Cleary-SC)

5690.0 Rescue 1502-USCG, patch via CAMSLANT to E-City Air, USCG Air Station Elizabeth City, NC, at 0047. (Cleary-SC)

5696.0 Rescue 1502-USCG HC-130, working Shark 02 (Cutter Tampa) regarding tasking for a search, at 0020. CAMSLANT, advising helicopter Coast Guard 2114 that Cutter Kodiak is enroute, at 0245. Cutter Tampa (WMEC-902) calling Cutter Staten Island (WPB-1345), at 2322. (Cleary-SC) Coast Guard 2127 (helicopter), came from 8983 kHz, getting instructions via CAMSLANT for a medical evacuation, at 1940. (Stern-FL)

5717.0 "N-1-C"-US Navy, coded traffic with "R-1-B," "B-2-R," and "C-2-N," at 2217. (Cleary-SC)

5732.0 J11-USCG, working LNT in ALE, then voice as Juliet 11 working CAMSLANT, at 0257. (Severt-KS) Shark 02-USCG Cutter Tampa, working Panther (DEA, Nassau, Bahamas), at 2114. (Cleary-SC)

5760.0 KNY70-NTCN, VA, ALE sounding at 1318. (Metcalfe-KY)

5778.5 B1Z171-US Army 1-171 Aviation, calling R26975, ALE at 1234. (Cleary-SC)

5787.5 RUH959-US Army UH-60L helicopter, ALE and then data with WAROPS (US Army 1-228 Aviation "Winged Warriors," Soto Cano, Honduras), at 0344. (Cleary-SC)

5821.0 WGY901-FEMA Region 1, MA, calling weekly regional net roll and working WGY931 (VT EOC), WGY971 (RI EOC), WGY941 (ME EOC), and WGY963 (VA EOC), at 1500. (Metcalfe-KY)

5833.5 G23691-US Army 2-147 Aviation, calling STPOPS, St. Paul, MN, ALE at 0243. (Cleary-SC)

5875.0 R23725-US Army, calling KMUING, Muir Army Air Field, PA, ALE at 0250. (Cleary-SC)

5881.5 R00191-US Army, calling T5B159 5-159 Aviation, VA, ALE at 1555. (Cleary-SC)

6502.5 RUH958-US Army UH-60L helicopter, calling WAROPS, Honduras, ALE at 0153. (Cleary-SC)

6694.0 Rescue 320-Canadian Forces CC-130, patch via Halifax Military to Halifax Search, requesting ambulance for inbound helicopter with a patient, at 2330. (Cleary-SC)

6715.0 Hunter 25-Canadian Forces CP-140, working Halifax Military at 2130. (Cleary-SC)

6765.0 NNN0AEY-US Navy/ Marine Corps MARS, calling roll of a SHARES regional net, at 1656. (Metcalfe-KY)

6767.5 USAIS1012-US Army Intelligence and Security Command, VA, working USADA1010, US Department of the Army, DC, ALE at 1341. (Metcalfe-KY)

6800.0 NCS204-Florida EOC, working NCS046, NCS/SHARES Bulletin Board System, in PACTOR at 1600. (Metcalfe-KY)

6803.1 Attprlcbase220-AT&T telephone company NS/EP net, working Attmdtbase210, ALE at 1706. (Metcalfe-KY)

6806.0 043SERCAP-CAP Southeast Region, ALE sounding at 2059. (Cleary-SC)

6910.0 R23472-US Army, calling T12CAB (12th Combat Aviation Brigade), ALE at 0434. (Cleary-SC)

6911.5 R23590-US Army, calling KMUING (Muir Army Air Field), ALE at 0140. (Cleary-SC)

7302.0 AFA4BQ-US Air Force MARS, net control at 1324. (Met-

- calfe-KY)
7361.5 R23748-US Army 12th Aviation, calling T12 (Davison Army Air Field), ALE at 2123. (Cleary-SC)
7480.1 Attlnptport209-AT&T NS/EP, working Attmdtwbase210, ALE at 1702. (Metcalf-KY)
7527.0 NRT-USCG Cutter Active, calling IKL (Cutter Tampa), ALE at 0028. IKL-Cutter Tampa, raised J39 in ALE, then voice as Shark 02, working 39C at 0051. 712-USCG, raised LNT in ALE, then voice as Rescue 712 working CAMSLANT, at 0105. Juliet 14-USCG helicopter, setting radio guard with CAMSLANT at 2254. (Cleary-SC)
7540.0 AFA2PT-US Air Force MARS, in MFSK16 at 1323. AFN4DM, Air Force MARS, MFSK16 at 1348. AFA2DB, Air Force MARS, MFSK16 exercise messages at 1440. (Metcalf-KY)
7547.0 AFF2T-US Air Force MARS, NC, working AFF2L, at 1348. (Metcalf-KY)
7602.0 AVS-Special tactical callsign for CAP National Headquarters, raising 040NHCAP in ALE, then voice as "Avenging Spirit" working "40," at 1437. (Metcalf-KY)
7650.0 R23484-US National Guard helicopter, ALE and data with KGEZNG, Shelbyville, IN, at 2328. (Cleary-SC)
7778.5 CL1-FBI, OH, calling OM2 (FBI, NE), ALE at 1814. (Cleary-SC)
7903.5 NF1-FBI, Norfolk, VA, calling RH1, Richmond, VA, ALE at 2349. (Cleary-SC)
8037.0 GTC-VA National Guard, Gate City VA, ALE sounding at 1550. (Perron-MD)
8097.0 Cuban MCW cut numbers (M08a), 5-figure groups sent as letters, in progress at 1800. (Sevart-KS)
8156.0 Coral Harbor Base-Royal Bahamas Defence Force, working C6YH at 1955. (Cleary-SC)
8180.0 "The English Man"-Russian Intelligence (E06), callup 690 485/127, AM at 1930. (Mike L-West Sussex, UK)
8181.0 CUFAN3-Venezuelan Armed Forces Unified Command, calling RESERVA5, Army 5th Reserve Battalion, ALE at 0438. (Perron-MD)
8181.5 T1Z151-SC National Guard 1-151 Aviation, ALE sounding at 1245. (Perron-MD)
8184.5 G23691-US Army 2-147 Aviation, calling STPOPS (St. Paul, MN), ALE at 0247. (Cleary-SC)
8280.0 T5L1-Possible Venezuelan Navy headquarters, calling Navy unit 8DV9, in LSB ALE at 0310. (Perron-MD)
8301.6 Sector San Juan-USCG, working helicopter Coast Guard 2139 regarding a suspect vessel, at 0154. (Cleary-SC)
8500.0 PR1-Venezuelan Navy Radio Station #1, calling CGA, Navy headquarters, ALE at 0103. 1W1S-Venezuelan Navy or Coast Guard, calling T8R1 in LSB ALE, also on 8810, 9017, 9071, 9075, and 12510, at 0450. (Perron-MD)
8912.0 014FEM-FEMA station WGY9014, calling TSC (Customs Service Center), ALE at 1709. (Cleary-SC)
8918.0 Air Force Rescue 76-US Air Force C-130 out of Patrick AFB on a search, working New York Radio at 1525. (Stern-FL)
8971.0 Wafer 21-US Navy P-3C, Spare Group 3A report to Gold-enhawk (USN, ME), at 1613. (Cleary-SC)
8983.0 CAMSLANT Chesapeake-USCG, setting radio guard with Rescue 1501, a C-130, at 1513. CAMSLANT, getting position from helicopter Coast Guard 6038, at 1538. (Stern-FL) Omni 21-US joint task force HC-130 enroute to El Salvador, setting guard with CAMSLANT at 1857. Coast Guard 2127-US Coast Guard helicopter, working CAMSLANT regarding a rescue, at 1908. (Cleary-SC)
8992.0 LL 26-US Navy P-3C, patch via Andrews HF-GCS to Duty Office, at 1538. (Cleary-SC)
9064.0 WGY908-FEMA, Region 8, Denver, CO, troubleshooting the SHARES Bulletin Board System with an unid station, at 1708. (Metcalf-KY)
9095.1 Unknown-French or Canadian Forces STANAG 4285, loud but no copy, at 2206. (Perron-MD) [S7 here, good sync but garbage, any config... encrypted? -Hugh]
9143.5 RLD-Possible VA National Guard, Richland, ALE sounding, also on 4562, at 0044. (Perron-MD)
10118.0 "The English Man"-Russian Intelligence (E07), callup 301-1, message 513/50 in 5-figure groups, AM but no upper sideband, at 1740. (Mike L-UK)
10190.0 English Man (E06), callup 690 485/127, in AM at 1830. (Mike L-UK)
10202.0 WGY9030-Unknown FEMA, raised HSCOC01, unknown Health Services station, in ALE, then voice with WGY ??? (weak) at 1623. (Metcalf-KY)
10225.0 Unid-US Military, simulating SITOP-B traffic for signal intelligence training, at 2050. (Sevart-KS)
10493.0 WGY904-FEMA, GA, taking check-ins for the quarterly National Emergency Coordination Network exercise, at 1400. (Metcalf-KY) WGY914-FEMA, GA, working an unheard station at 1449. (Cleary-SC)
10780.0 Cape Radio-US Air Force, Cape Canaveral Air Force Station, FL, radio checks with WB 774 (USN P-3C), at 1615. King 74-US Air National Guard rescue wing C-130, calling Cape Radio with no joy, at 1829. (Stern-FL)
11175.0 Gold 81-US Air Force KC-10A tanker, patch via Lajes HF-GCS to Shaw AFB Meteo, getting arrival weather for OTBH, Al-Udeid Air Base, Qatar, at 0013. Blue 81, US Air Force tanker, patch via "Station Offutt" (Offutt HF-GCS, NE) to unknown meteo at 1809. (Stern-FL) Andrews, long 202-character EAM in a distinctive format, at 1447. (Haverlah-TX) Pin Holder-US military, patch via Ascension HF-GCS to report satcom problems at 2359. (Cleary-NC)
11200.0 Unid-2 males discussing fishing in Spanish, probably commercial fishing bootleggers, at 2203. (Perron-MD)
11220.0 Station Andrews-US Air Force, Andrews AFB, MD, possible exercise procedure, working Daredevil (US military), who is passing encrypted data on 14908 kHz, at 0107. (Stern-FL)
11232.0 Trenton Military-Canadian Forces, ON, patching unknown aircraft to Lajes meteo (Azores), at 1952. Trenton, patch to Lajes meteo for Reach 1013, US Air Force Air Mobility Command, at 2055. (Stern-FL)
11426.6 KNY70-NTCN, VA, ALE sounding at 1418. (Metcalf-KY)
11486.0 Female English voice numbers (E11), null-message format with callup "382 oblique 00," new frequency for this one, at 0715. (Mike L-UK)
12088.0 English Man (E07), same message as 10118, AM but no upper sideband, at 1720. (Mike L-UK)
12510.0 1XV7-Venezuelan Navy, calling T5L1 in LSB ALE, at 1553. (Perron-MD)
13388.0 English Man (E07), same message as 10118, distorted AM at 1700. (Mike L-UK)
13446.0 TSC-US Customs Technical Service Center, FL, calling FC4, FEMA Region 4, GA, ALE at 1441. (Perron-MD)
13927.0 Cody 01-US Air Force, probably a C-130, patch via MARS to Offutt AFB, at 1519. (Stern-FL) [New frequency as of June. -Hugh]
13927.1 AFA3HS-US Air Force MARS, KS, patch for Air Evac 60413, a C-130 diverting for weather, at 1525. Cody 01-US Air Force, patch via AFA3HS to Teal Ops, Keesler AFB, MS, regarding radar failure in a thunderstorm, at 1541. AFA6AY-US Air Force Mars, CA, patch for Wooden 71, a tanker, at 2247. (Stern-FL) [Freq is now 13927.0. -Hugh]
14360.0 Attcnrybase180-AT&T NS/EP, GA, working Attmdtwbase210, ALE at 1717. (Metcalf-KY)
14396.5 WGY9416R-FEMA remote, usually OH but mobile in PA, SHARES weekly net check-in at 1553. NCS031-NCS Auxiliary station, TN, SHARES check-in, also at 1553. KHA908-NASA Ames Research Center, CA, SHARES check-in at 1557. WGY939-CA Office of Emergency Services, SHARES check-in at 1600. (Metcalf-KY)
14776.0 FG0-Unknown agency, calling FC4 (FEMA, GA), ALE at 1441. (Perron-MD)
15016.0 Detergent-US military, possible airborne command post, 28-character EAM simulcast on 4724, 8992, and 11175, at 0200. (Haverlah-TX)
15605.0 Attmdtwbase210-AT&T NS/EP, working Attmdtwport211, ALE at 1735. (Metcalf-KY)
16023.5 VALNY-NY National Guard, ALE sounding at 1230. (Metcalf-KY)
17436.0 Cuban PSK220F numbers (SK01), modified M08a format in progress at 1700. (Sevart-KS)
17478.0 Cuban PSK220F numbers (SK01), in progress at 1600. (Sevart-KS)
19233.5 HQ703N-US National Guard Headquarters, VA, working P030AN, PA, ALE at 1257. (Metcalf-KY)
20095.0 Attchgoport190-AT&T NS/EP, IL, working Attmdtwbase210, ALE at 1655. (Metcalf-KY)

Pakistani Navy and Virginia Guard ALE

This month we look at some more features and capabilities of the Hoka Code300-32, but before we get to that, here are some of the latest goings-on in the world of digital HF monitoring.

❖ Pakistani Navy ALE

I happened to be measuring a STANAG4285 high speed modem signal on 8145.2 kHz, when I was distracted by a very strong ALE signal a little lower in frequency. By the time I had tuned the rough spot, there was some strong USB voice underway. The two guys were using a curious mix of what sounded like an Indian language with some English words thrown in for good measure. I could catch a few cricketing terms in there, too, so the two were probably catching up on the Cricket World Cup taking place in the West Indies at the time.

The channel went silent for a while, only for the ALE to start up again, with SJAHAN calling NRS, followed by our two guys talking cricket again. This time I could figure out from the scores they were discussing that they were talking about Pakistan – which had been shocked by losing to Ireland, a cricketing nonentity, instead of losing to India.

The usual trawl of the reference websites ensued: Wikipedia, Haze & Gray, Scramble, etc, checking into the military organization of Pakistan. It was pretty easy to track down the culprits: SJAHAN being the Frigate *Shah Jahan* and NRS probably being the HQ in Karachi.

The Pakistani Navy has a large fleet of frigates (mostly ex-Royal Navy Type 21 ships), mine hunters, missile boats and other smaller craft, in addition to a few submarines. So far, the following frequencies and ALE identifiers have come to light:

Frequencies (kHz USB):

4348, 8057, 8143, 8282, 8353, 8453, 10512, 10962, 13067, 14850

Identifiers:

TARIQ	F181 Frigate "Tariq"
BABUR	F182 Frigate "Babur"
BADR	F184 Frigate "Badr"
SJAHAN	F185 Frigate "Shah Jahan"
TSULTAN	F186 Frigate "Tippu Sultan"
SHUJAAT	P1024 Missile Boat "Shujaat"
NRS	Naval Radio Station, Karachi
NATHIAGALI	Naval Radio Station, Nathia Gali

Several of these stations were heard during 2005 and 2006 using PacTOR-II modems rather than ALE, with messages in the clear. Callsigns used in this case are ARL+ 2 digits. Center of data for the PacTOR transmissions is the USB frequency + 1700 Hz.

❖ Virginia National Guard ALE

This state-wide ALE National Guard network was very active in late 2006 adding more stations each month. To date, there is no traffic to report other than sounds by each station.

The frequencies in use are as follows (kHz USB):

4536, 4561.8, 4562, 4836.8, 4837, 5125, 5816.8, 5817, 6766, 8037, 8037.1, 9119.5, 9143.5

Only RMD appears to use the .8kHz offset channels.

Identifiers:

AFF	???
CSM	Command Sergeant Major, Richmond
PUL	Pulaski
GTC	Gate City
VAB	Virginia Beach
RVA	Richmond
EMP	Emporia
FNK	Franklin
FTB	Fort Belvoir
MNS	Manassas
WCH	Winchester
HAM	Hampton
ONK	Onancock
RMD	Richmond
PRT	Portsmouth
SUF	Suffolk

❖ Hoka Code300-32, Part II

Last month we took a look at the basics of installing and running the Code300-32. As one would expect with a decoder of this standing, the list of modes offered is impressive. In addition to all the usual long-departed modes, such as DUP-FEC and SWED-ARQ, here's a reasonably complete list of modes that can be used on real signals on-air today:

- ICAO ANNEX-10
- ARQ-E and E3
- ARQ-M2 and M4
- AUM-13 & NUM-13
- BAUDOT RTTY (with SYNOP weather decoding)
- BEE (aka 36-50)
- CIS-11, 14 and 29
- CODAN 8500 selcal
- Coquelet-8 (and various sub-modes)
- CROWD-36
- DGPS
- DSC GMDSS
- FAX (FM and AM)
- GTOR
- Globe Wireless DATAPLEX
- SITOR-A and B
- HF DataLink
- MFSK (various Amateur Radio modes)
- MIL-STD-188-100A serial and 39 tone parallel
- MIL-STD-188-141A ALE

- MORSE (aka CW)
- Packet Radio
- PacTOR I and II
- Piccolo-6 and 12
- PSK (various Amateur Radio modes)
- STANAG 4285 and 4529
- Racal SkyFax

There are also professional options that deliver decoders for PacTOR-III and Codan 9000-series 16 Tone modems, the former certainly becoming very important for the HF digital listener these days. The Code300 can also generate digital copies of these signals for testing purposes.

There is a veritable army of analysis tools, too:

- Baudrate: measures key FSK signal parameters like speed and shift
- Auto Classify: automatically classifies many signals by speed and shift
- Phase Spectrum: measures key signal parameters of PSK signals
- Phase Scope: which shows phase/time information of PSK signals
- Phase Plane: a vector scope for all signal types
- Phase Constellation: graphically shows PSK signal constellations
- Waterfall: scrolls signal spectrum vertically down screen
- Waterfall & Sonogram: adds a sonogram display to the waterfall
- FSK Scope: measures timing characteristics of FSK signals
- AFP Scope: shows frequency, phase and power of a signal over time
- MFSK Scope: measures frequency vs time for FSK signals
- Analog Scope: a regular signal oscilloscope
- Eye Pattern: measure timing errors and distortion in signals
- Correlation Bit and Mod: measure signal ACF (Auto Correlation Function)
- Speed Bit Analysis: measures bit/block timings
- Bit Analysis: dumps signals bit-by-bit
- Character Analysis: dumps signals character-by-character
- Character Counter: counts character frequency (sometimes useful in deciphering encrypted signals)

We'll look at how some of these modules help deconstruct and identify various parts of signals in the coming months. Until then, enjoy your digital DX.

RESOURCES

World Navies Today www.hazegray.org/worldnav/menu.htm

Wikipedia en.wikipedia.org

Scramble www.scramble.nl

Haze Gray & Underway www.hazegray.org

Radio Budapest, Hungary, Closed Down

...At least it was predicted to have closed at the end of June, according to a "not official, but known for sure" report in late May published in Hungary's German-language newspaper with the strange name of Pester Lloyd, picked up by Markus Weidner and translated by Kai Ludwig, Andrew Tett, BDXC-UK, as well as Michael Wlochinski on the A-DX list via Wolfgang Büschel, and by our contributor Martin Gallas in Illinois. It said all foreign-language broadcasts would terminate June 30, although some languages ended earlier, such as French on May 31, as reported by Jean-Michel Aubier in France. Italian was already closed in March, and Spanish reduced.

Radio Budapest was founded in 1934. During the Cold War the broadcasts were considered relatively liberal and not so strongly ideolo-

logical as from other Eastern European stations.

Meanwhile, kimandrewelliott.com noted that the Hungarian Radio website www.english.radio.hu/index.php?rovat_id=1054 would not say anything more than "The traditional forms of media must adjust to the expectations created for us by the ever more increasingly globalising social and information conditions."

The editors were ordered to withhold any farewells until the very last transmissions, according to Hendrik Leuker, A-DX. Kai Ludwig suggests that the domestic network Kossuth Rádió might still be heard on SW. You may check now if there has been a reprieve to the English broadcasts which had been running to North America at 0100-0130 on 6040, 0230-0300 on 6195.

AFGHANISTAN [non] R. Solh has been good here most days on 17700 [via UK] till 1800*. Housework is almost fun while listening to the Afghan Top 40, and "our theme" appears periodically in the rotation. You can't set your watch any more by its appearance but at least they play the whole thing (Anne Fanelli in chilly-but-green Elma NY, DX LISTENING DIGEST) Audible this summer on above-average days only; heard the theme once starting at 1427 (gh, OK)

ANTARCTICA LRA36, 15476, was seldom audible, and may not have been on the air every weekday at 1800-2100, but on occasion rose above the noise level, perhaps assisted by sporadic E over North America for its last hop. Lots of music, alternating with talk features, several IDs interspersed, even in Japanese. Gabon was irregular on 15475 until 1900 and sometimes LRA36 was roughly of the same strength (gh, OK)

ARGENTINA Marcela Campos, head of RAE, was interviewed by Alfonso Montealegre on RNW's Radio Enlace. She thinks SW may last for a few more years. The younger generation isn't satisfied with the audio quality of SW. Thinking about putting Japanese on at 2200 for a morning broadcast, instead of Spanish, but waiting to see what happens to RAE. Radio Nacional is already on internet, and hopes to have RAE on there too before too much longer, but that is not her decision. SW is still there when internet and satellites fail. Has good relations with other stations, but does not have the wherewithal to work together with them (perhaps alluding to the collision on 15345). She has been in SW since 1989; before that was at a domestic station in remote Ushuaia where she would like to return some day after retirement (gh)

Since RAE uses so few channels (6060, 9690, 11710, 15345) in their aging SW transmitters, I wonder if they are crystal-controlled, like Denmark's 50 kW sender outside Copenhagen back in its day on 9520 or 15165? (Joe Hanlon, NJ, DXLD) I bet they are, as at least 11710 and 15345 drift off-frequency, another xtal characteristic. RAE further off-frequency than usual, judging from the het against Morocco and Spain which as usual produce only a sub-audible het of a few Hz against each other on 15345.0; May 28 at 1837 I put RAE at about 15343.4, no audio detected (gh) 15343.8, R. Nacional, at 2221-2248 June 2, interview in Spanish, Beatles, fair-good reception, no QRM (Ron Howard, CA, DXLD)

R. Nacional, 6280 reported last month, is a spur from 6060, matched by another one on 5840, 220 kHz separation (Luis Valderas, Chile, ibid.) 6280 heard at 2028 (Rubens Ferraz Pedrosa, Brasil, @tividade DX)

11440-LSB, Radio Continental, Buenos Aires, 0150-0155, program Gira Continental (Nicolás Eramo, Argentina, DXLD) Also at 2254-2307+ with ballads, news on hour, nothing audible on 15820-LSB (Harold Frogde, MI, MARE Tipsheet)

AUSTRALIA ABC Managing Director Mark Scott announced the appointment of Mr Hanh Tran as new Chief Executive of Radio Australia. Hanh has been Executive Producer of Vietnamese content for RA and was, from 1997 until 2001, Head of the Vietnamese Service for BBC World Service (ABC News via kimandrewelliott.com) The path to leadership at RA seems to be from one of the foreign-language services, as the previous head came from the French service, abolished from SW (gh)

BHUTAN Mr Thinley Dorji, Station Engineer, Bhutan Broadcasting Services, told me that the new 100 kW Thompson trans-

mitter (donated by Government of India) was supposed to be on air by the end of May. The old transmitter will be used as standby (Alokesh Gupta, DSWCI DX Window) Already heard from May 17, 6035 at 0005-0030 fadeout with the typical Buddhist monk choir (Anker Petersen, Denmark, via Gupta, DXLD) At 0000, 6035 blasting in, strongest station on 49m (Victor Goonetilleke, Sri Lanka, ibid.) Thinley confirmed the new transmitter being tested since 17 May; schedule 0100-0630, 0830-1600 (Alokesh Gupta, DXLD) But really heard opening at *0003 (Mike Barraclough, England, ibid.)

New transmitter is a Thomson Grass Valley TSW 2100D, delivered with a new 5/6 MHz quadrant antenna (Kai Ludwig, Germany, ibid.) At 1450 decent signal in English, giving e-mail and postal address towards end of that program (Jari Savolainen, Finland, WORLD OF RADIO) Schedule page shows continuous from 07 to 23 local (UT +6), so that would be 01-17 UT, but everyone has been reporting them signing on at 0003 UT; With English hours at 05, 08, 14, 16 UT, the last two TV simulcasts - although they do not make clear if all this really applies to SW as well as FM (gh) Bhutan 6035 was running extended services for its first parliamentary election trials past 1600 with English discussions. Bad interference cochannel NHK (Victor Goonetilleke, Sri Lanka, dx_india) Fades out around 0045 (Anker Petersen, Denmark, via Dario Monferini, playdx yg)

BOLIVIA R Virgen de Remedios, Tupiza, e-mailed me on 4 May that they had been testing on 5905 for four weeks, with 500 watts, half-wave open dipole, at 1200-2000, reports wanted (Björn Fransson, Sweden, DSWCI DX Window) Lately heard on 3215 and 4545 (DSWCI Ed., ibid.) 5905 not likely to get out much if daytime only (gh)

BRAZIL José Carlos Sigmaringa Seixas of R. Senado, 5990, e-mailed me their schedule as M-F 1000-2200, Sat & Sun 1000-1300 with the program Senado é Mais Brasil. Antenna is aimed toward northern states (Dirney Martins, radioscultas yg) Very good signal at 0955-1010 with Brazilian music, ID and talk (Brian Alexander, PA, DXLD)

BURMA [non] The Radio Free Asia Burmese service launched a five-minute long Arakanese language news service during its ethnic program, towards the end of Burmese program every Sunday at 1230-1330 on 9320, 9455, 13675. RFA Burmese will also launch Mon language in addition to Shan, Karen, Karenni, Kachin, and Chin since last year (Narinjara via Media Network blog) These minority language programs are lumped together under Burmese, not even mentioned in RFA frequency schedules, what an insult. They do the same with some Chinese minority languages (gh)

CHAD More to last month's report on the extremely distorted far-off-frequency RNT transmitter varying around 7312: instead of being fixed and returning to 6165, it shifted to the 7292 area, interfering with BBC Portuguese 7290 via South Africa at 0430-0530, but not always audible (gh) Also around 7290 at 1535, and 7288 from 1730 (Jari Savolainen, Finland, DXLD) E-mail in French to RNT about this got no response (Ehard Goddijn, RNW, ibid.) After that on some mornings heard wandering more widely, 7312 as high as 7370 (Wolfgang Büschel, Germany, ibid.)

CHILE Dr. Gene Scott, Anguilla, became irregular on 6090, allowing some much more interesting stations to be heard, such as (gh) 6089.87, Radio

Esperanza, Temuco, 0805-0905, Spanish sermon and religious music. Mentions of Esperanza. Good (Brian Alexander, PA, WORLD OF RADIO) See also ETHIOPIA; NIGERIA
CHINA Huayi Broadcasting Co., Fuzhou, 6185, has a DX program named BCLer's Sky every Saturday 0730-0830 (NDXC via Austr-

*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-07=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*

lian DX News) Despite English title, probably in Chinese (gh)

[and non] The heavy and almost continuous Firedrake jamming against Sound of Hope shifts some of its frequencies to keep up with SOH; at end of May on 18180 ex-18160, 13620, 14500, 13970, 10300, 9200 (Olle Alm, Sweden, DXLD) A new one on 7300, 24 hours such as at 1900, but not 14620. Also at 0900-1100 on 9540, 11760, Sat & Sun against Taiwan transmitters (S. Hasegawa, NDXC, WORLD OF RADIO) New 14520 ex-14620 at 1622-1654 // 7300, 9200, 10300, 18180 (Ron Howard, CA, DXLD)

CUBA The Dentro-Cuban Jamming Command continues to mess up frequencies other than those they are targeting, and do they care? Of course not! At 0022 I found jamming pulsing away harmonically on 18090, which is 3 x 6030 against R. Marti. Then at 0024 found on 17730 exactly the same jamming pulses as on 18060, but here spreading to 17725, bothering WYFR in Portuguese, and to 17735. This is what we tend to call "bubble jamming," but without the tones, since there is no carrier to beat against. 18090 is common, but never heard 17730 before, which is 3 x 5910 against R. República via Germany, and it was also heavily jammed on the fundamental. At 0109, heard 12060 pulses, the second harmonic of 6030 to go along with the third on 18090. Meanwhile, Cuba blockaded 500 SW receivers won by Cubans in an RCI/RNW essay contest (gh)

5940 and 6300 from Radio Havana Cuba in English at 0515-0545, fair reception, could be mistaken for legitimate fundamentals but are leapfrogging spurs from 6060 & 6180 over each other 120 kHz beyond (Brian Alexander, PA, DXLD) See also WESTERN SAHARA

EGYPT [and non] Looking for the CVC Chile mix previously heard on 12275, instead I found weak and distorted Spanish on 12270 at 0131, the second harmonic of R. Cairo 6135, and // better signal on unsynchronized 7270. 6135 is scheduled 0045-0200. Cairo Arabic fundamental 12050 also audible, stronger but awfully distorted (gh, OK) 12270.03, also heard at 0105-0200*, poor distorted audio (Brian Alexander, PA, DXLD)

ETHIOPIA 6109.92, Radio Fana, Addis Ababa, 0305-0335+, Horn of Africa music, talk in local language. Poor, mixing with TWR on 6110, but in the clear when TWR leaves the air at 0332. Heard // 7210, poor under BBC, but in the clear when BBC leaves the air at 0329 (Brian Alexander, PA, DXLD) 6109.92, R. Fana at 0335-0344, May 21, vernacular. HoA music followed, poor as was // 7210 (Scott R. Barbour Jr., NH, ibid.) But watch out for Colombia para Cristo leapfrog, also off-frequency; CVC Chile is also off 6110.0 but not until 0400 (gh)

[non] New rebel group radio, The Voice of Patriots, heard as scheduled Thursday 16-17 on 15260. Sounds like it's coming from a tin can (Björn Fransson, Sweden, HCDX)

9480, Voice of Democratic Path of Ethiopian Unity, via Wertachtal, Germany, *1901:45-1959* on a Wednesday, Amharic ID at sign on and off: "Yih Finote Demokrasi ye Ethiopia andinet," mostly political talks by one man, mentioning Somalia, Ogaden, Asmara and Taleban, in between Horn of Africa flute, 55444 deteriorating to 45343 (Anker Petersen, Denmark, DSWCI DX Window)

Radio Mustaqbal in Somali, on 15455, 250 kW, 240 degrees via Dhabbaya, UAE, refuted to: 0600-0630 & 0710-0740 Mon/Tue/Wed/Sat (DX Mix News, Bulgaria)

GABON Africa No. Un, 17630, has been irregular, apparently due to technical problems, such as carrier continually dropping off. I have never noted the Afropop jammer missing from 17660v, so it has priority over 17630 when they are short one transmitter (Olle Alm, Sweden, DXLD) 17630 at 1330 sounds like half power or less (Raúl Saavedra, Costa Rica, ibid.) And later 15475 may be weakened or missing, facilitating Antarctica, q.v., after 1800 (gh)

GREECE News in English from R. Macedonia, Thessaloniki M-F at 1156 (Rumen Pankov, R. Bulgaria DX program) One hour earlier than in winter (gh) English news at 1158-1201 on 9935, ended with local weather (Mike Barraclough, England, WDXC Contact)

Caught the end of Voice of Greece's English broadcast with woman announcer at 2055 Sunday on 7450 with music program, 2100 into Greek (Marty Delfin, Spain, DXLD) Previously unknown time, from 2000? (gh) Same heard here Sunday 2305-2405 on 7475, 9420 when Greek In Style is known to be scheduled. Hellenes Around the World, but hosted by someone other than Katerina, heard at another new time, UT Monday 0200-0300. Suddenly, we are overwhelmed with English broadcasts on the North American Service of The Voice of Greece! (John Babbis, MD, ibid.) But unreliably as may not be daily and they won't give us a full schedule (gh)

BBG's budget request for FY 2008 reveals where the US SW transmitters dismantled in Greece went to. One of the two newest shipped to Tajikistan to upgrade the Orzu site along with new antennas, and the other stored for eventual shipment to a high-priority area. These had already been moved once from the closed IBB site at Glória, Portugal (Kai Ludwig, Germany, DXLD)

ICELAND Months after planned closing of SW relays, still heard into June (gh) 12115, RUV, Reykjavik, 2306-2341*, with news and features in Icelandic (Rich D'Angelo, PA, NASWA Flashesheet)

IRAN V. of Justice, 0130-0230 includes the daily Inside the Bush Administration, then US Foreign Policy. Daily?! Not even Stephen Colbert can cram in as much political commentary per minute as these folks. 9495 solid S6 but by sign-off about S3. // 7235 weak entire time (Liz Cameron, MI, DXLD)

ISRAEL Another scare about IBA terminating English broadcasts erupted in June, but was resolved five days later. Jerusalem Post started an online

petition to save the broadcasts, and Ha'Aretz also editorialized against such a closure, both making all the usual points about the value, and necessity of foreign language, and shortwave broadcasts (via Doni Rosenzweig, Artie Bigley) On June 11, IBA shelved the cuts planned for July 1 (Media Network blog)

Kol Israel has a hard time adhering to its SW schedule. Spanish broadcast at 1945-2000 supposed to be on 9345, 9400, 11590, would have one or two frequencies cut off early, and the Hebrew frequency 15615 supposed to start at 2000 would be on several minutes early with Spanish (José Miguel Romero, Spain, DXLD) English at 1900 sometimes on 11605 instead of scheduled 11590 (Steve Lare, MI, ibid.)

JAPAN [and non] NHK World Radio Japan's A07 frequency schedule says "There will be major changes as of October 1." (John Norfolk, DXLD) As a result of planned cutbacks in broadcasts and language services (Joe Hanlon, NJ, ibid.) Daily broadcasting will be reduced from 65 hours to 49 hours, 20 minutes. English is to be drastically reduced from 14 hours to 3 hours, 10 minutes per day. Malay, German, Swedish, Italian will be discontinued. Other reductions: French, Spanish. SW transmission to NAM and Hawaii, and Europe except Russia will be discontinued. Other services remain unchanged (Tohru Yamashita, ABI, via Takahito Akabayashi, Tokyo, DXLD)

Japanese government will launch a radio channel in July for North Korea focusing on Japanese citizens abducted by Pyongyang, different from the privately-run Shiokaze, run by an activist group. The new state-run radio will focus on the government's position on the abduction issue, messages from victims' families, and efforts to have them sent back to Japan, for an hour a day, half in Korean and half in Japanese (Chosun Ilbo via S. Hasegawa, NDXC) WTFK? SW?

KOREA NORTH [non] 9485, Shiokaze - Sea Breeze via Taiwan, *1300-1330, English days developed a pattern in June, Tuesdays and Saturdays (Ron Howard, CA, DXLD)

Open Radio for North Korea changed schedule June 11 to 1100~1200 on 9930 via KWHI Hawaii, initially weekdays only, later expanding to weekends and to two hours. This change is interpreted as urgent action to avoid jamming on 7390 (Northeast Asian Broadcasting Institute) What makes ORNK think 9930 will not also be jammed? 9930 was already heavily jammed by the Chinese during Sound of Hope, M-F 1400-1600. ORNK 7390 was at 14-15 via Tajikistan, neither site very close to NK (gh)

LAOS [non] In early June, ten people were arrested in California for an arms trafficking plot aimed at overthrowing the government of Laos; among them was exiled Hmong leader Vang Pao (RN news via Arnaldo Slaen, condig list) Perhaps connected with Hmong Lao Radio, Wed/Fri 0100-0200 via Taiwan 15260; and Sat/Sun 1300-1400 via WHRI 11785 (gh)

LIBERIA [non] Star Radio via Ascension, 9525, often heard from 0700; sometimes repeated after 0730 when Cotton Tree News was missing; cf. SIERRA LEONE [non] (Brian Alexander, PA, DXLD) Star makes friendly replies to E-mail reports, but say they do not have a QSL card (Ron Howard, CA, ibid.)

MALDIVES ISLANDS Five private radio stations were awarded FM frequencies in May, but not including Minivan Radio, which had voluntarily closed its SW broadcasts in March hoping to get on FM (Minivan News via Media Network blog) Minivan R. said it might try to get time on some of the new FM stations, or possibly return to SW (Minivan News via kimandrewelliott.com) Minivan News is a separate organization from Minivan Radio, which also hoped for a name change (gh)

NETHERLANDS RNW is revamping its Spanish programming in October, eliminating long-running specialized programs such as Radio Enlace. Alfonso Monteleagre and I will continue to produce other shows. Also because of poor reception in South America, 15315 via Bonaire was replaced in June by 9450 at 0000-0200 (Jaime Báguena, RNW Director Artístico) See also CUBA

NIGERIA During another absence of Anguilla from 6090, I monitored all night. On 6089.85, R. Nigeria, Kaduna, carrier on at 0418 but no real audio until just after 0500, sunrise at the transmitter, with Kaduna signal rising to equal levels with Bandeirantes, Brasil. Talks by man and woman in presumed Hausa interspersed with African vocals every 10 minutes or so until 0530, when format changed to all vocals. Presumed news at 0600. Signal began slowly fading at 0610 after being at equal or slightly better levels with Brazil for over an hour. Carrier was still visible past 0730, 2.5 hours after sunrise! (Brandon Jordan, TN, DXLD) See also CHILE

PAPUA NEW GUINEA Wantok Radio Light, 7120, heard announcing in mid-May that they would move to 7325 in June, confirmed by e-mail (Wayne Bastow, NSW, DXLD) That had been planned for over a year; took a long time. But hardly an improvement, with HFCC showing at various times on 7325: China, Iran, UK, Canada, India, Russia, USA. However, an open window at 0600-1100, prime evening listening and DX time (gh) Reduced to -0930, as France in Chinese via Taiwan started using 7325 at 0930-1030 (Ron Howard, CA, WORLD OF RADIO) WRL was on new 7325 by May 31 from before 0700 and also from *2000, with NBC News relay in English at 0900 and 2200 (S. Hasegawa, NDXC, ibid.)

4960, Vanimo is presently called Radio St. Gabriel according to the bishop of Vanimo, Cesare Bonivento in an e-mail to Dave Foster. Will eventually join the CRN [Catholic Radio Network] now operated by Radio Maria when uplink facilities are installed in Port Moresby, probably by yearend (John Wright, Australian DX News) St. Gabriel Radio, Inc. operates WUCO 1270 AM in Marysville-Columbus and WFOT 89.5 FM in Mansfield-Lexington, offering good Catholic programming for the

Dioceses of Columbus and Toledo, OH (Mr. Chris Gabrelcik, President of St. Gabriel Radio, Inc., CRA Messenger) Maybe unrelated to PNG station, other than sharing patron saint (gh)

PERU R. Centinela del Norte reactivated on 4655.2 from Distrito de Cortegana, Provincia de Celendin, Departamento de Cajamarca heard at 0005-0200*, mentioning 4655 and FM 90.7. In 2000 and 2001, stations of three different names were active from Celendin province on 4655, so may be the same transmitter: Radio Celendin, Ecos del Eden and Radio Nuevo Amanecer (Rafael Rodriguez, Colombia, playdx yg)

5602.8, R. La Voz de los Andes, El Higuaron, heard in early June after a few weeks' silence, at 2253-2330 with music show Identidad Campesina, mentioning FM 93.9.

6536, Radiodifusora La Voz del Rondero, Huancabamba, at 2225-2245 with program Asi canta el Huaylas (Rafael Rodriguez, Colombia, condig list) Also heard on 6536.06, at 0210-0224*, folk music, ID, off with National Anthem (Brian Alexander, PA, DXLD)

Andina news reports that the government busted and confiscated equipment of a Radio Andina, Huancayo, on June 3. I'll find out if this is the same station which was on SW (Alfredo Cañote, Peru, condig list) WRTH 2007 lists it on 4996v with callsign OAX25, so not a pirate (gh) Nightly monitoring logs show it was last heard on 4995.6 June 7, 2005; in the morning, last logged on April 30, 2004 (Emilio Pedro Povrzenic, Latinoamerica DX, Argentina)

Radio Ancash, 'La Voz de los Andes', Huaraz, 4990, now has website: <http://www.radioancash.org/> (DXing the Finnish Way)

RWANDA [and non] According to reports on the drmx.org forum, 26 MHz DRM transmissions not only from Europe, but from here have been heard in May thanks to quite regular multi-hop sporadic E openings. DW Kigali on 25740 was getting to Switzerland and France, 80 Watts RMS into a quarter wave ground plane antenna placed 10 m above ground (Mike Barraclough, UK, WORLD OF RADIO)

SAUDI ARABIA English on 15250 identified as Broadcasting Service of the Kingdom of Saudi Arabia at 1213, signed off 1227 as English service of Radio Jeddah (Mike Barraclough, WDXC Contact) In French they ID as R. Riyadh, but not in English? (gh) 15250, BSKSA, Riyadh. English current affairs, including item on ethanol usage in the U.S., announcing 96.2 MHz in Jeddah, abruptly off 1226 (Craig Seager, NSW, Australian DX News) English maybe only on Fridays is till 1255, usually till 1155 (Rumen Pankov, Bulgaria, ibid.)

SERBIA On 7835, International R. Serbia with FMish modulation // 7240, ID at 1500 (Zacharias Liangas, Greece, DXLD) Was putting out similar spurs when same transmitter was on 6100 in March. That's plus 595 kHz, so look for a match on 6645 (gh) Viz.: at 1459 noted strong distorted audio with familiar interval signal on approx. 6686 and 5514, plus/minus 586 kHz from 6100 (Jari Savolainen, Finland, HCDX)

SIERRA LEONE [non] Cotton Tree News (CTN) via Ascension, 9525, as last month, nominally 0730-0800, was sometimes missing and instead its companion program, Star Radio for Liberia at 0700-0730 would be extended or repeated. V. of Indonesia interfered too, sometimes opening 9525 at 0730 instead of 11785. CTN sign-off announcement lists languages as English, Krio, Limba, Mende and Temne (Ron Howard, CA, DXLD) See also LIBERIA (gh) George Bennett of CTN is the same GB who ran Star Radio. He's a legend – a former head of the BBC African Service who later ran Radio Rajo/Radio Manta, the UN station in Mogadishu in the early 1990s. The last time I bumped into him in Nairobi, he was running the Red Cross in Somalia. A real radio man and Africa man (Chris Greenway, UK, DXLD)

SRI LANKA [non] Before you could read last month's item, IBC Tamil moved again, from 7225 to 7115, at 0000-0100 via Wertachtal, Germany, 250 kW (via Kai Ludwig, DXLD) Tuned in at 2357 and heard rapidly pulsed CW-sounding signal, jamming IBC Tamil past 0012 (Steve Lare, MI, ibid.)

SUDAN [non] BBC's Darfur Salaam to Sudan, in Arabic with powers, azimuths:

0500-0530 9735 Moscow 300 kW / 150
0500-0530 12015 Armavir 500 kW / 188
1700-1730 15515 Woofferton 300 kW / 125
1700-1730 17585 Ascension 250 kW / 065
(DX Mix News, Bulgaria)

TAJIKISTAN The Tajik language website of RFE/RL has been covering the (planned) launch of a (re-)new(ed) Foreign Service of Tajik State Radio – Voice of Tajik (Ovozi Tojik). The May 7 target date was delayed. It would be 16 hours a day in seven languages. (Translations from Tajik by Ibrahim Rustamov). HFCC A07 showed several additional SW frequencies registered in anticipation (Bernd Trutenau, Lithuania, DXLD) But no definite schedule has been published. Azimuths range from 60 to 135 degrees, i.e. only from ENE to SE (gh) According to Regnum.ru, Ovozi Tojik started broadcasting June 1, daily 0200-1800 in Arabic, Dari, English, Farsi, Russian, Tajik and Uzbek (Sergei Sosedkin, ibid.) So does that include existing but seldom reported English at 0345-0400 and 1645-1700? (gh)

TIBET [non] A-07 schedule from Lhasa includes Holy Tibet in English: 0700-0730: 9580 9490 6200 6130 6110 5240 4920 4905 [exc Tue] 1630-1700: 7385 7125 6200 6130 6110 5240 4920 4905 [both exc Sun?]
(S. Aoki via S. Hasegawa, NDXC)

UKRAINE In order to improve reception in CEu and avoid splash from Radio Free Afghanistan via Thailand and Sri Lanka on 15680, RUI replaced 15675 with 11550 at 0800-1300 including English at 1100-1200, still via Kharkiv, 100 kW, 277 degrees (Alexander Yegorov in open dx yg via Sergey Nikishin, DXLD) 11550 clear until 1230 RFA Kuwait (DX Mix News)

UAE Deutsche Welle has introduced a Dhabayya relay on 9545 at 22-24 in German (Eike Bierwirth, Germany, DXLD) Replaces Nauen site, still to SAM (Wolfgang Büschel, ibid.) So first time UAE facility intended for SAM, beyond usual Af (gh)

UNITED NATIONS [and non] Noticed in a recent Economist that UN Radio is looking for a new head of the service, based in New York, in case anyone is looking for a job there! (Walt Salmani, BC, mid-May, DXLD) UN Radio cancelled all SW broadcasts as of May 21, including 1730-1745 M-F English via 3 sites (DX Mix News, Bulgaria)

USA Good news for now: The 5 June markup of the House Foreign Operations Appropriations Subcommittee fully restored funding for the following VOA language services: Albanian, Bosnian, Croatian, Greek, Macedonian, Serbian, Ukrainian, Georgian, Uzbek, Hindi, Cantonese, Thai, and Tibetan. The mark also provides \$8 million for VOA English, which more than fully restores the cuts to VOA English radio broadcasts. For Radio Free Europe/Radio Liberty, the mark restored cuts to South Slavic [Serbian, Croatian, Bosnian], Romanian, Kazakh, Russian, and Ukrainian. For Radio Free Asia, the mark restored cuts to Tibetan and Cantonese language services. But it remained to be seen what the Senate Appropriations Committee would do. In 2006, it agreed with the White House/BBG proposal to cut those services (Kim Andrew Elliott, kimandrewelliott.com)

The Checkerboard Lounge, a new blues music show, premiered June 3 on WBCQ 7415, Sundays 2200-2300. We will air the likes of Buddy Guy, Jelly Roll Morton, Eric Clapton, Junior Wells, Robert Johnson. Tune in, enjoy the Blues and become Official Checkerboard Lounge Lizards (Roscoe, Your bartender, DXLD) Issuing limited edition QSLs; see <http://www.wbcq.com/checkerboard> (NE Alien Hunter, shortwaves yg)

A radio-related comedy show, Shore to Shore HF, premiered May 27, UT Sundays 0300-0400 on 7415 (Larry Will, WBCQ, DXLD)

URUGUAY R. Universo, Castillos, Dept. de Rocha, still plans to broadcast on SW 6055. Owner Juan Brañas answered my inquiry that along with moving the MW transmitter, SW could return by June. SW is named on its website R. Universo Internacional. Look at their expected SW coverage map at http://www.universoam.com/cobertura_oc.html (Horacio Nigro, Uruguay, DXLD) I don't think so: a very large oval encompassing all of SAM, most of NAM, most of EU, all of Africa, Asia as far as India – at least, not with the 40 WATTS as listed in WRTH 2007. No mention of power could I find on website for 6055 "kilogers" (gh) I've never heard it in these years since they announced their SW. Maybe the map predicts an increased output power. At least they still plan to go on SW (Nigro, ibid.)

VENEZUELA [non] RN de Venezuela via Cuba, originally all Spanish, has inserted some English segments, e.g. at 2330 on 13680, 15250 via Cuba with news about OAS, sports (Sheryl Paszkiewicz, WI, WORLD OF RADIO)

WESTERN SAHARA [non] I thought LV de la RASD, 6300, signed on around 0700, but June 5 at 0606 it was already going with monotonous chants, then Arabic announcements, music. Meanwhile, RHC mixing product of 6060 leapfrogging over 6180, 120 kHz further up, could be heard underneath on 6300, and the two produced a SAH of about 4 Hz, which speaks remarkably for the frequency control of both stations, unless it is just coincidental (gh)

RASD Polisario Front on 6300.0 according to monitoring: 0600-0800 in Arabic, 1700-1800 in Spanish, 1800-2300 in Arabic (DX Mix News, Bulgaria) But a few days later again heard in Spanish until 2400* (José Miguel Romero, Spain, DXLD) They keep jumping the Spanish hour back and forth between 1700 and 2300 (gh) Streams live via <http://web.jet.es/rasd/radionacional.htm> Website of RASD TV Station <http://www.rasd-tv.com> has a 4-minute videoclip showing facilities (Bernd Trutenau, Lithuania, DXLD)

ZIMBABWE After numerous delays, Mugabe's new Voice of Zimbabwe was supposed to start on Africa Day, May 25, according to Electronic Chronicle (via Media Network) But then delayed indefinitely again per Zimbabwe Times (via Chris Greenway, DXLD) But heard from May 25 only with music tests on 4828 at night, 5975 daytime (David Pringle-Wood, Zimbabwe) 4828 music only then widely reported from Europe, North and South America, along with domestic service on 3396 (gh)

The new shortwave radio station recently launched by our only broadcasting station must clearly carry a government health warning: It could drive you crazy and nuts – with deadly boredom! My question to the Minister of Information and Publicity, Sikhanyiso Ndlovu and ZBH chief executive officer Henry Muradzikwa is: Why subject Zimbabweans at home and in the Diaspora to yet more torture and cruelty? (Bornwell Chakaodza, Harare, allafrica.com via kimandrewelliott.com)

Meanwhile, at a summit in Ghana, Minister Patrick Chinamasa launched a blistering attack on radio stations broadcasting into Zimbabwe and called on the African Commission to help close them down. (Violet Ganda, SW Radio Africa Zimbabwe news via David Pringle-Wood, 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>

0018 UTC on 7555

KUWAIT: Voice of America relay. Special English program of *Focus on Business*. Co-channel interference commencing at 0029. Fair-poor signal quality. EIBI listing notes Pashto service via Sri Lanka at 0030. (Scott Barbour, Intervale, NH) **Radio Kuwait** 15495, 0345. Arabic announcements to Arabic music program. (Joe Wood, Greenback, TN)

0030 UTC on 9900

BULGARIA: Radio Varna. Bulgarian/English. Romantic pop ballads to several IDs and station jingle at 0100. Newscast amid fair signal quality with 9905 splatter from Iran's VOIRI. (Barbour) **Radio Bulgaria** 9400, 0241-0245. Discussion on Bulgarian culture. (David Weronka, Benson, NC)

0136 UTC on 6925USB

PIRATE: WTCR. Music selection of C&W, to mix of tunes from Santana, Jackson Brown and Johnny Cash. Station ID at 0140 and 0200: "This is WTCR-20th Century Radio." Sign-off routine with address maildrop and QSL policy. Fair-good signal. Additional pirates: **The Crystal Ship** (USA) 6875, 0310-0319.* (Wood) Euro-Pirates: **Weekend Music Radio** (Scotland) 6400.05, 0000-0010+; 0125-0140; 0355-0415; 2345-0020; **Cupid Radio** (Netherlands) 6265.19, 2345-0020; **Radio Borderhunter** (Netherlands) 6310, 2345-0020; **WBNY** (USA) 6210.03 USB, 1535-1545+. (Brian Alexander, PA)

0234 UTC on 11710

ARGENTINA: RAE. English program of Argentine vocals and male/female announcer's text and conversations. (Stewart MacKenzie WDX6AA, Huntington Beach, CA) **RAE** 15343.81 audible 2205-2215 in Spanish. (Alexander)

0256 UTC on 6150

ROMANIA: Radio Romania Intl. Sign-on interval signal into station ID and frequencies for North American service. National news coverage on U.S. military presence in Romania and Bulgaria to item on NATO, and music program. Fair signal // 9645. (Wood)

0305 UTC on 6109.92

ETHIOPIA: Radio Fana. Horn of Africa music style to text in local language. (Amharic?) Poor signal mixing with TWR on 6110, until their sign-off at 0332. Monitored Fana // 7210 (poor) under BBCWS. Clear at BBC sign-off 0329. (Alexander)

0335 UTC on 9880

RUSSIA: Voice of Russia. (via Armavir). Text on U.S. political system to Glenn Miller classics played by Moscow Chamber Orchestra //9860 good. (Wood) VOR 9865, 0315-0320. (Weronka) **VOR** 13635, 0349; 13635, 0230 (Jerry Brookman, Kenai, AK) Russia's **Tikhiy Okean** 9765, 0835-0900. Russian news, //12065. (Chuck Bolland, FL) **TWR**-India via Novosibirsk, Russia 12085, 0136-0145.* (Barbour)

0415 UTC on 9625

CANADA: CBC Northern Svc. Fair signal quality for bossa nova music program including *Soul Bossa Nova* by Quincy Jones. (Wood) **Radio Canada Intl** 6100, 2315, RCI 15235, 1846; South Korea's **KBS Worldwide**, Canadian relay 9560, 1205. (Fraser) 9560, 0249. (MacKenzie) CKZU Vancouver 6160, 0225, 0342, 0417-0428, 2342 with SIO 333. (Brookman)

0540 UTC on 9615

NEW ZEALAND: Radio NZ International. News announcements and events in Fiji, with good signal; 6095, 1015 news on National Labor Agreement. SIO 454. (Wood) NZ sports report 9870 at 1136. (Harold Frodge, Midland, MI) 15720, 2133. (Brookman)

0605 UTC on 7275

NIGERIA: Radio Nigeria via National Service -Abuja. Male/female duo with English news briefs. Poor signal quality with fading, for difficult monitoring. SINPO 13222. (Jim Evans, Memphis, TN) **Voice of Nigeria** 15120, 1906-1915 English news. (Arnaldo Slaen, Argentina).

0734 UTC on 9525

ASCENSION ISLAND: Cotton Tree News (targeted to Sierra Leone). News and African languages covering social and medical issues of Africa. ID: "This news comes to you from CTN, Freetown." Subsequent log 0743-0758.* News to drums signal and sign-off announcement in English. Fair signal quality. (Ron Howard, Mon-

terrey, CA) Program is a daily service of live news and information broadcast from the studios of Radio Mount Aureol at Fourah College. CTN is an independent radio production studio, directed by Foundation Hironnelle. - Gayle VH

1000 UTC on 9505

CUBA: Radio Rebelde. Opening ID to Spanish newscast // 5025 with slight delay. Both frequencies with steady signal. (Bolland) **Radio Havana** 5940, 0515-0545 with "leap-frogging" frequencies from 6060 and 6180. (Alexander) 6180, 0443 (Wood) 6000, 0255-0300. (Weronka; Slaen) **China Radio Intl relay** 9790, 0341. (Wood). 6180, 0518. (Brookman) **Radio Nacional de Venezuela** via Havana 6180, 1000-1010 in Spanish. (Slaen)

1133 UTC on 7470

MONGOLIA: Radio Free Asia via Ulaanbaatar. Tibetan. Announcer barely audible under jammer. Poor signal, SINPO 2222, similar quality on //13830 via Tajikistan. (Evans)

1143 UTC on 3335

PAPUA NEW GUINEA: Radio East Sepik. Reggae amid music mix. Two minutes of silence at 1200, followed by music program. Might have been Karai National Service but tentative due to high static level. Otherwise a good signal. (John Wilkins, Wheat Ridge, CO)

1145 UTC on 7270

INDIA: All India Radio (Chennai). Tamil. India subcontinental music with talk between tunes. Poor signal SINPO 2422 //13695 (Bangalore) slightly weaker signal. (Evans). AIR Radio (Panaji) 9810, 0128-0142. (Barbour)

1852 UTC on 11880

AUSTRALIA: Radio Australia. Program interview about Australia to local vocal tunes. Station ID at 1900. 17785, 2245 //15230, 15515; 13630, 2242. (MacKenzie) 15240, 0226; 15515, 0229. 9710, 1705 (Brookman)

1920 UTC on 15476

ANTARCTICA: LRA-36 Radio Nacional Arcángel San Gabriel. Argentine country music to multilingual IDs. Newscast audible 1935-1943 with station jingles between items. Poor signal with deep fades and lightning crashes. (Mick Delmage, Sherwood Park, Alberta, Canada)

2157 UTC on 7415

USA: WBCQ. Closing bits of This Week in Amateur Radio International. ID at 2200 commencing with Checkerboard Lounge program. Premier broadcast by Roscoe the Bartender. Blues music program with tunes by Buddy Guy, Magic Sam, Son House, Robert Johnson, Big Mama Forton and John Lee Hooker. Roscoe dedicated an Eric Clapton tune to yours truly at 2231 UTC. More tunes from James Cotton and Lightning Hopkins. ID, QSL policy with address to 2258 sign-off. Scheduled to be a weekly program on WBCQ every Sunday at 2200. Thanks for the E.C. tune, Roscoe. (Gayle VH)

2215 UTC on 7125

GUINEA: Radio Conarky. French chats to variety of local African music and French ballads. Poor to fair signal quality, covered by Russia at 2300. (Alexander)

2335 UTC on 6300

CLANDESTINE: Radio Nacional de la RASD (relay via: Rabuni-Tindouf, Algeria). Spanish talk at tune-in, followed by Arabic music program to 0000 UTC. Male's sign-off routine to presumed national anthem amid fair signal quality. (Barbour) Web with real audio available at: <http://web.jet.es/rasd/radionacional.htm>. Additional clandestines: Radio Voice of the People (via Radio Netherlands Talata-Volondry, Madagascar) 9765, 0402-0412. English and Vernacular IDs to text. (Wood) Web: www.vopradio.co.zw/. Radio Saa (via Lssoundin, France, brokered by TDP-Belgium) 15180, 1600-1615. Hausa service with SINPO 24442. (Slaen)

*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?

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Good Listening from the Far East

This month we shine the *Programming Spotlight* on the Far East, with a look at two radio stations which are heard well in North America, thanks to a pair of relay stations in Sackville, Nova Scotia, Canada, and in Bonaire, Netherlands Antilles. For the purposes of this column, I have limited my observations to transmissions from these sites. Interestingly, here in Southern Ontario, I found Bonaire to provide the best signal.

I refer of course to Radio Japan (NHK) and KBS Worldwide in South Korea.

As well as news and information about politics and events in Asia and the World, both stations provide the listener with a tremendous amount of music. In every broadcast you will hear a plethora of tunes, either J-Pop (Japanese Pop Music) or K-Pop (Korean Pop Music).

As a music fan I like the tunes one can hear on both stations. Sadly, here in North America most of us know nothing of this vibrant music scene, beyond an occasional spin of Kyu Sakamoto's hit "Sukiyaki" or the Peanuts from those Godzilla movies. Still, if I had a criticism, it would be nice to have a bit more variety, perhaps some more traditional music. But I can't be too critical of either station.

By the way, I've heard two versions of how Sakamoto's hit became "Sukiyaki" in English. The title in Japanese is "Ue o muite aruko" which means "Look Up While Walking." One version states that Kenny Ball and his Jazzmen recorded it and thought English speakers would have trouble saying the name.

The second version, probably apocryphal but amusing nonetheless, has a radio connection. It suggests that a DJ played the record, couldn't say the title so just blurted "that was Sukiyaki" because it was the only Japanese he knew!

Regardless, it was one of only three Japanese songs to chart in the US – an incredible statistic when you hear some of the wonderful music from this nation. Sadly, Sakamoto died in a tragic air crash in Japan in 1985.

RADIO JAPAN

Every transmission from Radio Japan begins with a 10-minute newscast. As could be expected, most of the news is concentrated on Japanese and Asian affairs, although there is coverage of important world events as well.

During the Midnight and 0100 UTC broadcasts, the news is followed by **What's Up Japan**.

According to the Radio Japan website, the program, which runs for 20 minutes, "features current topics in politics, economics, sport and other fields in Japan and across Asia, giving insight into the world of Japan and Asia now."

News Today 30 Minutes takes up the last half of the hour. The latter program is actually the audio portion of an NHK Television broadcast. I guess they save a few yen that way.

On weekends, the 50 minutes remaining in the hour are filled with a variety of music programs. These include:

Pop Up Japan (heard UTC Mondays at 0010 and 0110, and UTC Sundays at 0030 and 0130) "On Pop Up Japan, Pakkun Makkun will introduce a line-up of specially selected J-Pop tunes, interspersed with their own sharp brand of comedy. The show will also look at some unique elements of Japanese culture, such as animation, the Akihabara scene, and the latest Tokyo fashions." You can contact the hosts to make a request via the programs' website: www.nhk.or.jp/popupjapan/

(In passing, I found it sort of amusing that my computer blocked a "pop up" from the Pop Up Japan website!) This program reminds me of CBC Radio One's "Go" heard on Saturday mornings and hosted by Brent Bambury...it's a decidedly youth oriented, fast paced show, quite funny.

A Song for Everyone (heard UTC Sundays and Mondays at 0049 and 0149)

Japan Music Scene (heard UTC Sundays and Mondays at 0054 and 0154)

Rounding out the weekend broadcasts is **World Interactive** (heard UTC Mondays at 0030 and 0130, UTC Sundays at 0010 and 0110)

World Interactive is predominantly a listener mail program. The Radio Japan website still suggests that there are DX segments, but these were dropped some time ago. The program answers listener mail, occasionally makes phone calls to listeners, and interviews people from abroad, living in Japan.

During the broadcasts at 0500 and 1000 UTC via Sackville, the weekend schedule is the same. However, on weekdays, the following programs replace *News Today 30 Minutes*:

On UTC Mondays and Fridays, one can hear **J-MELO**. "J-Melo features the latest, cutting edge developments in Japanese music, selections of hit songs, and diverse material from a wide-range of different genres including pop, rock, jazz and classical."

UTC Tuesday through Thursday, **A Song For Everyone** is followed by **Japan Music Scene** and



Radio Japan Staff

January 25, 1987

Hello from Tokyo and Melbourne

Insight and Foresight (Tu), **Pop Up Japan** (W) and **World Interactive** (Th).

Finally, during the 1100 UTC broadcast via Sackville, the weekday schedule is as follows:

News is at 1100, **A Song For Everyone** at 1110 and **Japan Music Scene** at 1115.

UTC Mondays one can hear **Japan Music Archives**. "The program introduces the changing phases of modern Japanese music under a chosen theme, and highlights social events and trends that provide as their backgrounds."

UTC Tuesdays brings **Basic Japanese for You**. This is the beginners' course. The emphasis is on learning words and expressions, aided by (surprise) song lyrics.

On UTC Wednesdays, **Japan Music Travelogue** is aired. "The program spotlights various cities and regions across Japan and the traditions and features that make them unique. Music from these areas are also played and discussed in detail."

On UTC Thursdays, it's back to Japanese lessons with **Brush Up Your Japanese**, a more advanced course in Japanese. Radio Japan's Japanese lessons are available online at: www.nhk.or.jp/lesson/

And on UTC Fridays, it's **Countdown Japan**. (This is one of the few programs on either station that I haven't heard. I assume it's a music

program, unless Japan has an advanced space program.)

Finally, each weekday transmission ends with **A Song for Everyone**.

UTC Saturdays, Radio Japan brings you News at 1100, and at 1110 **Weekend Japanology**. This is followed by, of course, **A Song for Everyone**.

Weekend Japanology “bring(s) often-neglected aspects of Japanese society and culture into light, the entire program is a breakaway from stereotypical images of Japan and its people.”

UTC Sundays, the schedule is **News** at 1100, **Insight and Foresight** at 1110 and **J-MELO** at 1130.

BEST BETS FOR HEARING RADIO JAPAN

0000 UTC	6145 kHz	(Sackville)
0100 UTC	11935 kHz	(Bonaire)
0500 UTC	6110 kHz	(Sackville)
1000 UTC	6120 kHz	(Sackville)
1100 UTC	6120 kHz	(Sackville)

❖ About the Radio Japan website

Radio Japan prints the times of its programs in Japan Standard Time on some web pages and in UTC on others. Be careful when consulting the website to note which time that particular page is using. When I did a column for *Monitoring Times* about language lessons, I almost got suckered into using JST times.

There's another curious thing. There is a .pdf file on the Radio Japan website listing their program schedule. It also has a chart listing times and frequencies. Oops, make that frequency. Only one frequency is listed, when occasionally there are multiple frequencies on the air at the time. I found the 0100 broadcast to be the best heard via the transmitter in Bonaire. The chart for North America, however, only lists one frequency, originating in Japan. Perhaps it's just an oversight. Check the Shortwave Guide in *Monitoring Times* and also dig around the club maintained sites for unpublished frequencies, or you might miss this well heard broadcast.

KBS RADIO WORLDWIDE

Like Radio Japan, KBS Worldwide opens with 10 minutes of **News**, but they follow the news with **News Commentary**.

In the hour long transmissions, **News and News Commentary** are followed by **Seoul Calling**, a program heard Monday through Friday to “keep you posted on what is going on in and around Seoul, Korea.”

It consists of pop music and features about life in Seoul. Emphasis is put on economic growth and positive news about the city – for instance, expansion of General Motors and a total smoking ban in the city. Daily features include **Sports Roundup** (M), **Korean Festivals** (Tu), **National Treasures of Korea** (W), **Tech Trends** (Th) and **Koreans to Remember** (great Koreans in history) (F).

None of the pop music featured in **Seoul Calling** would sound out of place on a North American radio station, if it were in English. One song sounded like an exact copy of Avril Lavigne, but in Korean.

Let's Learn Korean wraps up each daily edition of *Seoul Calling*. Lessons are available online at: http://rki.kbs.co.kr/learn_korean/lessons/e_index.htm#

Weekend broadcasts, whether of an hour or half hour in length, consist on Saturdays of **Worldwide Friendship** and on Sundays of **Korean Pop Interactive**.

Worldwide Friendship is the KBS worldwide mailbag program. Regular features include *Interesting News of the Week*, *Listeners Letters* and more pop music. “The listeners’ feedback program features letters, e-mails and reception reports from our audience and deals with all comments and inquiries about KBS World Radio’s programming or Korea in general.”

All KBS Worldwide weekday broadcasts conclude with these programs:

Faces of Korea (Monday)

Faces of Korea looks at the people of this country. One recent and very touching report was about Chae Song-tae:

“Chae Seong-tae is the owner of Haecheon, a Japanese restaurant in Hannamdong. His nickname is the ‘rice car CEO’ because he drives around a five ton automobile called the “rice car of love,” which has a full functioning kitchen in which all kinds of dishes can be cooked. Chae drives around his restaurant car for disabled customers to have them enjoy a sense of eating out.”

Business Watch (Tuesday)

As one can imagine this program covers the business world in Korea. And, if anything, KBS programming proudly proclaims that Korea is open for business.

Culture on the Move (Wednesday)

As the title suggests, *Culture on the Move* covers all things cultural. Topics have included the 2007 Korea International Art Fair, Korea’s Café Culture, 2007 Orchestra Festival and a Hip Hop Musical!

Verification Card

Dear Mr. Webster

We thank you for your reception report.
Wir bedanken uns für Ihren Empfangsbericht.
Nous vous remercions de votre rapport d'écoute.
Muchas gracias por su informe de recepción.
Terima kasih atas kiriman laporan penangkapan anda.
Muito Agradecidos pela sua notificação de boa recepção.

Frequency: _____ KHz

UTC(GMT): _____

☆ The dancer is performing Seung-Mu, a Buddhist monk's dance! This dance involves both grace and precise movements.

AUGUST 1986

Radio Korea
Korean Broadcasting System
Seoul, Korea

Korea, Today and Tomorrow (Thursday)

This interesting program covers “recent developments in the Korean peninsula.” Mostly the program looks at encouraging ties and co-operation with the north. Recent programs discussed test train runs between North and South, and inauguration of regular shipping routes between the two.

Seoul Report (Friday)

Seoul Report is a weekly interview program. Each week, a visitor to Korea is interviewed. It may be an academic, a veteran of the Korean War, a broadcaster or an artist.

BEST BETS FOR KBS WORLDWIDE

0200-0230 UTC	9560 kHz	(Sackville)
1200-1300 UTC	9650 kHz	(Sackville)

Some, but not all programming is available online at the Radio Japan and KBS Worldwide websites. As mentioned, you can hear the Japanese and Korean language lessons, plus some features. There is not as much audio content on the Radio Japan website. There are far more programs available on the KBS Worldwide website, as well as details of past shows.

In addition, there is a daily KBS program downloadable via World Radio Network (www.wrn.org)

❖ Radio is good listening

Before leaving the Pacific Region, let me just mention a powerful example of the importance of radio in times of crisis.

In early June, the east coast of Australia was pounded by severe weather and tides. I listened to a bit of the coverage online. ABC Sydney set up a special link on their website for local coverage from their radio station in Newcastle.

Coincidentally, I have a friend in Australia who lives about as far from Toronto, New South Wales, as I do from Toronto, Ontario. Ironically, the name Toronto is a Mohawk word, meaning, “where there are trees standing in the water.” Between my friend’s eyewitness accounts and the coverage from ABC, it really brought the situation to life. Regular reports of who had power and who didn’t, which roads and railway tracks were flooded; evacuation notices, as well as calls from listeners reporting conditions were fascinating.

How else do you find out information in an emergency, other than by radio? If you have no power, you have no TV or internet, and often phone lines are down. Radio is the only way to get immediate information. And people can keep their sense of humor in a crisis, as demonstrated by the caller who said “if anyone is missing a jetty, it’s on my front lawn.”

Books by Ernest H. Robl:

THE BASIC RAILFAN BOOK

UNDERSTANDING INTERMODAL

THE POWDER RIVER BASIN

Detailed descriptions at

<http://www.robl.w1.com>

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH

gaylevanhorn@monitoringtimes.com

New QSL Card Series for Collectors

This month there are three stations that have revised their QSL cards. Before you are in the midst of the upcoming autumn DX sessions, why not take advantage of the following offerings for your collection?

Radio Taiwan has a series of 12 cards depicting puppets. The cards are multicolored on high sheen paper stock. To begin the series, send reception reports to, 55 Pei An Road, Taipei 10462, Taiwan, or refer to the link at: Link to Reception Reports: <http://english.rti.org.tw/customerservice/ReceptionForm.aspx>. To learn more about RTI, refer to <http://english.rti.org.tw/>

Ecuador's HCJB Global continues their seven 2007 card series of trains. You train lovers will not want to miss this colorful series. Send your reception reports to: Casilla 17-17-691, Quito, Ecuador. Two IRCs or return mint postage



are recommended.

The third station is Radio Free Asia. RFA is offering a four-card series to honor the youth of the world. Don't miss out on this chance to add another vibrant series to your collection. To learn more about RFA, visit their website at www.rfa.org, email: contact@rfa.org reception reports: qsl@rfa.org or mail your correspondence to: Radio Free Asia, 2025 M. Street N.W. - Suite 300, Washington, DC 20036 USA.

Finally, Radio Bulgaria welcomes all listeners to become a member of the station's *Monitoring Club*. To learn more of the report requirements, write to their English Service, Radio Bulgaria, 4 Dragagan, Tzankov Blvd., 1040 Sofia, Bulgaria, or refer to: www.bnr.bg/RadioBulgaria/Emission_English/dxreport.htm.

AMATEUR RADIO

French St. Martin FS/AH8DX, 80 meters SSB. Full data, two-color card. Received in seven days for SASE to Craig M. Maxey, 16550 SW Taft Ct., Beaverton, OR 97007. (Larry Van Horn NC)

Sardinia Island ISO/WH0Q, 40 meters SSB. Full data color scenery card. Received in 66 days for a report to Fabrizio Vedovilli, Box 500850 CK, Saipan MP 96950. Email: wh0q.in3znr@brennercom.net (Richard W. Parker KB2DMD, Geryville, PA)

Senegal PA3GIO/6W, 20 meters SSB. Full data color photo card. Received in 17 days for a SAE and \$2.00 US to Bert Van Den Berg, Parklaan 38, NL 3931 KK Woudenberg, Netherlands. (Van Horn)

Slovenia S51FB, 15 meters SSB. Full data color photo card. Received in 100 days via ARRL. (Van Horn)

ASCENSION ISLAND

Cotton Tree Radio/CTN (targeted to Sierra Leone) 9525 kHz. Email response received from George Bennett-Editor in Chief, CTN gbennett76@yahoo.co.uk. Response stated station does not have verification cards yet. (Ron Howard, Monterrey, CA) For more on CTN, please refer to Ron's log in SWBC Logs column. - Gayle VH

AUSTRIA

Radio Osterrich/Radio Austria International 6155 kHz. Full data verification letter from Listener's Relations Department with illegible signature, plus German/English program schedule. Received in 23 days for an English report and \$1.00 US. Station address: Argentinierstrasse 30a, A-1040 Wien, Austria. (Parker)

AUSTRALIA

VMW 6230USB, Western Australia & 6507USB, Charlieville, Queensland. Two full data laminated Bureau of Meteorology QSL cards signed by Mike Dalakis-A/SRRTE,

plus information letter with website info for HF Transmissions. Received in 33 days for an mp3 CD and prepared card (not used). Station address: Bureau of Meteorology, Communication Section, 700 Collins Street Docklands, 3008 Australia. (Edward Kusalik, Alberta, Canada)

BURKINA FASO

Radio Burkina, 5030 kHz. Date/time verification letter signed by Pascal Goba-Chef des Programmes. Received in 42 days for a CD and return mint postage. Station address: Boite Postal 7029 Ouagadougou, Burkina Faso. (Mick Delmage, Sherwood Park, Alberta, Canada)

MEDIUM WAVE

Australia-ARDS Darwin, 1530 kHz AM. Full data verification letter signed by Dale Chesson-Station Manager. Received for an AM report. Station address: P.O. Box 1671, Nhulunbuy NT 0881 Australia. (Craig Edwards, Nhulunbuy, NT Australia)

China-Nanchang, Jiangxi Province, 729 kHz AM. Two beautiful QSL cards, program schedule and personal letter from Wei Guang-Chief Editor. Received in 56 days for a CD report and \$1.00 US. Station address: Jiangxi News Station, 209 Hongdu Zhong Dadao, Nanchang, Jiangxi 330046 China. Pleased with this my 39th China QSL. (Patrick Martin, Seaside, OR)

KION 1460 kHz AM. Full data verification letter signed by James V. Sohn-Chief Engineer. Received for an AM report and \$1.00 US. Station address: 903 North Main St., Salinas, CA 93906-3912 USA. (Edwards)

KXLX 700 kHz AM. Partial data antenna/logo card with illegible signature. Received in 14 days for an AM report. Station address: P.O. Box 1740, Airway Heights, WA 99001 USA. (Delmage)

WCTT 680 kHz AM. Handwritten verification letter from Terry Harris-Program Director. Station listed as 830 watts at night. Received

in 12 days for a tentative CD report. Station address: 821 Adams Road, Corbin, KY 40702 USA. (Martin)

SOUTH AFRICA

South African Radio League. Full data QSL and verification letter. Received for their *Amateur Radio Mirror International* program on shortwave. Received in 90 days for an English report and one IRC. QSL address: Amateur Radio Mirror International, South African Radio League, P.O. Box 90438, Garsfontein 0042 Republic of South Africa. (Alokesh Gupta, India)

ST. HELENA

Radio St. Helena 11902.5 kHz. Full data Radio St. Helena 2006 *Revival Transmission* card #337. Received in 374 days for an English report and \$3.00 US. Station address: P.O. Box 24, Jamestown, St. Helena Island, South Atlantic Ocean STHL IZZ. Received four full data DSWCI 50th Anniversary cards signed by Anker Petersen. Cards are for each target area of broadcast. Received in 20 days for a follow up report and \$2.00 US. QSL address: Danish SW Club International, Tavleager 31, DK 2670 Greve, Denmark. (Parker) Full data card from Radio St. Helena 11902, plus station info sheet in 175 days for three IRCs. (Kraig Krist, Manassas, VA) Full data card signed by Laura Lawrence-Station Manager in 5-1/2 months for mp3 CD report. (Kusalik)

UTILITY

BRA Broad River (Non-Directional Beacon) Asheville, NC 379 kHz (400 watts). Full data prepared QSL card and letter with photo from Charles Liberto, W4MEC. Received in 26 days. QSL address: DOT/FAA/SSC, New Airport Road Fletcher, NC 28732. (Jim Pogue, Memphis, TN)

RG Gally Outer Marker Beacon & Compass Locator 350 kHz. Full data prepared QSL card verified by Bradley E. Nelson, KJOW. Received in 28 days. QSL address: SW Oklahoma SSC, 4500 SW 67th, Oklahoma City, OK 73159. (Pogue)



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 ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo/*NASWA Flash Sheet*; Rachel Baughn/MT; Alokesh Gupta, New Delhi, India; Anker Petersen/*DSWCI-DX Window*; Bernd Trutenau, Lithuania; Ivo Ivanov; Jose Jacob, India; Jose Miguel Romero; Adrian Sainsbury/R.NZ Intl; Tom Taylor, UK; Harold Sellers/*ODXA/DX Ontario*; Sakthi Vel, India; Wolfgang Bueschel, Germany; Daniel Sampson, WI; Andreas Volk, Germany; *BCL News*; *Cumbre DX*; *BDX Club*; *DX Mix News*, Bulgaria; *Hard Core DX*; *NASWA Journal/NASWA Flashsheet*; *World Wide DX Club-Top News*.

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.

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

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

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

0000	0005	Greece, Voice of	7475eu	9420eu	15640eu
0000	0015	Japan, Radio Japan/NHK World	17810as		13650as
0000	0027	Czech Rep, Radio Prague	7345na	9440na	
0000	0030	Australia, HCJB Global	15525va		
0000	0030	Australia, Radio	9660as	12080as	13690as
		15240pa	17715as	17750va	17775va
		17795va			
0000	0030	Burma, Dem Voice of Burma	5955eu		
0000	0030	Egypt, Radio Cairo	9460na		
0000	0030	UK, BBC World Service	3915as	5970as	
		17615as			
0000	0030	USA, Voice of America	7555as		
0000	0045	India, All India Radio	9690as	9705as	
		11620as	11645as	13605as	
0000	0045	USA, WYFR/Family Radio FL	17805am		
0000	0056	Romania, Radio Romania Intl	9775na	11790na	
0000	0057	Canada, Radio Canada Intl	11700as		
0000	0058	Germany, Deutsche Welle	7245as	13730as	
		15595as			
0000	0059	Spain, Radio Exterior Espana	6055na		
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	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	
		7180as	9570as	9725as	11885as
		13750as	15115as		
0000	0100	Costa Rica, University Network		5030va	
		6150va	7375va	9725va	
0000	0100	Guyana, Voice of 3291do			
0000	0100	Japan, Radio Japan/NHK World		6145na	
0000	0100	Malaysia, RTM/Trax FM	7295as		
0000	0100	Netherlands, Radio	9845na		
0000	0100	New Zealand, Radio NZ Intl	15720pa		
0000	0100	New Zealand, Radio NZ Intl	13730pa		
0000	0100	Papua New Guinea, Wantok R. Light		7325va	
0000	0100	Russia, Voice of 7250na	9665na	12755na	
0000	0100	Singapore, MediaCorp Radio	6150do		
0000	0100	UK, BBC World Service	6195as	9580as	
		9740as	11955as	15335as	15360as
0000	0100	UK, Bible Voice BC		6140as	
0000	0100	Ukraine, Radio Ukraine Intl	7440eu		
0000	0100	USA, American Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7811usb	10320usb
		12133usb	13362usb		
0000	0100	USA, KAIJ Dallas TX	5755va		
0000	0100	USA, KTBN Salt Lake City UT	7505na	15590na	
0000	0100	USA, WBCQ Monticello ME	5110am	7415na	
		9330na			
0000	0100	USA, WBOH Newport NC	5920am		
0000	0100	USA, WEWN Vandiver AL	5810na		
0000	0100	USA, WHRA Greenbush ME	7520na		
0000	0100	USA, WHRI Cypress Creek SC		7315am	
		7520am			
0000	0100	USA, WHRI Cypress Creek SC		9515am	
0000	0100	USA, WHRI Cypress Creek SC		7490am	
0000	0100	USA, WINB Red Lion PA	9265am		
0000	0100	USA, WRMI Miami FL	9955va		
0000	0100	USA, WTJC Newport NC	9370na		
0000	0100	USA, WWCR Nashville TN	5070na	7465na	
		13845na			
0000	0100	USA, WWRB Manchester TN	5745am		
0000	0100	USA, WWRB Manchester TN	3185va	5050va	
		6890na			
0000	0100	USA, WYFR/Family Radio FL	6065am	9595am	
		11835am			
0005	0100	Canada, Radio Canada Intl	6100na		
0030	0045	Germany, Pan American BC	6165as		
0030	0100	Australia, Radio	9660as	12080as	13690as
		15240pa	15415as	17715as	17750va
		17795va			
0030	0100	Lithuania, Radio Vilnius	11690na		
0030	0100	Thailand, Radio	5890na	9570af	
0030	0100	UK, Bible Voice BC	9620as		
0030	0100	USA, Voice of America	9715va	9780va	
		11725va	15185va	15205va	15290va
		15560va	17820va		
0035	0058	Sun/Mon	Austria, Radio Austria Intl	9870am	
0043	0058	twhfa	Austria, Radio Austria Intl	9870am	
0055	0100		Italy, RAI Italia	11800na	

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

0100	0104	Canada, Radio Canada Intl	6100na		
0100	0115	Italy, RAI Italia	11800na		
0100	0127	Czech Rep, Radio Prague	6200na	7345na	
0100	0130	Slovakia, Radio Slovakia Int	5930na	9440sa	
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	13690as
		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	6020na	9470eu	
		9535as	9570na	9580na	9725eu
		9790na	11870as	15115as	15785as
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		5960va	
		11780as	11935na	15235as	15325as
		17560va	17685pa	17810as	17825va
0100	0200	Malaysia, RTM/Trax FM	7295as		
0100	0200	Netherlands, Radio	9845na		
0100	0200	New Zealand, Radio NZ Intl	15720pa		
0100	0200	New Zealand, Radio NZ Intl	13730pa		
0100	0200	North Korea, Voice of Korea	3560as	7140as	
		9345am	9730am	11735ca	13760ca
		15180ca			
0100	0200	Papua New Guinea, Wantok R. Light		7325va	
0100	0200	Russia, Voice of 7250na	9665na	12775na	
0100	0200	Singapore, MediaCorp Radio	6150do		
0100	0200	Sri Lanka, SLBC	6005as	9770as	15745as
0100	0200	Taiwan, Radio Taiwan Intl	11875as	15465na	
0100	0200	UK, BBC World Service	6195as	9410as	
		9580as	11750as	11955as	15310as
		15335as	15360as		
0100	0200	UK, Bible Voice BC		6140as	
0100	0200	USA, American Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7811usb	10320usb
		12133usb	13362usb		
0100	0200	USA, KAIJ Dallas TX	5755va		
0100	0200	USA, KTBN Salt Lake City UT	7505na		
0100	0200	USA, KWHR Naalehu HI	17655as		
0100	0200	USA, Voice of America	7430va	11705va	
0100	0200	USA, WBCQ Monticello ME	5110am	7415na	
		9330na			
0100	0200	USA, WBOH Newport NC	5920am		
0100	0200	USA, WEWN Vandiver AL	5810na		
0100	0200	USA, WHRA Greenbush ME	5890na		
0100	0200	USA, WHRI Cypress Creek SC		5850am	
		7315am	7490am		
0100	0200	USA, WINB Red Lion PA	9265am		
0100	0200	USA, WRMI Miami FL	9955va		
0100	0200	USA, WRMI Miami FL	7385na		
0100	0200	USA, WTJC Newport NC	9370na		
0100	0200	USA, WWCR Nashville TN	5070na	5935na	
		7465na			
0100	0200	USA, WWRB Manchester TN	5745am		
0100	0200	USA, WWRB Manchester TN	3185va	5050va	
		6890na			
0100	0200	USA, WYFR/Family Radio FL	6065am	9595am	
0100	0200	Uzbekistan, CVC International		11790as	
0105	0128	Sun/Mon	Austria, Radio Austria Intl	9870am	
0113	0128	twhfa	Austria, Radio Austria Intl	9870am	
0115	0130	Sat	Australia, HCJB Global	15405va	
0130	0200		Iran, Voice of the Islamic Rep	7235na	9495na
0130	0200		Sweden, Radio	6010na	11675va
0130	0200	twhfa	USA, Voice of America	6040va	
0140	0200		Vatican City, Vatican Radio	5915va	7335va
0143	0158	twhfa	Austria, Radio Austria Intl	9870am	
0145	0200	twhfes	Albania, Radio Tirana	6120eu	7425na

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

0200	0215	Croatia, Croatian Radio	6165na	9925eu	
0200	0230	Iran, Voice of the Islamic Rep	7235na	9495na	
0200	0230	South Korea, KBS World Radio		15575sa	
0200	0245	USA, WYFR/Family Radio FL	11835na		
0200	0258	DRM	New Zealand, Radio NZ Intl	13730pa	
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 13690as		
		15240pa 15415as 15515as 17750va		
		21725va		
0200	0300	Bulgaria, Radio 9700na	11700na	
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	Netherlands, Radio	9405va	
0200	0300	New Zealand, Radio NZ Intl	15720pa	
0200	0300	North Korea, Voice of Korea	4405as 13650as	
		15100as		
0200	0300	Papua New Guinea, Wantok R. Light	7325va	
0200	0300	Philippines, Radio Pilipinas	11880va 15285va	
		15510va		
0200	0300	Russia, Voice of 9665na	9860na 13635na	
		13775na		
0200	0300	Singapore, MediaCorp Radio	6150do	
0200	0300	Sri Lanka, SLBC	6005as 9770as	
0200	0300	Thailand, Radio	5890na	
0200	0300	UK, BBC World Service	6030af 6195as	
		11750as 11955as 15310as 15335as		
		15360as 17790as		
0200	0300	USA, American Forces Radio	4319usb 5446usb	
		5765usb 6350usb 7811usb 10320usb		
		12133usb 13362usb		
0200	0300	USA, KAIJ Dallas TX	5755va	
0200	0300	USA, KJES Vado NM	7555na	
0200	0300	USA, KTNB Salt Lake City UT	7505na	
0200	0300	USA, KWHR Naalehu HI	17655as	
0200	0300	USA, WBCQ Monticello ME	5110am 7415na	
		9330na		
0200	0300	USA, WBOH Newport NC	5920am	
0200	0300	USA, WEWN Vandiver AL	5810na	
0200	0300	USA, WHRA Greenbush ME	5890na	
0200	0300	USA, WHRI Cypress Creek SC	5850am	
		7315am		
0200	0300	USA, WINB Red Lion PA	9265am	
0200	0300	USA, WRMI Miami FL	9955va	
0200	0300	USA, WRMI Miami FL	7385na	
0200	0300	USA, WTJC Newport NC	9370na	
0200	0300	USA, WWCR Nashville TN	3215na 5070na	
		5935na 7465na		
0200	0300	USA, WWRB Manchester TN	5745am	
0200	0300	USA, WWRB Manchester TN	3185va 5050va	
		6890na		
0200	0300	USA, WYFR/Family Radio FL	5985am 11855am	
0200	0300	Uzbekistan, CVC International	11790as	
0200	0300	Taiwan, Radio Taiwan Intl	5950na 9680am	
0215	0230	Nepal, Radio 3230as	5005as 6100as	
		7165as		
0230	0300	Albania, Radio Tirana	6115eu 7425eu	
0230	0300	South Korea, KBS World Radio	9560na	
0230	0300	Sweden, Radio 6010na		
0245	0300	India, All India Radio	7420as	
0245	0300	Myanmar, Radio 9730do		
0250	0300	Vatican City, Vatican Radio	6040va 7305va	
0255	0300	Rwanda, Radio 6055do		
0259	0300	DRM New Zealand, Radio NZ Intl	11675pa	

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

0300	0320	Vatican City, Vatican Radio	6040va 7305va	
		15560va		
0300	0327	Czech Rep, Radio Prague	7345na 9870na	
0300	0330	Egypt, Radio Cairo	7270na	
0300	0330	Myanmar, Radio 9730do		
0300	0330	Philippines, Radio Pilipinas	11880va 15285va	
		15510va		
0300	0330	USA, KJES Vado NM	7555na	
0300	0330	USA, Voice of America	4930af 6080af	
		7340af 9885af 12080af 15580af		
0300	0330	USA, WBCQ Monticello ME	9330am	
0300	0330	Vatican City, Vatican Radio	9660af	
0300	0355	South Africa, Channel Africa	5960af	
0300	0356	Romania, Radio Romania Intl	6150va 9645na	
		11895va 15220va		
0300	0359	South Africa, Channel Africa	3345af	

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 13690as		
		15240pa 15415as 15515as 17750va		
		21725va		
0300	0400	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	9690na	
0300	0400	11770as 15110as 15120as	15785as	
0300	0400	Costa Rica, University Network	5030va	
		6150va 7375va 9725va		
0300	0400	Cuba, Radio Havana	6000na 6180na	
0300	0400	Germany, Deutsche Welle	11695as 13810as	
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	New Zealand, Radio NZ Intl	15720pa	
0300	0400	New Zealand, Radio NZ Intl	11675pa	
0300	0400	North Korea, Voice of Korea	3560as 7140as	
		9345as 9730as 11735ca 13760ca		
		15180ca		
0300	0400	Oman, Radio Oman	15355as	
0300	0400	Papua New Guinea, Wantok R. Light	7325va	
0300	0400	Russia, Voice of 15735as		
0300	0400	Russia, Voice of 9435na	9515na 9665na	
		9860na 9880na 12065na	13635na	
0300	0400	Rwanda, Radio 6055do		
0300	0400	Singapore, MediaCorp Radio	6150do	
0300	0400	Sri Lanka, SLBC	6005as 9770as	
0300	0400	Taiwan, Radio Taiwan Intl	5950am 15215sa	
0300	0400	Turkey, Voice of 5975va	7270va	
0300	0400	UK, BBC World Service	11760as	
0300	0400	UK, BBC World Service	3255af 6005af	
		6030af 6190af 6195as 9750af		
		12035af 15310as 15360as 15575as		
		17760as 21660as		
0300	0400	Ukraine, Radio Ukraine Intl	7440na	
0300	0400	USA, American Forces Radio	4319usb 5446usb	
		5765usb 6350usb 7811usb 10320usb		
		12133usb 13362usb		
0300	0400	USA, KAIJ Dallas TX	5755va	
0300	0400	USA, KTNB Salt Lake City UT	7505na	
0300	0400	USA, KWHR Naalehu HI	17655as	
0300	0400	USA, WBCQ Monticello ME	5110am 7415na	
0300	0400	USA, WBOH Newport NC	5920am	
0300	0400	USA, WEWN Vandiver AL	5810na	
0300	0400	USA, WHRA Greenbush ME	5890na	
0300	0400	USA, WHRI Cypress Creek SC	5835am	
0300	0400	USA, WHRI Cypress Creek SC	5850am	
		7490am		
0300	0400	USA, WHRI Cypress Creek SC	7315am	
0300	0400	USA, WINB Red Lion PA	9265am	
0300	0400	USA, WRMI Miami FL	9955va	
0300	0400	USA, WTJC Newport NC	9370na	
0300	0400	USA, WWCR Nashville TN	3215na 5070na	
		5765na 5935na		
0300	0400	USA, WWRB Manchester TN	3185va 5050va	
0300	0400	USA, WYFR/Family Radio FL	6065na 9505na	
		11740na 15255na		
0300	0400	Uzbekistan, CVC International	13680as	
0330	0335	Bahrain, Radio Bahrain	6010as	
0330	0345	Israel, Kol Israel	9345eu 11590va 17600va	
0330	0355	Vietnam, Voice of 6175na		
0330	0357	Czech Rep, Radio Prague	6080as 9445as	
		11600as		
0330	0400	UK, BBC World Service	15420af	
0330	0400	USA, Voice of America	4930af 6080af	
		9885af 12080af 15580af		
0330	0400	USA, WBCQ Monticello ME	9330am	

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

0400	0430	Australia, Radio 9660as 12080as 13690as		
		15240pa 15515as 17750va 21725va		
0400	0430	France, Radio France Intl	9805af 11995af	
		13675af		
0400	0430	Sri Lanka, SLBC	6005as 9770as 15745as	
0400	0430	USA, Voice of America	4930af 6080af	
		9575af 11835af 12080af 15580af		
0400	0430	USA, WWRB Manchester TN	5745am	
0400	0445	USA, WYFR/Family Radio FL	6065na 9505na	

0400 0458		New Zealand, Radio NZ Intl	15720pa	
0400 0458	DRM	New Zealand, Radio NZ Intl	11675pa	
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	twhf	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	6020na	6080as
		13750as	15120as	15785as
		17855as		17725as
0400 0500		Costa Rica, University Network	5030va	
		6150va	7375va	9725va
0400 0500		Cuba, Radio Havana	6000na	6180na
0400 0500		Germany, Deutsche Welle	7225af	7245af
		12045af	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		Netherlands, Radio	6165na	
0400 0500	vl	Papua New Guinea, Wantok R. Light	7325va	
0400 0500		Russia, Voice of 9435na	9515na	9860na
		9880na	13635na	13775na
0400 0500	DRM	Russia, Voice of 15735as		
0400 0500	vl	Rwanda, Radio	6055do	
0400 0500		Singapore, MediaCorp Radio	6150do	
0400 0500	vl	Uganda, Radio	4976do	5026do
0400 0500	DRM	UK, BBC World Service	7440eu	
0400 0500		UK, BBC World Service	3255af	6005af
		6190af	7120af	7160af
		11760as	12035af	12095eu
		15360as	15460af	15565eu
		17760as	17790as	21660as
0400 0500		USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7811usb
		12133usb	13362usb	10320usb
0400 0500		USA, KAIJ Dallas TX	5755va	
0400 0500		USA, KTNB Salt Lake City UT	7505na	
0400 0500		USA, KWHR Naalehu HI	17655as	
0400 0500		USA, WBCQ Monticello ME	5110am	7415na
0400 0500		USA, WBOH Newport NC	5920am	
0400 0500		USA, WEWN Vandiver AL	5810na	
0400 0500		USA, WHRA Greenbush ME	5890na	
0400 0500	mtwhf	USA, WHRI Cypress Creek SC	5835am	
0400 0500	Sat/Sun	USA, WHRI Cypress Creek SC	7315am	
0400 0500		USA, WHRI Cypress Creek SC	7490am	
0400 0500		USA, WMLK Bethel PA	9265va	
0400 0500		USA, WRMI Miami FL	9955va	
0400 0500		USA, WTJC Newport NC	9370na	
0400 0500		USA, WWCR Nashville TN	3215na	5070na
		5890na	5935na	
0400 0500		USA, WWRB Manchester TN	3185va	5050va
		6890na		
0400 0500		USA, WYFR/Family Radio FL	6855na	7780va
		9715am		
0400 0500		Uzbekistan, CVC International	13680as	
0430 0500		Australia, Radio	9660as	12080as
		15240pa	15415as	15515va
		21725va		17750va
0430 0500		Nigeria, Radio/Kaduna	6090do	
0430 0500		Swaziland, TWR	3200af	4775af
0430 0500		USA, Voice of America	4930af	4960af
		9575af	11835af	12080af
0430 0500	Sat	USA, WWRB Manchester TN	5745am	
0445 0500		Italy, RAI Italia	6110af	6145af
0459 0500	DRM	New Zealand, Radio NZ Intl	9890pa	7235af

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

0500 0507	twhf	Canada, CBC NQ SW Service	9625na	
0500 0515	Sun	Sri Lanka, SLBC	6005as	9770as
0500 0530	mtwhf	France, Radio France Intl	13680af	15160af
		13680af		
0500 0530		Germany, Deutsche Welle	5945af	9700af
0500 0530		Vatican City, Vatican Radio	4005eu	7250eu
		9660af	11625af	13765af
0500 0555		South Africa, Channel Africa	9685af	
0500 0559		South Africa, Channel Africa	7240af	
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	13690as
		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	6020na	6190na	
		11710af	11880as	15350as	15465as
		17505as	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 Intl/Voice Africa			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		New Zealand, Radio NZ Intl	9615pa		
0500 0600	DRM	New Zealand, Radio NZ Intl	9890pa		
0500 0600		Nigeria, Radio/Kaduna	4770do	6090al	
0500 0600	vl	Papua New Guinea, Wantok R. Light	7325va		
0500 0600		Russia, Voice of 17635pa	21790pa		
0500 0600	DRM	Russia, Voice of 15735as			
0500 0600		Singapore, MediaCorp Radio	6150do		
0500 0600		Swaziland, TWR	3200af	4775af	9500af
0500 0600	vl	Uganda, Radio	4976do	5026do	
0500 0600	DRM	UK, BBC World Service	7440eu		
0500 0600		UK, BBC World Service	3255af	6005af	
		6190af	6195af	7160af	9410eu
		11695af	11760as	11765af	11955as
		12095eu	15310as	15360as	15420af
		15565eu	17640af	17760as	17790as
		17885af	21660as		
0500 0600		Ukraine, Radio Ukraine Intl	9945eu		
0500 0600		USA, American Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7811usb	10320usb
		12133usb	13362usb		
0500 0600		USA, KAIJ Dallas TX	5755va		
0500 0600		USA, KTNB Salt Lake City UT	7505na		
0500 0600		USA, KWHR Naalehu HI	13650as		
0500 0600		USA, Voice of America	4930af	6080af	
		12080af	15580af		
0500 0600		USA, WBCQ Monticello ME	5110am	7415na	
0500 0600		USA, WBOH Newport NC	5920am		
0500 0600		USA, WEWN Vandiver AL	5850na		
0500 0600		USA, WHRA Greenbush ME	6145na		
0500 0600	Sat/Sun	USA, WHRI Cypress Creek SC		7315am	
0500 0600		USA, WMLK Bethel PA	9265va		
0500 0600		USA, WRMI Miami FL	9955va		
0500 0600		USA, WTJC Newport NC	9370na		
0500 0600		USA, WWCR Nashville TN	3215na	5070na	
		5890na	5935na		
0500 0600		USA, WWRB Manchester TN	3185va		
0500 0600		USA, WYFR/Family Radio FL	6855na	9355va	
0500 0600		Uzbekistan, CVC International		13680as	
0500 0600		Zambia, CVC International	9430af		
0505 0520	m	Austria, Radio Austria Intl	17870me		
0505 0530	Sat/Sun	Austria, Radio Austria Intl	17870me		
0515 0530	vl	Rwanda, Radio	6055do		
0530 0556		Romania, Radio Romania Intl	9655va	11830va	
		15435va	17770va		
0530 0600	vl	Rwanda, Radio	6055do		
0530 0600		Thailand, Radio	17655eu		
0535 0600	Sat/Sun	Austria, Radio Austria Intl	17870me		
0545 0600	twhf	Austria, Radio Austria Intl	17870me		

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

0600 0603		Croatia, Croatian Radio	6165eu	9470eu	
		11610eu			
0600 0615	Sat/Sun	South Africa, TWR	11640af		
0600 0630		Australia, Radio	9660as	12080as	13690as
		15160as	15240pa	15515as	17750va
0600 0630	mtwhf	France, Radio France Intl	11725af	15160af	
		17800af			
0600 0630		Germany, Deutsche Welle	7310af	15275af	
0600 0630		Nigeria, Radio, Natl Svc/Abuja		7275do	
0600 0630	mtwhf	UK, Sudan Radio Service	15440af	15505af	
0600 0645	mtwhf	South Africa, TWR	11640af		
0600 0655		South Africa, Channel Africa	15255af		
0600 0658		New Zealand, Radio NZ Intl	9615pa		
0600 0658	DRM	New Zealand, Radio NZ Intl	9890pa		
0600 0700		Anguilla, University Network	6090am		
0600 0700		Armenia, CVC International	15515as		
0600 0700		Australia, ABC NT Alice Springs	2310do		

0600	0700	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	11710af
0600	0700	11880as	13660as
0600	0700	15465as	17505as
0600	0700	17710as	17505as
0600	0700	Costa Rica, University Network	5030va
0600	0700	6150va	7375va
0600	0700	Cuba, Radio Havana	6000va
0600	0700	6180na	9550va
0600	0700	Germany, CVC Intl/Voice Africa	15640af
0600	0700	Greece, Voice of	11645eu
0600	0700	Guyana, Voice of	3291do
0600	0700	Japan, Radio Japan/NHK World	7230eu
0600	0700	11740as	11760as
0600	0700	17870pa	21755pa
0600	0700	Liberia, ELWA	4760do
0600	0700	Malaysia, RTM/Trax FM	7295as
0600	0700	Malaysia, RTM/Voice of Malaysia	6175as
0600	0700	9750as	15295as
0600	0700	Nigeria, Radio/Kaduna	4770do
0600	0700	Papua New Guinea, Wantok R. Light	7325va
0600	0700	Russia, Voice of	17635pa
0600	0700	Singapore, MediaCorp Radio	6150do
0600	0700	Solomon Islands, SIBC	5020do
0600	0700	Swaziland, TWR	3200af
0600	0700	UK, BBC World Service	17885af
0600	0700	UK, BBC World Service	3255af
0600	0700	6190af	7475eu
0600	0700	9860as	11695as
0600	0700	11955af	12095as
0600	0700	15400af	17640as
0600	0700	21660af	11760as
0600	0700	UK, BBC World Service	7440eu
0600	0700	USA, American Forces Radio	4319usb
0600	0700	5765usb	6350usb
0600	0700	12133usb	13362usb
0600	0700	USA, KAIJ Dallas TX	5755va
0600	0700	USA, KTNB Salt Lake City UT	7505na
0600	0700	USA, KWHR Naalehu HI	13650as
0600	0700	USA, Voice of America	6080af
0600	0700	12080af	15580af
0600	0700	USA, WBCQ Monticello ME	5110am
0600	0700	USA, WBOH Newport NC	5920am
0600	0700	USA, WEWN Vandiver AL	5850na
0600	0700	USA, WHRA Greenbush ME	7490na
0600	0700	USA, WHRI Cypress Creek SC	7335am
0600	0700	7365am	7490am
0600	0700	USA, WMLK Bethel PA	9265va
0600	0700	USA, WRMI Miami FL	9955va
0600	0700	USA, WTJC Newport NC	9370na
0600	0700	USA, WWCR Nashville TN	3215na
0600	0700	5890na	5935na
0600	0700	USA, WWRB Manchester TN	3185va
0600	0700	USA, WYFR/Family Radio FL	6000am
0600	0700	9680na	11530af
0600	0700	Vanuatu, Radio	4960do
0600	0700	Yemen, Rep of Yemen Radio	9780me
0600	0700	Zambia, CVC International	13650af
0630	0700	Australia, Radio	9660as
0630	0700	15160as	15240pa
0630	0700	17750va	15415as
0630	0700	Bulgaria, Radio	9600eu
0630	0700	UK, BBC World Service	11990af
0630	0700	UK, Sudan Radio Service	11945af
0630	0700	UK, Sudan Radio Service	15445af
0630	645	Vatican City, Vatican Radio	4005va
0630	645	7250eu	9645eu
0630	645	13765eu	15570af
0645	0700	Albania, TWR Europe	11865eu
0645	0700	Monaco, TWR Europe	9800eu
0659	0700	New Zealand, Radio NZ Intl	7145pa

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

0700	0705	UK, BBC World Service	6005af
0700	0727	Czech Rep, Radio Prague	9880eu
0700	0730	France, Radio France Intl	13675af
0700	0730	Slovakia, Radio Slovakia Int	9440pa
0700	0745	USA, WYFR/Family Radio FL	7780va
0700	0800	Albania, TWR Europe	11865eu
0700	0800	Anguilla, University Network	6090am

0700	0800	Australia, ABC NT Alice Springs	2310do
0700	0800	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, Radio	9660as
0700	0800	13630as	15160pa
0700	0800	15240pa	15415as
0700	0800	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	11880as
0700	0800	13710as	15450as
0700	0800	17540as	17710as
0700	0800	Costa Rica, University Network	5030va
0700	0800	6150va	7375va
0700	0800	Germany, CVC Intl/Voice Africa	15640af
0700	0800	Guyana, Voice of	3291do
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
0700	0800	9750as	15295as
0700	0800	Monaco, TWR Europe	9800eu
0700	0800	Myanmar, Radio	9730do
0700	0800	New Zealand, Radio NZ Intl	6095pa
0700	0800	New Zealand, Radio NZ Intl	6095pa
0700	0800	New Zealand, Radio NZ Intl	7145pa
0700	0800	Nigeria, Radio/Kaduna	4770do
0700	0800	Papua New Guinea, Wantok R. Light	7325va
0700	0800	Russia, Voice of	17495pa
0700	0800	Singapore, MediaCorp Radio	6150do
0700	0800	Solomon Islands, SIBC	5020do
0700	0800	Swaziland, TWR	4775af
0700	0800	Taiwan, Radio Taiwan Intl	5950am
0700	0800	UK, BBC World Service	9470eu
0700	0800	UK, BBC World Service	6190af
0700	0800	9470eu	9860af
0700	0800	11765af	11955as
0700	0800	15360as	15400af
0700	0800	17830af	21660as
0700	0800	UK, BBC World Service	17885af
0700	0800	UK, Bible Voice BC	5945eu
0700	0800	Ukraine, Radio Ukraine Intl	9945eu
0700	0800	USA, American Forces Radio	4319usb
0700	0800	5765usb	6350usb
0700	0800	12133usb	13362usb
0700	0800	USA, KAIJ Dallas TX	5755va
0700	0800	USA, KTNB Salt Lake City UT	7505na
0700	0800	USA, KWHR Naalehu HI	13650as
0700	0800	USA, WBCQ Monticello ME	5110am
0700	0800	USA, WBOH Newport NC	5920am
0700	0800	USA, WEWN Vandiver AL	5850na
0700	0800	USA, WHRI Cypress Creek SC	7335am
0700	0800	7365am	
0700	0800	USA, WMLK Bethel PA	9265va
0700	0800	USA, WRMI Miami FL	9955va
0700	0800	USA, WTJC Newport NC	9370na
0700	0800	USA, WWCR Nashville TN	3215na
0700	0800	5890na	5935na
0700	0800	USA, WWRB Manchester TN	3185va
0700	0800	USA, WYFR/Family Radio FL	5985na
0700	0800	9505am	9715am
0700	0800	Vanuatu, Radio	4960do
0700	0800	Zambia, CVC International	13650af
0715	0750	Albania, TWR Europe	11865eu
0715	0750	Monaco, TWR Europe	9800eu
0730	0800	Australia, HCJB Global	11750pa
0730	0800	Pakistan, Radio	15100eu

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

0800	0815	Sat	UK, Bible Voice BC	5945eu
0800	0820	mtwhfs	Albania, TWR Europe	11865eu
0800	0820	mtwhfs	Monaco, TWR Europe	9800eu
0800	0825		Malaysia, RTM/Voice of Malaysia	6175as
0800	0830		9750as	15295as
0800	0830		Australia, ABC NT Katherine	5025do
0800	0830		Australia, ABC NT Tennant Creek	4910do
0800	0830		Myanmar, Radio	9730do
0800	0830		Pakistan, Radio	15100eu
0800	0845	Sat	Guam, TWR/KTWR	11840pa
0800	0845	Sun	UK, Bible Voice BC	5945eu
0800	0845		USA, WYFR/Family Radio FL	9930af
0800	0900		Anguilla, University Network	6090am
0800	0900		Australia, ABC NT Alice Springs	2310do
0800	0900		4835do	
0800	0900		Australia, CVC International	15335as

0800 0900	Australia, HCJB Global	11750pa	
0800 0900	Australia, Radio 12080as	5950va	9710va
		13630va	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	11620as	11880as
		13710e	15350as
		15350as	17490eu
		17540as	
0800 0900	Costa Rica, University Network		5030va
		6150va	7375va
		7375va	9725va
			11870va
0800 0900	Germany, CVC Intl/Voice Africa		15640af
0800 0900 vl	Greece, Voice of	9420eu	15630eu
0800 0900 mtwhf	Guam, TWR/KTWR		11840pa
0800 0900	Guyana, Voice of	3291do	5950do
0800 0900	Indonesia, Voice of		9525as
			11785pa
			15150al
0800 0900 Sat	Latvia, Radio SWH		9290eu
0800 0900 vl	Liberia, ELWA		4760do
0800 0900	Malaysia, RTM/Trax FM		7295as
0800 0900	New Zealand, Radio NZ Intl		6095pa
0800 0900 DRM	New Zealand, Radio NZ Intl		7145pa
0800 0900	Nigeria, Radio/Kaduna		4770do
0800 0900	Nigeria, Voice of/Ext. Svc Lagos		6090al
0800 0900	Papua New Guinea, NBC		4890do
0800 0900 vl	Papua New Guinea, Wantok R. Light		7325va
0800 0900	Russia, Voice of	17495pa	17635pa
0800 0900 DRM	Russia, Voice of	12060eu	15780eu
0800 0900	Singapore, MediaCorp Radio		6150do
0800 0900 vl	Solomon Islands, SIBC		5020do
0800 0900	South Africa, Channel Africa		9620af
0800 0900	South Korea, KBS World Radio		9570as
0800 0900	Swaziland, TWR	4775af	6120af
0800 0900	Taiwan, Radio Taiwan Intl		11715pa
0800 0900	UK, BBC World Service		9480eu
0800 0900	UK, BBC World Service		6190af
		9470eu	9740as
		15310as	15360as
		17760as	17790as
		21470af	21660as
0800 0900 Sat/Sun	UK, BBC World Service		6195as
0800 0900	Ukraine, Radio Ukraine Intl		9945eu
0800 0900	USA, American Forces Radio		4319usb
		5765usb	6350usb
		12133usb	13362usb
0800 0900	USA, KAIJ Dallas TX		5755va
0800 0900	USA, KNLS Anchor Point AK		7355as
0800 0900	USA, KTN Salt Lake City UT		7505na
0800 0900	USA, KWHR Naalehu HI		9930as
0800 0900	USA, WBOH Newport NC		5920am
0800 0900	USA, WEWN Vandiver AL		5850na
0800 0900	USA, WHRI Cypress Creek SC		7335am
0800 0900	USA, WMLK Bethel PA		9265va
0800 0900	USA, WRMI Miami FL		9955va
0800 0900	USA, WTJC Newport NC		9370na
0800 0900	USA, WWCN Nashville TN		3215na
		5890na	5935na
0800 0900	USA, WWRB Manchester TN		3185va
0800 0900	USA, WYFR/Family Radio FL		5985na
0800 0900 vl	Vanuatu, Radio		4960do
0800 0900	Zambia, CVC International		13650af
0805 0900 mtwhf	Guam, TWR/KTWR		15170as
0815 0845 Sat	UK, Bible Voice BC		9655eu
0830 0900	Australia, ABC NT Katherine		2485do
0830 0900	Australia, ABC NT Tennant Creek		2325do
0830 0900	Lithuania, Radio Vilnius		9710eu

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

0900 0900	USA, WBCQ Monticello ME		5110am	7415na
0900 0927	Czech Rep, Radio Prague		9800eu	21745as
0900 0930	Australia, HCJB Global		11750pa	
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
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		11620as	15210pa
			15350as	17490eu
0900 1000	Costa Rica, University Network			5030va

			6150va	7375va	9725va	11870va
			13750va			
0900 1000	Germany, Deutsche Welle				15340as	17770as
0900 1000 vl/Sun	Greece, Voice of		9420eu		15630eu	
0900 1000	Guyana, Voice of		3291do		5950do	
0900 1000 vl	Liberia, ELWA		4760do			
0900 1000	Malaysia, RTM/Trax FM				7295as	
0900 1000	New Zealand, Radio NZ Intl				6095pa	
0900 1000 DRM	New Zealand, Radio NZ Intl				7145pa	
0900 1000	Nigeria, Radio/Kaduna				4770do	6090al
0900 1000	Nigeria, Voice of/ Ext. Svc Lagos					9690af
0900 1000	Papua New Guinea, NBC				4890do	
0900 1000 vl	Papua New Guinea, Wantok R. Light					7325va
0900 1000	Saudi Arabia, BSKSA				15250af	
0900 1000	Singapore, MediaCorp Radio				6150do	
0900 1000 vl	Solomon Islands, SIBC				5020do	9545al
0900 1000	South Africa, Channel Africa				9620af	
0900 1000 DRM	UK, BBC World Service				9480eu	
0900 1000 smtwhf	UK, BBC World Service				9605as	
0900 1000	UK, BBC World Service				6190af	6195as
			7320eu	9470eu	9740eu	9860af
			11760me	15310as	15360as	15400af
			15575as	17760as	17830af	17885af
			21470af			
0900 1000	USA, American Forces Radio				4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0900 1000	USA, KAIJ Dallas TX				5755va	
0900 1000	USA, KTN Salt Lake City UT				7505na	
0900 1000	USA, KWHR Naalehu HI				9930as	
0900 1000	USA, WBCQ Monticello ME				5110am	7415na
0900 1000	USA, WBOH Newport NC				5920am	
0900 1000	USA, WEWN Vandiver AL				5850na	
0900 1000	USA, WHRI Cypress Creek SC					7315am
					7335am	
0900 1000	USA, WRMI Miami FL				9955va	
0900 1000	USA, WTJC Newport NC				9370na	
0900 1000	USA, WWCN Nashville TN				5070na	5765na
					5935na	9985na
0900 1000	USA, WWRB Manchester TN				3185va	
0900 1000	USA, WYFR/Family Radio FL				5985na	6885na
					9450va	9755am
0900 1000 vl	Vanuatu, Radio				4960do	
0900 1000	Zambia, CVC International				13650af	
0930 0945	Israel, Kol Israel				13855eu	15760eu
0930 1000 Sun	Italy, IRRS				9510eu	

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

1000 1003 mtwhf	Croatia, Croatian Radio			9830pa
1000 1030	Mongolia, Voice of			12085as
1000 1030	UK, BBC World Service			9605as
1000 1058	New Zealand, Radio NZ Intl			6095pa
1000 1100	Anguilla, University Network			11775am
1000 1100	Australia, ABC NT Alice Springs			
				4835do
1000 1100	Australia, ABC NT Katherine			2485do
1000 1100	Australia, ABC NT Tennant Creek			
1000 1100	Australia, CVC International			11955as
1000 1100	Australia, CVC International			9760eu
1000 1100	Australia, HCJB Global			15540va
1000 1100	Australia, Radio			9580va
1000 1100	Austria, CVC International			11815eu
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			
1000 1100	China, China Radio Intl			6040as
				11635as
				13590as
				15190as
				15210as
				15350eu
				17490as
				17690as
1000 1100	Costa Rica, University Network			5030va
				6150va
				7375va
				9725va
				11870va
				13750va
1000 1100	Guyana, Voice of			3291do
1000 1100	India, All India Radio			7270as
				15020as
				15260as
				17800as
				17895pa
1000 1100 Sun	Italy, IRRS			9510eu
1000 1100	Japan, Radio Japan/NHK World			
				9650va
				9695as
				11730as
				17585eu
1000 1100 vl	Liberia, ELWA			4760do
1000 1100	Malaysia, RTM/Trax FM			7295as
1000 1100	Netherlands, Radio			13710as
				13820as
1000 1100 DRM	New Zealand, Radio NZ Intl			7145pa
1000 1100	Nigeria, Radio/Kaduna			4770do
1000 1100	Nigeria, Voice of/ Ext. Svc Lagos			

1000 1100	North Korea, Voice of Korea	3560as	11710am
	11735as	13650as	15180am
1000 1100	Papua New Guinea, NBC	4890do	
1000 1100 vl	Papua New Guinea, Wantok R. Light	7325va	
1000 1100	Saudi Arabia, BSKSA	15250af	
1000 1100	Singapore, MediaCorp Radio	6150do	
1000 1100 vl	Solomon Islands, SIBC	5020do	9545al
1000 1100	South Africa, Channel Africa	9620af	
1000 1100	UK, BBC World Service	6190af	6195as
	7320eu	9470eu	9740as
	11760me	15310as	15575as
	17790as	17885af	21470af
1000 1100 Sat/Sun	UK, BBC World Service	15400af	
1000 1100	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7811usb
	12133usb	13362usb	
1000 1100	USA, KAIJ Dallas TX	5755va	
1000 1100	USA, KNLS Anchor Point AK	6890as	7355al
1000 1100	USA, KTNB Salt Lake City UT	7505na	
1000 1100	USA, KWHR Naalehu HI	9930as	
1000 1100	USA, WBCQ Monticello ME	5110am	7415na
1000 1100	USA, WBOH Newport NC	5920am	
1000 1100	USA, WEWN Vandiver AL	5850na	
1000 1100	USA, WHRI Cypress Creek SC	7335am	7315am
1000 1100	USA, WRMI Miami FL	9955va	
1000 1100	USA, WTJC Newport NC	9370na	
1000 1100	USA, WWCR Nashville TN	5070na	5765na
	5935na	15825na	
1000 1100	USA, WWRB Manchester TN	3185va	
1000 1100	USA, WYFR/Family Radio FL	5950na	5985na
	6855na	7855am	9450va
			9755am
1000 1100	Zambia, CVC International	13590af	
1015 1045 Sun	UK, Bible Voice BC	5910as	
1030 1057	Czech Rep, Radio Prague	9880eu	11665eu
1030 1058	Vietnam, Voice of 7285as		
1030 1100	Iran, Voice of the Islamic Rep	15600as	17660as
1030 1100	UK, BBC World Service	9605as	11945as
	15285as	15360as	21660as
1059 1100	New Zealand, Radio NZ Intl	9870pa	

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

1100 1115 Sun	UK, Bible Voice BC	5945as	
1100 1128	Vietnam, Voice of 9840as	7220as	7285as
1100 1130	Australia, HCJB Global	15540va	
1100 1130	Iran, Voice of the Islamic Rep	15600as	17600as
1100 1145	USA, WYFR/Family Radio FL	9550am	9755am
1100 1158 DRM	New Zealand, Radio NZ Intl	7145pa	
1100 1200	Anguilla, University Network	11775am	
1100 1200	Australia, ABC NT Alice Springs	4835do	2310do
1100 1200	Australia, ABC NT Katherine	2485do	
1100 1200	Australia, ABC NT Tennant Creek		2325do
1100 1200	Australia, CVC International	13635as	
1100 1200 DRM	Australia, Radio	12080va	
1100 1200	Australia, Radio	5995va	6020va
	9560pa	9580va	9590va
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	6040na
	11650as	11750na	11795as
	13645as	13650eu	13720as
1100 1200	Costa Rica, University Network	5030va	
	6150va	7375va	9725va
	13750va		11870va
1100 1200 Sun	Italy, IRRS	9510eu	
1100 1200	Japan, Radio Japan/NHK World		6120na
	9695as	11730as	
1100 1200 vl	Liberia, ELWA	4760do	
1100 1200	Malaysia, RTM/Trax FM	7295as	
1100 1200	Netherlands, Radio	11675na	
1100 1200	New Zealand, Radio NZ Intl	9870pa	
1100 1200	Nigeria, Radio/Kaduna	4770do	6090al
1100 1200	Nigeria, Voice of/ Ext. Svc Lagos		9690af
1100 1200	Papua New Guinea, NBC	4890do	
1100 1200 vl	Papua New Guinea, Wantok R. Light	7325va	
1100 1200	Saudi Arabia, BSKSA	15250af	
1100 1200	Singapore, Radio Singapore Intl	6150as	6080as
1100 1200	South Africa, Channel Africa	9620af	
1100 1200	Taiwan, Radio Taiwan Intl	11715as	
1100 1200 Sat/Sun	UK, BBC World Service	9660am	15400af
	15575as		
1100 1200	UK, BBC World Service	6190af	6195as
	7320eu	9465sa	9470eu
			9740as

9860va	11760me	15310as	17760as
17790as	17885af	21470af	
1100 1200 mtwhf	UK, BBC World Service	15575as	17830af
1100 1200 Sat	UK, Bible Voice BC	5945as	
1100 1200	Ukraine, Radio Ukraine Intl	11550eu	
1100 1200	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7811usb
	12133usb	13362usb	
1100 1200	USA, KAIJ Dallas TX	5755va	
1100 1200	USA, KTNB Salt Lake City UT	7505na	
1100 1200	USA, KWHR Naalehu HI	9930as	
1100 1200	USA, WBOH Newport NC	5920am	
1100 1200	USA, WEWN Vandiver AL	5850na	
1100 1200	USA, WINB Red Lion PA	9265am	
1100 1200	USA, WRMI Miami FL	9955va	
1100 1200	USA, WTJC Newport NC	9370na	
1100 1200	USA, WWCR Nashville TN	5070na	5765na
	5935na	15825na	
1100 1200	USA, WWRB Manchester TN	3185va	
1100 1200	USA, WYFR/Family Radio FL	5985na	7780am
	9625am		
1100 1200	Zambia, CVC International	13590af	
1115 1130 twhf	UK, Bible Voice BC	5945as	
1115 1200 m	UK, Bible Voice BC	5945as	
1130 1145	UK, BBC World Service	7135as	11920as
1130 1200	Australia, HCJB Global	15400va	
1130 1200 mtwhfa	Australia, HCJB Global	15425va	
1130 1200	Bulgaria, Radio	11700eu	15700eu
1130 1200	Guam, AWR/KSDA	15435as	
1130 1200 mtwhf	UK, BBC World Service	9660am	
1130 1200	Vatican City, Vatican Radio	15595va	17765va

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

1200 1215 vl	UK, Bible Voice BC	5945as	
1200 1230 Sun	Australia, HCJB Global	15425va	
1200 1230	France, Radio France Intl	17800af	
1200 1230	Germany, AWR Europe	15435as	
1200 1230 DRM	UK, Bible Voice BC	5945as	
1200 1245	USA, WYFR/Family Radio FL	5950na	5985na
1200 1256	Romania, Radio Romania Intl	11875eu	15220eu
1200 1258	New Zealand, Radio NZ Intl	9870pa	
1200 1259	Canada, Radio Canada Intl	9660as	15170as
1200 1259	Poland, Radio Polonia	9525eu	11805eu
1200 1300	Anguilla, University Network	11775am	
1200 1300	Australia, ABC NT Alice Springs	4835do	2310do
1200 1300	Australia, ABC NT Katherine	2485do	
1200 1300	Australia, ABC NT Tennant Creek		2325do
1200 1300	Australia, CVC International	13635as	
1200 1300 DRM	Australia, Radio	5995va	
1200 1300	Australia, Radio	5995va	6020va
	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	9460as
	9730as	9760pa	11650as
	11690as	11760pa	11660as
	13650eu	13790eu	17490eu
1200 1300	Costa Rica, University Network		9725va
	11870va	13750va	
1200 1300	Malaysia, RTM/Trax FM	7295as	
1200 1300 DRM	New Zealand, Radio NZ Intl	7145pa	
1200 1300	Nigeria, Radio/Kaduna	4770do	6090al
1200 1300	Nigeria, Voice of/ Ext. Svc Lagos		9690af
1200 1300	Papua New Guinea, NBC	4890do	
1200 1300 vl	Papua New Guinea, Wantok R. Light	7325va	
1200 1300	Singapore, Radio Singapore Intl	6150as	6080as
1200 1300	South Korea, KBS World Radio		9650na
1200 1300	UAE, AWR Africa	15140as	
1200 1300	UK, BBC World Service	6190af	6195as
	7320eu	9465sa	9470eu
	9660am	9860af	11750as
	15310as	15575as	17790as
	21470af		17885af
1200 1300 mtwhf	UK, BBC World Service	17830af	
1200 1300	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7811usb
	12133usb	13362usb	
1200 1300	USA, KAIJ Dallas TX	9480va	
1200 1300	USA, KNLS Anchor Point AK	9780as	9920al
1200 1300	USA, KTNB Salt Lake City UT	7505na	
1200 1300	USA, KWHR Naalehu HI	12130as	
1200 1300	USA, Voice of America	6140va	9645va
	9760va	11860as	

1200 1300	USA, WBOH Newport NC	5920am	
1200 1300	USA, WEWN Vandiver AL	5850na	
1200 1300	USA, WHRA Greenbush ME	17650na	
1200 1300	USA, WHRI Cypress Creek SC	9495am	
	17650am		
1200 1300	USA, WINB Red Lion PA	9265am	
1200 1300	USA, WRMI Miami FL	9955va	
1200 1300	USA, WTJC Newport NC	9370na	
1200 1300	USA, WWCR Nashville TN	7465na	9985na
	13845na	15825na	
1200 1300	USA, WWRB Manchester TN	3185va	
1200 1300	USA, WYFR/Family Radio FL	17555am	17750am
1200 1300	Zambia, CVC International	13590af	
1205 1220 m	Austria, Radio Austria Intl	6155va	13730va
	17715va		
1205 1230 Sat/Sun	Austria, Radio Austria Intl	6155va	13730va
	17715va		
1215 1230 twhf	Austria, Radio Austria Intl	17715va	
1215 1300	Egypt, Radio Cairo	17835as	
1230 1258	Vietnam, Voice of 9840as	12020as	
1230 1300	Bangladesh, Bangla Betar	7185as	
1230 1300	Sweden, Radio	13580va	15240na 15735va
1230 1300	Thailand, Radio	9835va	
1230 1300	Turkey, Voice of	13685eu	15450eu
1235 1300 Sat/Sun	Austria, Radio Austria Intl	6155va	13730va
	17715va		
1245 1300 Sat	Australia, HCJB Global	15425va	
1245 1300 twhf	Austria, Radio Austria Intl	6155va	13730va
	17715va		
1245 1300 m	Austria, Radio Austria Intl	17715va	

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

1300 1328	Serbia, International Radio Serbia	7240eu	
1300 1329	Czech Rep, Radio Prague	13580eu	17540as
1300 1330 twhf	Albania, Radio Tirana	13750na	
1300 1330	Egypt, Radio Cairo	17835as	
1300 1330	Germany, Universal Life	15750as	
1300 1330 Sun	Italy, IRRS	15750as	
1300 1330	Turkey, Voice of	13685eu	15450eu
1300 1400	Anguilla, University Network	11775am	
1300 1400	Armenia, CVC International	15615as	
1300 1400	Australia, CVC International	13635as	
1300 1400	Australia, Radio	5995va	6020va 9560as
	9580va	9590va	
1300 1400 DRM	Australia, Radio	5995va	
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	9570na
	9650as	9730as	9760pa 9765as
	9870as	11660as	11760pa 11980as
	13610eu	13755as	13790eu 15260na
	17625sa		
1300 1400	Costa Rica, University Network		9725va
	11870va	13750va	
1300 1400	Germany, Overcomer Ministries		6110na
1300 1400 vl/Sat	Greece, Voice of	9420eu	15630eu
1300 1400 Sun	Latvia, Radio SWH	9290eu	
1300 1400	Malaysia, RTM/Trax FM	7295as	
1300 1400	New Zealand, Radio NZ Intl	6095pa	
1300 1400	Nigeria, Radio/Kaduna	4770do	6090al
1300 1400	Nigeria, Voice of/ Ext. Svc Lagos		9690af
1300 1400	North Korea, Voice of Korea	4405na	9335na
	11710na	13760eu	15245eu
1300 1400	Papua New Guinea, NBC	4890do	
1300 1400 vl	Papua New Guinea, Wantok R. Light		7325va
1300 1400	Singapore, Radio Singapore Intl		6080as
	6150as		
1300 1400	South Korea, KBS World Radio		9570na
	9770as		
1300 1400	UK, BBC World Service	6190af	6195as
	7320eu	9740as	9860af 11750as
	11760me	15310as	15420af 17790as
	17885af	21470af	
1300 1400 Sat/Sun	UK, BBC World Service	15575as	
1300 1400 mtwhf	UK, BBC World Service	17830af	
1300 1400	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7811usb 10320usb
	12133usb	13362usb	
1300 1400	USA, KAIJ Dallas TX	9480va	
1300 1400	USA, KTBH Salt Lake City UT	7505na	
1300 1400	USA, KWHR Naalehu HI	12130as	
1300 1400	USA, Voice of America	9645va	9760va
1300 1400 w f	USA, WBCQ Monticello ME	9330am	
1300 1400	USA, WBOH Newport NC	5920am	
1300 1400	USA, WEWN Vandiver AL	5850na	

1300 1400	USA, WHRA Greenbush ME	17650na	
1300 1400 mtwhf	USA, WHRI Cypress Creek SC		9495am
1300 1400	USA, WHRI Cypress Creek SC		17650am
1300 1400	USA, WINB Red Lion PA	13570am	
1300 1400	USA, WRMI Miami FL	9955va	
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 Radio FL	11830na	11865na
	11895na	11910na	17750na
1300 1400	Zambia, CVC International	13590af	
1330 1357 DRM/f-a	Czech Rep, Radio Prague	9850eu	
1330 1400 DRM	Canada, Radio Canada Intl	7240eu	
1330 1400 twhfa	Guam, AWR/KSDA	15275as	
1330 1400	India, All India Radio	9690as	11620as
	13710as		
1330 1400	Laos, National Radio	7145as	
1330 1400	Sweden, Radio	15240na	15735va
1330 1400	UK, BBC World Service	7465eu	
1345 1400	Guam, TWR/KTWR	9975as	

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

1400 1415 t h	Germany, Pan American BC	13645me	
1400 1415 twf	Russia, FEBA	9500eu	
1400 1430	Australia, Radio	5995va	6080va 7240as
	9590va		
1400 1430 fa	Guam, TWR/KTWR	9975as	
1400 1430 DRM	Romania, Radio Romania Intl	9600eu	
1400 1430	Thailand, Radio	9805va	
1400 1430 tha	UK, Sudan Radio Service	15470af	
1400 1500	Anguilla, University Network	11775am	
1400 1500	Armenia, CVC International	15615as	
1400 1500	Australia, CVC International	13635as	
1400 1500 Sat/Sun	Bhutan, BBS	6035as	
	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	9560as
	9765as	9870eu	11675as 11765as
	11775as	13610eu	13710eu 13740na
	13790eu		
1400 1500	Costa Rica, University Network		9725va
	11870va	13750va	
1400 1500 Sat	Germany, Overcomer Ministries		17810eu
1400 1500	Germany, Overcomer Ministries		6110eu
	13810va		
1400 1500 mtw	Guam, TWR/KTWR	9975as	
1400 1500	India, All India Radio	9690as	11620as
	13710as		
1400 1500 Sun	Italy, IRRS	6125eu	
1400 1500	Japan, Radio Japan/NHK World		7200as
	11730as	11840pa	
1400 1500	Jordan, Radio	11690na	
1400 1500	Libya, Voice of Africa	17775af	17870af
	21695af	21870af	
1400 1500	Malaysia, RTM/Trax FM	7295as	
1400 1500	Netherlands, Radio	9345as	9840as
	11835as		
1400 1500	New Zealand, Radio NZ Intl	6095pa	
1400 1500	Nigeria, Radio/Kaduna	4770do	6090al
1400 1500	Nigeria, Voice of/ Ext. Svc Lagos		9690af
1400 1500 vl	Papua New Guinea, Wantok R. Light		7325va
1400 1500	Russia, Voice of	6045as	7165as 9745as
	11755as	15695as	15660as
1400 1500 DRM	Russia, Voice of	9450eu	
1400 1500	Singapore, MediaCorp Radio	6150do	
1400 1500	South Africa, Channel Africa	9620af	
1400 1500	Taiwan, Radio Taiwan Intl	15265as	
1400 1500 Sat	UK, BBC World Service	12095af	
1400 1500 mtwhf	UK, BBC World Service	17830af	
1400 1500	UK, BBC World Service	3255af	6190af
	6195as	7320eu	9740as 9860af
	11750as	11920as	15310as 15575as
	21470af	21660af	
1400 1500 Sat/Sun	UK, Bible Voice BC	15680as	
1400 1500	Ukraine, Radio Ukraine Intl	7530eu	
1400 1500	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7811usb 10320usb
	12133usb	13362usb	
1400 1500	USA, KAIJ Dallas TX	9480va	
1400 1500	USA, KJES Vado NM	11715na	
1400 1500	USA, KNLS Anchor Point AK	7355as	
1400 1500	USA, KTBH Salt Lake City UT	7505na	15590na
1400 1500	USA, KWHR Naalehu HI	9930as	
1400 1500	USA, Voice of America	4930af	6080af

	7125va	9760va	13570va	15185va
	15530va	15580af	17685af	17740va
1400 1500	USA, WBCQ Monticello ME	9330am		
1400 1500	USA, WBOH Newport NC	5920am		
1400 1500	USA, WEWN Vandiver AL	9955na		
1400 1500	USA, WHRA Greenbush ME	17650na		
1400 1500	USA, WHRI Cypress Creek SC		9840am	
	11785am	17650am		
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, WWCN Nashville TN	9985na	12160na	
	13845na	15825na		
1400 1500	USA, WWRB Manchester TN	9385na		
1400 1500	USA, WYFR/Family Radio FL	7320va	9865eu	
	11830na	11910na	12150eu	13695am
	17750am			
1400 1500	Zambia, CVC International	13590af		
1415 1430	Nepal, Radio	3230as	5005as	6100as
	7165as			
1415 1445 m	UAE, FEBA	12025eu		
1430 1445 Sun	Germany, Pan American BC	13645as	13820as	
1430 1445 twf	UAE, FEBA	12025eu		
1430 1500	Australia, Radio	5995va	6080va	7240as
	9475as	9590va	11660pa	
1430 1500	Myanmar, Radio	5986as		
1430 1500 DRM	South Korea, KBS World Radio		9770eu	

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

1500 1510 mtwhfa	Turkmenistan, Turkmen Radio	5015eu	
1500 1528	Vietnam, Voice of 9550va	9840va	12020va
	13860va		
1500 1530 vl	Eritrea, Bana Radio	5100do	
1500 1530	Guam, AWR/KSDA	11640as	
1500 1530	Nigeria, Radio, Natl Svc/Abuja	7275do	
1500 1530	UK, BBC World Service	9695af	11860af
	15420af		
1500 1530 ta	UK, Bible Voice BC	13840as	
1500 1545	Sweden, IBRA Radio	7340as	
1500 1545	USA, WYFR/Family Radio FL	15770am	
1500 1550	New Zealand, Radio NZ Intl	6095pa	
1500 1555	South Africa, Channel Africa	17770af	
1500 1557	Canada, Radio Canada Intl	11675as	17720as
1500 1559	Germany, Overcomer Ministries	17815na	
1500 1559	Libya, Voice of Africa	17775af	17870af
	21695af	21870af	
1500 1559	South Africa, Channel Africa	9620af	
1500 1600	Anguilla, University Network	11775am	
1500 1600	Armenia, CVC International	15615as	
1500 1600	Australia, CVC International	13635as	
1500 1600	Australia, Radio	5995va	6080va
	9475as	9590va	7240as
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	6100as
	7160as	7325eu	9785as
	11775as	11965eu	13640eu
	13740na	17630af	13685af
1500 1600	Costa Rica, University Network	9725va	
	11870va	13750va	
1500 1600	Germany, CVC Intl/Voice Africa	15715af	
1500 1600	Japan, Radio Japan/NHK World	6190as	
	7200as	9505va	9525na
1500 1600	Jordan, Radio	11690na	11730as
1500 1600	Malaysia, RTM/Trax FM	7295as	
1500 1600	Netherlands, Radio	9345as	9890as
	11835as		
1500 1600	Nigeria, Radio/Kaduna	4770do	6090al
1500 1600	Nigeria, Voice of/ Ext. Svc Lagos	9690af	
1500 1600	North Korea, Voice of Korea	4405eu	9335na
	11710na	13760eu	15245eu
1500 1600 vl	Papua New Guinea, Wantok R. Light	7325va	
1500 1600	Russia, Voice of	4965me	4975me
	9625as	9660as	11985me
1500 1600	Singapore, MediaCorp Radio	6150do	
1500 1600	UAE, AWR Africa	11670as	
1500 1600 Sat	UK, BBC World Service	12095af	
1500 1600 mtwhf	UK, BBC World Service	17830af	
1500 1600	UK, BBC World Service	3255af	5975as
	6190af	6195as	7320af
	9860af	11750as	11760as
	15310as	15400af	15485af
	21660af		21470af
1500 1600	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7811usb
			10320usb

1500 1600	12133usb	13362usb	
1500 1600	USA, KAIJ Dallas TX	9480va	
1500 1600	USA, KJES Vado NM	11715na	
1500 1600	USA, KTVN Salt Lake City UT	7505na	15590na
1500 1600	USA, KWHR Naalehu HI	9930as	
1500 1600	USA, Voice of America	4930af	6080af
	6160va	7125va	9590va
	13735va	15105va	15530va
	15580va	17895va	15550va
1500 1600	USA, WBCQ Monticello ME	9330am	
1500 1600	USA, WBOH Newport NC	5920am	
1500 1600	USA, WEWN Vandiver AL	9955na	
1500 1600	USA, WHRA Greenbush ME	17650na	
1500 1600	USA, WHRI Cypress Creek SC		9840am
	11785am		
1500 1600 Sun	USA, WHRI Cypress Creek SC		15355am
1500 1600 mtwhfa	USA, WHRI Cypress Creek SC		17650am
1500 1600	USA, WINB Red Lion PA	13570am	
1500 1600	USA, WRMI Miami FL	7385na	
1500 1600	USA, WTJC Newport NC	9370na	
1500 1600	USA, WWCN Nashville TN	9985na	12160na
	13845na	15825na	
1500 1600	USA, WWRB Manchester TN	9385na	
1500 1600	USA, WYFR/Family Radio FL	7320va	11830na
	11910na	17750am	
1500 1600	Zambia, CVC International	15715af	
1505 1520 m	Austria, Radio Austria Intl	13775ca	
1505 1530 Sat/Sun	Austria, Radio Austria Intl	13775ca	
1505 1600 DRM	Canada, Radio Canada Intl	9800na	
1505 1600	Canada, Radio Canada Intl	9515na	
1510 1545	Swaziland, TWR	4760af	
1515 1530 twhf	Austria, Radio Austria Intl	13775ca	
1515 1600 Sat	UK, Bible Voice BC	15680as	
1530 1545	India, All India Radio	7255as	9910as
1530 1550	Vatican City, Vatican Radio	12065va	13765va
	15235va		
1530 1600	Germany, AWR Europe	15225as	
1530 1600	Iran, Voice of the Islamic Rep	7370as	9635as
1530 1600 Sun	UK, Bible Voice BC	13590me	
1530 1600 m	UK, Bible Voice BC	15680as	
1530 1600	USA, Voice of America	6160va	9590va
	9760va	12080va	15550va
1535 1600 Sat/Sun	Austria, Radio Austria Intl	13775ca	
1540 1600 mtwhf	UK, Bible Voice BC	13590me	
1545 1600 m	Austria, Radio Austria Intl	13775ca	
1545 1600 twhfa	Austria, Radio Austria Intl	13775ca	
1545 1600 Sun	Germany, Pan American BC	13820me	
1545 1600 Sat	UK, Bible Voice BC	13590me	
1551 1600	New Zealand, Radio NZ Intl	7145pa	
1551 1600 DRM	New Zealand, Radio NZ Intl	6095pa	

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

1600 1605 DRM	Canada, Radio Canada Intl	9800na	
1600 1605 Sun	Croatia, Croatian Radio	6165eu	
1600 1615 mtwhfa	Croatia, Croatian Radio	6165eu	
1600 1615	Pakistan, Radio	9380va	11550af
1600 1615 twhf	UK, Bible Voice BC	13590me	11570va
1600 1620 mtwh	Moldova, Radio DMR Pridnestrovye	5965eu	
1600 1630 vl	Eritrea, Bana Radio	5100do	
1600 1630 h	Germany, Pan American BC	13820me	
1600 1630	Guam, AWR/KSDA	11640as	11805as
1600 1630	Iran, Voice of the Islamic Rep	7370as	7330as
1600 1630	Myanmar, Radio	9730do	
1600 1630 Sat/Sun	Nigeria, Voice of/ Ext. Svc Lagos	9690af	
1600 1630	Swaziland, TWR	4760af	
1600 1640 f	UK, Bible Voice BC	13590me	
1600 1645	Moldova, Radio DMR Pridnestrovye	5965eu	
	USA, WYFR/Family Radio FL	11830na	11865na
	17750am		
1600 1657	Czech Rep, Radio Prague	5930eu	17485af
1600 1700	Anguilla, University Network	11775am	
1600 1700	Australia, CVC International	13635as	
1600 1700	Australia, Radio	5995va	6080va
	9475as	9710va	11660pa
1600 1700 Sat	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	Canada, Radio Canada Intl	9515na	
1600 1700	China, China Radio Intl	6100af	9570af
	11900eu	11940eu	11965eu
	13750va		13760eu
1600 1700	Costa Rica, University Network		11870va
	13750va		
1600 1700	Egypt, Radio Cairo	11740af	
1600 1700	Ethiopia, Radio	7165af	9560af
1600 1700	France, Radio France Intl	15160af	15605af
	17605af		

1600 1700	Germany, CVC Intl/Voice Africa	15715af	
1600 1700	Germany, Deutsche Welle 15640as	6170as	9485as
1600 1700 Sun	Germany, Overcomer Ministries	17815na	
1600 1700	Germany, Universal Life	7285va	
1600 1700 fs	Italy, IRRS	7285eu	
1600 1700	Jordan, Radio	11690na	
1600 1700	Malaysia, RTM/Trax FM	7295as	
1600 1700 DRM	New Zealand, Radio NZ Intl	6095pa	
1600 1700	New Zealand, Radio NZ Intl	7145pa	
1600 1700	Nigeria, Radio/Kaduna	4770do	6090al
1600 1700	North Korea, Voice of Korea	3560va	9990va
		11545va	
1600 1700 vl	Papua New Guinea, Wantok R. Light	7325va	
1600 1700	Russia, Voice of	6070as	7350as
		9405as	9890eu
		11985va	12055va
		12115va	
1600 1700 vl	Rwanda, Radio	6055do	
1600 1700	South Korea, KBS World Radio		9515eu
1600 1700	Taiwan, Radio Taiwan Intl	11550as	15515as
1600 1700	UK, BBC World Service	3915af	5975as
		6190af	6195as
		11760as	11920as
		17840af	21470af
			21660af
			7465eu
			17830af
			9695af
			12095af
1600 1700 Sun	UK, Bible Voice BC	13590me	
1600 1700	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb
		12133usb	13362usb
1600 1700	USA, KAIJ Dallas TX	9480va	
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	4930va	6080af
		12080va	13600va
			15580af
			17895va
1600 1700	USA, WBCQ Monticello ME	9330am	
1600 1700	USA, WBOH Newport NC	5920am	
1600 1700	USA, WEWN Vandiver AL	9450na	
1600 1700	USA, WHRA Greenbush ME	17640na	
1600 1700	USA, WHRI Cypress Creek SC		9840am
		11960am	17640am
1600 1700	USA, WINB Red Lion PA	13570am	
1600 1700 smtwhf	USA, WMLK Bethel PA	9265va	17495va
1600 1700	USA, WRMI Miami FL	9955va	
1600 1700	USA, WTJC Newport NC	9370na	
1600 1700	USA, WWCR Nashville TN	9985na	12160na
		13845na	15825na
1600 1700	USA, WWRB Manchester TN	9385na	
1600 1700	USA, WYFR/Family Radio FL	6085am	13630af
		13695na	15650af
		21455va	21525af
1600 1700	Zambia, CVC International	15715af	
1615 1630	Vatican City, Vatican Radio	4005va	7250va
		9645va	15595va
1615 1645 mtwhf	Swaziland, TWR	6130af	
1615 1700	UK, Bible Voice BC	13590me	
1630 1645	UK, Bible Voice BC	13590me	
1630 1700	Guam, AWR/KSDA	6155as	
1630 1700	Nigeria, Voice of/ Ext. Svc Lagos		15120af
1630 1700	Slovakia, Radio Slovakia Int	5920eu	6055eu
1630 1700 Sat/Sun	Swaziland, TWR	6130af	
1630 1700 Sun	UK, Bible Voice BC	13590me	
1640 1650 mtwhfa	Turkmenistan, Turkmen Radio		4930eu
1645 1700 f	Sweden, IBRA Radio	9830as	
1645 1700	Tajikistan, Tajik Radio	7245as	

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

1700 1704	Canada, Radio Canada Intl	9515na	
1700 1715	Swaziland, TWR	3200af	
1700 1715 vl	UK, Bible Voice BC	13590me	
1700 1725	Vietnam, Voice of	7280va	9725eu
		11630va	13860va
1700 1727	Czech Rep, Radio Prague	5930eu	17485af
1700 1730	Jordan, Radio	11690na	
1700 1730 Sun	UK, Bible Voice BC	13590me	
1700 1730	UK, Bible Voice BC	13590me	
1700 1730	USA, Voice of America	6080af	15580af
1700 1745	UK, BBC World Service	9630af	
1700 1755	South Africa, Channel Africa	15235af	
1700 1756	Romania, Radio Romania Intl	9535eu	11735eu
1700 1759	Poland, Radio Polonia	7140eu	7265eu
1700 1800	Anguilla, University Network	11775am	
1700 1800	Australia, CVC International	13635as	
1700 1800	Australia, Radio	5995va	6080va
		9475as	9580va
			9710va
			11660pa

1700 1800 Sat	Canada, CBC NQ SW Service		9625na
1700 1800	Canada, CFRX Toronto ON	6070na	
1700 1800	Canada, CFPV 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	6100af	9570af
		9695eu	11900af
		11940eu	13760eu
1700 1800	Costa Rica, University Network		11870va
		13750va	
1700 1800	Egypt, Radio Cairo	11740af	
1700 1800	Eqt. Guinea, Radio Africa	15190af	
1700 1800	Germany, CVC Intl/Voice Africa		15715af
1700 1800	Germany, Universal Life	7285va	
1700 1800 fs	Italy, IRRS	7285eu	
1700 1800	Japan, Radio Japan/NHK World		9535va
		11970eu	15355af
1700 1800	Malaysia, RTM/Trax FM	7295as	
1700 1800	New Zealand, Radio NZ Intl	7145pa	
1700 1800 DRM	New Zealand, Radio NZ Intl	6095pa	
1700 1800	Nigeria, Radio/Kaduna	4770do	6090al
1700 1800	Nigeria, Voice of/ Ext. Svc Lagos		15120af
1700 1800 vl	Papua New Guinea, Wantok R. Light	7325va	
1700 1800	Russia, Voice of	7350as	9405as
		11510af	11985af
			9820eu
1700 1800 Sat/Sun	Russia, Voice of	9820eu	9890eu
1700 1800 vl	Rwanda, Radio	6055do	
1700 1800	Taiwan, Radio Taiwan Intl	15690af	
1700 1800 mtwhf	UK, BBC World Service	17830af	
1700 1800 DRM	UK, BBC World Service	1296eu	7465eu
1700 1800	UK, BBC World Service		
		3915as	5975as
		7320eu	7380af
		11955as	12095af
		17840af	21470af
1700 1800 Sat	UK, Bible Voice BC	9430me	
1700 1800	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb
		12133usb	13362usb
1700 1800	USA, KAIJ Dallas TX	9480va	
1700 1800	USA, KTBN Salt Lake City UT	15590na	
1700 1800	USA, KWHR Naalehu HI	9930as	
1700 1800 Sat/Sun	USA, Voice of America	4930af	
1700 1800	USA, WBCQ Monticello ME	9330am	17495am
1700 1800	USA, WBOH Newport NC	5920am	
1700 1800	USA, WEWN Vandiver AL	9450na	15390eu
1700 1800	USA, WHRA Greenbush ME	15705na	
1700 1800	USA, WHRI Cypress Creek SC		9840am
		11960am	15705am
1700 1800	USA, WINB Red Lion PA	13570am	
1700 1800 smtwhf	USA, WMLK Bethel PA	9265va	17495va
1700 1800	USA, WRMI Miami FL	9955va	
1700 1800	USA, WTJC Newport NC	9370na	
1700 1800	USA, WWCR Nashville TN	9985na	12160na
		13845na	15825na
1700 1800	USA, WWRB Manchester TN	9385na	12180na
		15250va	
1700 1800	USA, WYFR/Family Radio FL	13630af	13690na
		15650af	17795am
1700 1800	Zambia, CVC International	15715af	
1705 1800 DRM	Canada, Radio Canada Intl	9800na	
1730 1745	Israel, Kol Israel	9345eu	13675eu
1730 1800	Bulgaria, Radio	5900eu	9600eu
1730 1800	Guam, AWR/KSDA		9980me
1730 1800 vl	Liberia, ELWA	4760do	
1730 1800	Swaziland, TWR	9500af	
1730 1800 DRM	Sweden, Radio	5955eu	
1730 1800	Sweden, Radio	6065va	
1730 1800	UK, Bible Voice BC	9430me	13590me
1730 1800	USA, Voice of America	6080af	15410af
		15580af	
1730 1800 mtwhf	USA, Voice of America	4930af	13755af
		15775af	
1730 1800	Vatican City, Vatican Radio	11625af	13765af
		15570af	
1745 1800	Bangladesh, Bangla Betar	7185as	
1745 1800	India, All India Radio	7410eu	9445af
		9950eu	11620eu
		15075af	15155af
			17670af

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

1800 1815 Sat	UK, Bible Voice BC	11875as	
1800 1828	Vietnam, Voice of	5955eu	7280va
1800 1830 w	Austria, AWR Europe		15315af
1800 1830 f	Italy, IRRS	7285eu	
1800 1830	Nigeria, Radio, Natl Svc/Abuja		7275do
1800 1830	South Africa, AWR Africa	3215af	3345af
		9610af	

1800 1830	UK, BBC World Service	5975as	11955as
1800 1830 Sun	UK, Bible Voice BC	6060eu	
1800 1830	UK, Bible Voice BC	13590me	
1800 1830	USA, Voice of America	6080af	15580af
	17895af		
1800 1830 Sat/Sun	USA, Voice of America	4930af	
1800 1845 Sat	UK, Bible Voice BC	6060eu	
1800 1845	USA, WYFR/Family Radio FL	17535af	
1800 1850	New Zealand, Radio NZ Intl	7145pa	
1800 1850 DRM	New Zealand, Radio NZ Intl	9870pa	
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	Bangladesh, Bangla Betar	7185eu	
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	9530af	11765af
	15235af	17810af	
1800 1900 DRM	Canada, Radio Canada Intl	9800na	
1800 1900	China, China Radio Intl	9600eu	11940eu
	13760eu		
1800 1900	Costa Rica, University Network		11870va
	13750va		
1800 1900	Eqt. Guinea, Radio Africa	15190af	
1800 1900	Germany, CVC Intl/Voice Africa		13820af
1800 1900	Germany, Universal Life	7285va	
1800 1900	India, All India Radio	7410eu	9445af
	9950eu	11620eu	11935af 13605af
	15075af	15155af	17670af
1800 1900 Sun	Italy, IRRS	7285eu	
1800 1900 vl	Liberia, ELWA	4760do	
1800 1900	Malaysia, RTM/Trax FM	7295as	
1800 1900	Netherlands, Radio	6020af	7125af
	11655af		
1800 1900	Nigeria, Radio/Kaduna	4770do	6090al
1800 1900	Nigeria, Voice of/ Ext. Svc Lagos		15120af
1800 1900	North Korea, Voice of Korea	4405eu	7100af
	11900af	15245eu	
1800 1900 vl	Papua New Guinea, Wantok R. Light	7325va	
1800 1900	Russia, Voice of	7370eu	9745af 9850af
	9890eu	11510af	11630eu
1800 1900 vl	Rwanda, Radio	6055do	
1800 1900	South Korea, KBS World Radio		7275eu
1800 1900	Swaziland, TWR	3200af	9500af
1800 1900	Taiwan, Radio Taiwan Intl	3965eu	
1800 1900 DRM	UK, BBC World Service	7420eu	
1800 1900	UK, BBC World Service	5975as	5995as
	6190af	6195eu	7380af 9410va
	12095eu	15400af	17795af 21470af
1800 1900 mtwhf	UK, BBC World Service	17830af	
1800 1900 Sat/Sun	UK, Bible Voice BC	9430me	
1800 1900	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7811usb 10320usb
	12133usb	13362usb	
1800 1900	USA, KAIJ Dallas TX	9480va	
1800 1900	USA, KTN Salt Lake City UT	15590na	
1800 1900 smtwhf	USA, WBCQ Monticello ME	7415am	
1800 1900	USA, WBCQ Monticello ME	9330am	17495am
1800 1900	USA, WBOH Newport NC	5920am	
1800 1900	USA, WEWN Vandiver AL	9450na	15390eu
1800 1900	USA, WHRA Greenbush ME	15705na	
1800 1900	USA, WHRI Cypress Creek SC		9840am
	11960am	15705am	
1800 1900	USA, WINB Red Lion PA	13570am	
1800 1900 smtwhf	USA, WMLK Bethel PA	9265va	17495va
1800 1900	USA, WRMI Miami FL	9955va	
1800 1900	USA, WTJC Newport NC	9370na	
1800 1900	USA, WWCN Nashville TN	9975na	12160na
	13845na	15825na	
1800 1900	USA, WWRB Manchester TN	9385va	12180na
	15250va		
1800 1900	USA, WYFR/Family Radio FL	9845af	13630af
	13690af	13730af	13800na 15650af
	17795va	18980va	
1800 1900	Yemen, Rep of Yemen Radio	9780me	
1800 1900	Zambia, CVC International	5940af	
1805 1810 Sat	Croatia, Croatian Radio	6165eu	
1805 1815 mtwhf	Croatia, Croatian Radio	6165eu	
1830 1858	Serbia, International Radio Serbia		7240eu
1830 1900	Slovakia, Radio Slovakia Int	5920eu	7345eu
1830 1900	Turkey, Voice of	9785eu	
1830 1900	UK, BBC World Service	6005af	9485as
	9630af		
1830 1900 f	UK, Bible Voice BC	9430me	
1830 1900	USA, Voice of America	4930af	15410af
	15580af	17895af	
1845 1900 mtwhfa	Albania, Radio Tirana	6035eu	7465eu

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

1900 1903	Bahrain, Radio Bahrain	6010as	
1900 1905 DRM	Canada, Radio Canada Intl	9800na	
1900 1915	Congo, RTV Congolaise	4765af	5985af
1900 1925	Israel, Kol Israel	9400eu	11590va 15640af
1900 1928	Vietnam, Voice of	7280va	9730va
1900 1930	Germany, Deutsche Welle	9895af	11795as
	17820af		
1900 1930	Turkey, Voice of	9785eu	
1900 1930 Sat	UK, Bible Voice BC	9775af	
1900 1930	UK, Bible Voice BC	6060eu	
1900 1945	India, All India Radio	7410eu	9445af
	9950eu	11620eu	11935af 13605af
	15075af	15155af	17670af
1900 1945	USA, WYFR/Family Radio FL	6085am	
1900 1957 Sat/Sun	Netherlands, Radio	15315na	17660va
	17735af		
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	9435va
	9440va	11940eu	
1900 2000	Costa Rica, University Network		11870va
	13750va		
1900 2000	Egypt, Radio Cairo	15375af	
1900 2000	Eqt Guinea, Radio Africa	15190af	
1900 2000	Germany, CVC Intl/Voice Africa		13820af
1900 2000 vl	Liberia, ELWA	4760do	
1900 2000	Malaysia, RTM/Trax FM	7295as	
1900 2000	Netherlands, Radio	5905af	7115af
	11655af	17810af	
1900 2000	New Zealand, Radio NZ Intl	9615pa	
1900 2000 DRM	New Zealand, Radio NZ Intl	9890pa	
1900 2000	Nigeria, Radio/Kaduna	4770do	6090al
1900 2000	Nigeria, Voice of/ Ext. Svc Lagos		15120af
1900 2000	North Korea, Voice of Korea	3560va	9975va
	11535va		
1900 2000	Papua New Guinea, NBC	4890do	
1900 2000 vl	Papua New Guinea, Wantok R. Light		7325va
1900 2000	Russia, Voice of	7195eu	7310eu 9890eu
	12070eu		
1900 2000 vl	Rwanda, Radio	6055do	
1900 2000 vl	Solomon Islands, SIBC	5020do	9545al
1900 2000	Swaziland, TWR	3200af	
1900 2000 vl	Uganda, Radio	4976do	5026do
1900 2000 DRM	UK, BBC World Service	7420eu	
1900 2000	UK, BBC World Service	5995as	6005as
	6190af	9410af	9455af 9485af
	9630as	15400af	17795as
1900 2000 mtwhf	UK, BBC World Service	17830af	
1900 2000 Sun	UK, Bible Voice BC	9775af	
1900 2000	Ukraine, Radio Ukraine Intl	7490eu	
1900 2000	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7811usb 10320usb
	12133usb	13362usb	
1900 2000	USA, KAIJ Dallas TX	9480va	
1900 2000	USA, KJES Vado NM	15385na	
1900 2000	USA, KTN Salt Lake City UT	15590na	
1900 2000	USA, Voice of America	4930af	4940af
	6080af	7480va	9670va 15410af
	15445af	15580af	17895af
1900 2000	USA, WBCQ Monticello ME	7415am	9330am
	17495am		
1900 2000	USA, WBOH Newport NC	5920am	
1900 2000	USA, WEWN Vandiver AL	9450na	15390eu
1900 2000	USA, WHRA Greenbush ME	13710na	
1900 2000	USA, WHRI Cypress Creek SC		9840am
	13710am	17650am	
1900 2000	USA, WINB Red Lion PA	13570am	
1900 2000 smtwhf	USA, WMLK Bethel PA	9265va	17495va
1900 2000	USA, WRMI Miami FL	9955va	
1900 2000	USA, WTJC Newport NC	9370na	
1900 2000	USA, WWCN Nashville TN	9975na	12160na
	13845na	15825na	
1900 2000	USA, WWRB Manchester TN	9385va	12180na
	15250va		
1900 2000	USA, WYFR/Family Radio FL	7240va	9610af
	13690na	13800na	17795am 17845af
	18930eu		

1900	2000		Zambia, CVC International	5940af	
1930	2000	Sat/Sun	Germany, Pan American BC	5850me	
1930	2000		Iran, Voice of the Islamic Rep	6205eu	6255eu
			7205af	9800af	9925af
1930	2000		Lithuania, Radio Vilnius	6255eu	
1930	2000		Sweden, Radio	6065va	
1935	1955		Italy, RAI Italia	5960eu	9845eu
1945	2000	DRM	Vatican City, Vatican Radio	9800na	
1950	2000		Vatican City, Vatican Radio	4005eu	5885eu
			9645eu		

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

2000	2015	Sun	Germany, Pan American BC	5850me	
2000	2020		Vatican City, Vatican Radio	4005af	5885af
			9645af		
2000	2027		Czech Rep, Radio Prague	5930eu	11600va
2000	2027		Lithuania, Radio Vilnius	6255eu	
2000	2030	twfhas	Albania, Radio Tirana	7465eu	13720va
2000	2030		Egypt, Radio Cairo	15375af	
2000	2030		Germany, AWR Europe	15235as	
2000	2030	f	Germany, Pan American BC	5850me	
2000	2030		Iran, Voice of the Islamic Rep	6205eu	6255eu
			7205af	9800af	9925af
2000	2030		Swaziland, TWR	3200af	
2000	2030		Turkey, Voice of	6195eu	
2000	2030		USA, Voice of America	4930af	4940af
			6080af	15455af	15580af
2000	2030		Vatican City, Vatican Radio	7365af	9755af
			11625af		
2000	2030	DRM	Vatican City, Vatican Radio	9800na	
2000	2045		USA, WYFR/Family Radio FL	17750eu	
2000	2050		New Zealand, Radio NZ Intl	9615pa	
2000	2050	DRM	New Zealand, Radio NZ Intl	9890pa	
2000	2057		Germany, Deutsche Welle	7130af	11795af
2000	2059		Canada, Radio Canada Intl	5850eu	7235eu
			15325eu		
2000	2100		Anguilla, University Network	11775am	
2000	2100		Australia, ABC NT Alice Springs	4835do	2310do
2000	2100		Australia, ABC NT Katherine	2485do	
2000	2100		Australia, ABC NT Tennant Creek	6080va	2325do
2000	2100		Australia, Radio	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	DRM	Canada, Radio Canada Intl	9800na	
2000	2100		China, China Radio Intl	5960eu	7190eu
			7265eu	7295af	9440af
			9800eu	11640af	13630af
2000	2100		Costa Rica, University Network		13750va
2000	2100		Eqt Guinea, Radio Africa	15190af	
2000	2100		Germany, CVC Intl/Voice Africa	13820af	
2000	2100		Germany, Deutsche Welle	11865af	15205af
2000	2100		Indonesia, Voice of	9525eu	11785eu
			15150al		
2000	2100	vl	Liberia, ELWA	4760do	
2000	2100		Malaysia, RTM/Trax FM	7295as	
2000	2100		Netherlands, Radio	5905af	7115af
			17810af		
2000	2100	Sat/Sun	Netherlands, Radio	15315na	17660va
			17735na		
2000	2100		Nigeria, Radio/Kaduna	4770do	6090al
2000	2100		Nigeria, Voice of/ Ext. Svc Lagos		15120af
2000	2100		Papua New Guinea, NBC	4890do	
2000	2100	vl	Papua New Guinea, Wantok R. Light		7325va
2000	2100		Russia, Voice of	9890eu	12070eu
2000	2100	vl	Rwanda, Radio	6055do	
2000	2100	vl	Solomon Islands, SIBC	5020do	9545al
2000	2100		South Africa, Channel Africa	3345af	
2000	2100	mtwhf	Spain, Radio Exterior Espana	9665eu	11625af
2000	2100	vl	Uganda, Radio	4976do	5026do
2000	2100		UK, BBC World Service	6005af	6190af
			9410af	9455af	9630af
2000	2100	mtwhf	UK, BBC World Service	17830af	
2000	2100	DRM	UK, BBC World Service	5875eu	
2000	2100		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7811usb
			12133usb	13362usb	
2000	2100		USA, KAIJ Dallas TX	9480va	
2000	2100		USA, KJES Vado NM	15385na	
2000	2100		USA, KTBN Salt Lake City UT	15590na	
2000	2100		USA, WBCQ Monticello ME	7415am	9330am
			17495am		
2000	2100		USA, WBOH Newport NC	5920am	
2000	2100		USA, WEWN Vandiver AL	9450na	15220af
2000	2100	mtwhf	USA, WHRA Greenbush ME	7400na	
2000	2100	Sat/Sun	USA, WHRA Greenbush ME	11885na	

2000	2100		USA, WHRI Cypress Creek SC	17650am	
2000	2100	Sat/Sun	USA, WHRI Cypress Creek SC	11885am	9840am
2000	2100	mtwhf	USA, WHRI Cypress Creek SC	13670am	7400am
2000	2100		USA, WINB Red Lion PA	13570am	
2000	2100	smtwhf	USA, WMLK Bethel PA	9265va	17495va
2000	2100		USA, WRMI Miami FL	9955va	
2000	2100		USA, WTJC Newport NC	9370na	
2000	2100		USA, WWCR Nashville TN	9975na	12160na
			13845na	15825na	
2000	2100		USA, WWRB Manchester TN	9385va	12180na
			15250va		
2000	2100		USA, WYFR/Family Radio FL	3230af	7430eu
			17725am	17845af	18980va
2000	2100		Zambia, CVC International	5940af	
2005	2100		Syria, Radio Damascus	9330eu	12085eu
2020	2100		Belarus, Radio	7105eu	7390eu
			7440al		
2025	2045		Italy, RAI Italia	5970va	11875va
2030	2045		Thailand, Radio	9680eu	
2030	2056		Romania, Radio Romania Intl	9515va	11810va
			11940va	15465va	
2030	2058		Vietnam, Voice of	7280va	9550va
			13860va		
2030	2100		Cuba, Radio Havana	9505va	11760va
2030	2100	DRM	Netherlands, Radio	9800na	
2030	2100		Turkey, Voice of	7170va	
2030	2100		USA, Voice of America	4930af	6080af
			7555as	15445af	15580af
2030	2100	Sat/Sun	USA, Voice of America	4940af	
2045	2100		India, All India Radio	7410eu	9445eu
			9910pa	11620va	11715pa
2051	2100		New Zealand, Radio NZ Intl	15720pa	

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

2100	2130		Australia, ABC NT Katherine	2485do	
2100	2130		Australia, ABC NT Tennant Creek		2325do
2100	2130		Austria, AWR Europe	11955af	
2100	2130	Sat	Canada, CBC NQ SW Service		9625na
2100	2130		China, China Radio Intl	5960eu	7190eu
			7285eu	9490eu	9600eu
			13630af		
2100	2130		Cuba, Radio Havana	9505va	11760va
2100	2130		Nigeria, Radio, Natl Svc/Abuja		7275do
2100	2130		South Korea, KBS World Radio		3955eu
2100	2130		Turkey, Voice of	7170va	
2100	2130		USA, Voice of America	6080af	7555as
			15580af		
2100	2145		USA, WYFR/Family Radio FL	13800na	17795am
			18980va		
2100	2150	DRM	New Zealand, Radio NZ Intl	11675pa	
2100	2159	smtwhf	Germany, Overcomer Ministries		7310eu
2100	2159	Sat/Sun	Spain, Radio Exterior Espana	9840eu	11625af
2100	2200		Anguilla, University Network	11775am	
2100	2200		Australia, ABC NT Alice Springs	4835do	2310do
2100	2200		Australia, Radio	9500as	9660as
			11695pa	12080as	13630as
2100	2200		Bulgaria, Radio	5900eu	9700eu
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	DRM	Canada, Radio Canada Intl	9800na	
2100	2200		Costa Rica, University Network		13750va
2100	2200		Eqt Guinea, Radio Africa	15190af	
2100	2200		Germany, Deutsche Welle	9735af	11865af
			15205af		
2100	2200		Guyana, Voice of	3291do	5950do
2100	2200		India, All India Radio	7410eu	9445eu
			9910pa	11620va	11715pa
2100	2200		Japan, Radio Japan/NHK World	6055eu	6180eu
			6055eu	6180eu	11855af
			17870pa		
2100	2200	vl	Liberia, ELWA	4760do	
2100	2200		Malaysia, RTM/Trax FM	7295as	
2100	2200		New Zealand, Radio NZ Intl	15720pa	
2100	2200		Nigeria, Radio/Kaduna	4770do	6090al
2100	2200		Nigeria, Voice of/ Ext. Svc Lagos		7255af
2100	2200		North Korea, Voice of Korea	4405eu	13760eu
			15245eu		
2100	2200		Papua New Guinea, NBC	4890do	
2100	2200	vl	Papua New Guinea, Wantok R. Light		7325va
2100	2200		South Africa, Channel Africa	3345af	
2100	2200		Syria, Radio Damascus	9330eu	12085eu
2100	2200		UK, BBC World Service	3915as	6005af
			6190af	6195af	11675am
			12095af	13640am	15400af
2100	2200	DRM	UK, BBC World Service	5875eu	

2100	2200	Ukraine, Radio Ukraine Intl	7510eu	
2100	2200	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7811usb
		12133usb	13362usb	
2100	2200	USA, KAIJ Dallas TX	9480va	
2100	2200	USA, KTBN Salt Lake City UT	15590na	
2100	2200	USA, WBCQ Monticello ME	7415am	9330am
		17495am		
2100	2200	USA, WBOH Newport NC	5920am	
2100	2200	USA, WEWN Vandiver AL	9450na	15220af
2100	2200	USA, WHRA Greenbush ME	7400na	
2100	2200	USA, WHRA Greenbush ME	11885na	
2100	2200	USA, WHRI Cypress Creek SC		7400am
		13670am		
2100	2200	USA, WHRI Cypress Creek SC		11885am
2100	2200	USA, WINB Red Lion PA	13570am	
2100	2200	USA, WRMI Miami FL	9955va	
2100	2200	USA, WRMI Miami FL	7385na	
2100	2200	USA, WTJC Newport NC	9370na	
2100	2200	USA, WWCR Nashville TN	9975na	12160na
		13845na	15825na	
2100	2200	USA, WWRB Manchester TN	9385va	12180na
		15250va		
2100	2200	USA, WYFR/Family Radio FL	3230af	7430eu
		9610af	11565eu	17795am
2115	2200	Egypt, Radio Cairo	9990eu	
2130	2157	Czech Rep, Radio Prague	9410af	11600na
2130	2200	Australia, ABC NT Katherine	5025do	
2130	2200	Australia, ABC NT Tennant Creek		4910do
2130	2200	Canada, CBC NQ SW Service		9625na
2130	2200	Guam, AWR/KSDA	11850as	
2130	2200	Sweden, Radio	6065va	7420va
2151	2200	DRM	New Zealand, Radio NZ Intl	13730pa

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

2200	2210	Syria, Radio Damascus	9330eu	12085eu
2200	2230	DRM	Germany, Deutsche Welle	9800na
2200	2230		India, All India Radio	7410eu
			9910pa	11620va
2200	2230	vl	Liberia, ELWA	4760do
2200	2230		Papua New Guinea, NBC	4890do
2200	2245		Egypt, Radio Cairo	9990eu
2200	2245		USA, WYFR/Family Radio FL	15770af
2200	2256		Romania, Radio Romania Intl	7185va
			9790va	11940va
2200	2300		Anguilla, University Network	6090am
2200	2300		Australia, ABC NT Alice Springs	
			4835do	
2200	2300		Australia, ABC NT Katherine	5025do
2200	2300		Australia, ABC NT Tennant Creek	4910do
2200	2300		Australia, Radio	9660as
			15230pa	15240va
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	
2200	2300		China, China Radio Intl	7175eu
2200	2300		Costa Rica, University Network	
2200	2300		Eqt Guinea, Radio Africa	15190af
2200	2300		Guyana, Voice of 3291do	
2200	2300		Malaysia, RTM/Trax FM	7295as
2200	2300	DRM	New Zealand, Radio NZ Intl	13730pa
2200	2300		New Zealand, Radio NZ Intl	15720pa
2200	2300		Nigeria, Radio/Kaduna	4770do
2200	2300		Nigeria, Voice of/ Ext. Svc Lagos	7255af
2200	2300	vl	Papua New Guinea, Wantok R. Light	7325va
2200	2300	vl	Solomon Islands, SIBC	5020do
2200	2300		Taiwan, Radio Taiwan Intl	15600eu
2200	2300		Turkey, Voice of	6195va
2200	2300		UK, BBC World Service	5955as
			5975am	6195as
			12095af	13640am
2200	2300		USA, American Forces Radio	4319usb
			5765usb	6350usb
			12133usb	13362usb
2200	2300		USA, KAIJ Dallas TX	9480va
2200	2300		USA, KTBN Salt Lake City UT	15590na
2200	2300		USA, Voice of America	7120va
			9415va	11725va
2200	2300	mtwhf	USA, WBCQ Monticello ME	5110am
2200	2300		USA, WBCQ Monticello ME	7415am
2200	2300		USA, WBOH Newport NC	5920am
2200	2300		USA, WEWN Vandiver AL	9975na
2200	2300		USA, WHRA Greenbush ME	11885na
2200	2300		USA, WHRI Cypress Creek SC	
2200	2300	mtwhfa	USA, WHRI Cypress Creek SC	9515am
2200	2300		USA, WINB Red Lion PA	13570am
2200	2300		USA, WRMI Miami FL	9955va

2200	2300	USA, WTJC Newport NC	9370na	
2200	2300	USA, WWCR Nashville TN	5070na	7465na
		9985na	13845na	
2200	2300	USA, WWRB Manchester TN	6890va	9385va
		12180na	15250va	
2200	2300	Sat/Sun	USA, WWRB Manchester TN	3185na
			15250va	
2200	2300		USA, WYFR/Family Radio FL	9620af
2205	2230		Italy, RAI Italia	11895va
2215	2230		Croatia, Croatian Radio	6165eu
2230	2257		Czech Rep, Radio Prague	7345na
2230	2300		Guam, AWR/KSDA	15320as
2230	2300		Papua New Guinea, NBC	9675do
2230	2300		USA, Voice of America	7260va
			11705as	13725va
2245	2300		India, All India Radio	9705as
			11620as	11645as
				13605as

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	
2300	0000		China, China Radio Intl	5915as
			6145na	7180as
2300	0000		Costa Rica, University Network	11685as
2300	0000		Cuba, Radio Havana	9550va
2300	0000		Egypt, Radio Cairo	9460na
2300	0000		Guyana, Voice of 3291do	
2300	0000		India, All India Radio	9705as
			11620as	11645as
2300	0000		Malaysia, RTM/Trax FM	7295as
2300	0000	DRM	New Zealand, Radio NZ Intl	13730pa
2300	0000		New Zealand, Radio NZ Intl	15720pa
2300	0000		Papua New Guinea, NBC	9675do
2300	0000	vl	Papua New Guinea, Wantok R. Light	7325va
2300	0000		Singapore, MediaCorp Radio	6150do
2300	0000	vl	Solomon Islands, SIBC	5020do
2300	0000		UK, BBC World Service	3915as
			6195as	9740as
			12010as	11945as
2300	0000		USA, American Forces Radio	4319usb
			5765usb	6350usb
			12133usb	13362usb
2300	0000		USA, KAIJ Dallas TX	9480va
2300	0000		USA, KTBN Salt Lake City UT	15590na
2300	0000		USA, Voice of America	7120va
			7555va	9570va
2300	0000		USA, WBCQ Monticello ME	5110na
			9330am	17495am
2300	0000		USA, WBOH Newport NC	5920am
2300	0000		USA, WEWN Vandiver AL	9975na
2300	0000		USA, WHRA Greenbush ME	7520na
2300	0000	Sun	USA, WHRI Cypress Creek SC	
2300	0000		USA, WHRI Cypress Creek SC	7315am
			7520am	
2300	0000	mtwhfa	USA, WHRI Cypress Creek SC	9515am
2300	0000	Sun	USA, WHRI Cypress Creek SC	7490am
2300	0000		USA, WINB Red Lion PA	9265am
2300	0000		USA, WRMI Miami FL	9955va
2300	0000		USA, WTJC Newport NC	9370na
2300	0000		USA, WWCR Nashville TN	5070na
			9985na	13845na
2300	0000		USA, WWRB Manchester TN	3185na
			6890na	15250va
2300	0000		USA, WYFR/Family Radio FL	15255am
2300	2300		Bulgaria, Radio	9700na
2300	2315		Nigeria, Radio/Kaduna	4770do
2300	2330		Australia, Radio	9660as
			13690pa	15230pa
			17795va	15240va
2300	2345		USA, WYFR/Family Radio FL	11740na
2300	2345	DRM	Vatican City, Vatican Radio	7370na
2305	0000		Canada, Radio Canada Intl	6100na
2305	0000		Greece, Voice of	7475eu
2330	0000		Australia, Radio	9660as
			13690pa	15230pa
			17785va	17795va
2330	0000		Burma, Dem Voice of Burma	5955eu
2330	0000		Lithuania, Radio Vilnius	9875na
2330	0000		UK, BBC World Service	9580as
2330	0000		USA, Voice of America	7350as
2330	2358		Vietnam, Voice of	9840as
2330	2359	DRM	Sweden, Radio	9800na

Ear on the National Capitol Region

In addition to politicians, the seat of government and such, when I think of Washington, D.C., I think of the U.S. military. You can't drive around the D.C. area without running into a military base. Travel outside the beltway and you are within a short driving distance of even more military installations. So, it made sense that the DC area would be the first in the country to get one of the new 380-400 MHz IP-based P25 Land Mobile Radio (LMR) trunk radio systems (TRS) in 2006.

A lot has changed since I first penned in this column about the US Army National Capital Region (NCR) trunk radio system going online in the new Department of Defense (DoD) 380-400 MHz land mobile radio (LMR) band.

The first phase of the NCR trunk project was completed in October 2006. It was carried out in conjunction with the U.S. Army's Director of Information Management (DOIM). It links more than 5,000 Federal personnel and up to 58 public safety agencies in and around the NCR region.

NCR Phase I provides interoperable mission-critical voice communications with civilian public safety agencies in the NCR region, including greater Washington DC, Maryland, Virginia and Fort Hamilton, NY. The NCR Phase I deployment covered 10 Army bases, including the Pentagon, Fort Belvoir, Fort Myer, Fort McNair, Fort Meade, Fort Hamilton, Fort Detrick, Walter Reed Army Medical Center (WRAMC) and Fort AP Hill.

The deployment of NCR Phase II, now known as Joint NCR, should have been completed in the first quarter of this year. Phase II adds the US Navy (Naval District Washington, the Naval Academy, among others) along with the US Air Force (Bolling Air Force Base, among others) to the NCR regional system. NCR Phase II provides seamless wide-area communications and convoy operations over a large footprint, and is one of the first tri-service DoD LMR systems.

❖ Project P-25

The Project 25, or P25 standard, allows independent multi-vendor procurement of radio networks and subscriber devices (radios) and provides a robust public-safety feature set (including data capability and AES, Advanced Encryption Standard) and operates on narrower 12.5 kHz bandwidths rather than older 25 kHz systems.

This new Joint NCR system meets many of the same requirements as the upcoming nationwide Federal wireless communications system, called the Integrated Wireless Network (IWN) for 20 Federal Law Enforcement agencies from

Homeland Security (DHS), Department of Justice (DOJ) and the Treasury.

Joint NCR is an IP-based network solution that will facilitate interoperable communications. Interoperable communications is achieved via a *NetworkFirst* system with approximately 60 civilian public safety agencies located in both the National Capital Region and in suburban Maryland and Virginia. These agencies are currently communicating on different frequencies and have disparate radio systems throughout the NCR.

❖ The Joint NCR System

While we don't have all the details yet on Joint NCR, we have made some major inroads into system sites, frequencies and talkgroups. Here is the latest information on this extensive radio system.

JOINT NATIONAL CAPITAL REGION TRUNK RADIO SYSTEM

System: M/A-COM trunked P25IP
P25 WACN: 580A0

Fort Belvoir VA – JNCR System 001

Site 101 Fort Belvoir VA
381.6750/391.6750c 381.8250/391.8250c
381.9750/391.9750c
385.0125/395.0125c
385.2125/395.2125
385.8875/395.8875
386.1875/396.1875
386.3375/396.3375

Site 202 NSWC Indian Head MD

380.4500/390.4500c 380.7625/390.7625c
381.4250/391.4250

Site 303 Bolling AFB DC

386.0625/396.0625c 386.9625/396.9625c
388.2625/398.2625
388.8875/398.8875
389.1625/399.1625
389.2375/399.2375
389.4875/399.4875

Site 404 NAS Patuxent River MD

380.4375/390.4375 380.8625/390.8625

386.3000/396.3000c

Site 505 NSWC Dahlgren VA

380.4625/390.4625 380.9125/390.9125
385.1750/395.1750c

Site 606 Unknown location

385.0875/395.0875c 385.3250/395.3250c

Site 707 Quiraok Mountain (Site C) MD

380.6625/390.6625 385.7125/395.7125c
387.2500/397.2500c

Site 909 US Naval Academy MD (Annapolis)

386.3125/396.3125c

Fort Myer VA – JNCR System 002

Site 101 380.0625/390.0625c
380.3250/390.3250c

380.3750/390.3750

380.6250/390.6250

380.6750/390.6750

380.8250/390.8250

380.9750/390.9750

381.0875/391.0875

381.2375/391.2375c

381.2875/391.2875

381.6250/391.6250c

381.7750/391.7750

381.9250/391.9250

Site 202 380.2125/390.2125

380.5250/390.5250c

380.7750/390.7750

381.1375/391.1375

Raven Rock (Site R) (AJCC) PA – JNCR System 005

Site 101 385.0250/395.0250

387.3750/397.3750

Fort Detrick MA – JNCR System 006

Site 101 385.7000/395.7000c

385.8000/395.8000c

385.9500/395.9500

387.2375/397.2375c

387.5375/397.5375

387.6375/397.6375

Fort Meade MD – JNCR System 007

Site 101 Fort Meade

380.3875/390.3875c 380.5500/390.5500c

380.8375/390.8375c

380.9875/390.9875c

381.3250/391.3250

381.7875/391.7875

Site 202 Adelphi

389.5750/399.5750 [Army Research Lab]

Tyson's Corner (Fort Richie Site E) VA – JNCR System 008

Site 101 380.0750/390.0750c

380.4250/390.4250c

380.7250/390.7250

Silver Hill (Prince George's) MD – JNCR System 009

Site 101 380.2750/390.2750c

380.5750/390.5750c

380.8750/390.8750

Fort A. P. Hill, Virginia – JNCR System 00a

Site 101 Fort AP Hill VA

385.7875/395.7875c 387.2250/397.2250c

387.5250/397.5250

387.8250/397.8250

389.1250/399.1250

389.3000/399.3000

Site 202 Unknown location

385.8625/395.8625c 387.1875/397.1875

387.4625/397.4625

387.7875/397.7875

389.0750/398.0750

Site 303 Reston VA
386.0125/396.0125c
386.9375/396.9375c
388.7375/398.7375c

Fort Hamilton (Brooklyn) NY – JNCR System 00b

Site 101 380.0750/390.0750
380.2750/390.2750
380.4250/390.4250c
380.5750/390.5750
380.7250/390.7250

Walter Reed Army Medical Center (WRAMC) – JNCR System 00c

Site 101 385.7125/395.7125c
385.9125/395.9125c
386.2125/396.2125c
386.5625/395.5625c
386.8125/396.8125c

Unknown Location – JNCR System 00d

Site 101 380.1250/390.1250c
380.4750/390.4750c
380.4875/390.4875c
380.9375/390.9375

JOINT NCR TRS TALKGROUPS

2 WRAMC Police
5 WRAMC Fire Primary
6 WRAMC Fire Alternate
11 WRAMC Roads and Grounds
15 WRAMC Security "Vance Units"
17 WRAMC Security Desk
100 Fort Belvoir Fire Department
Fort Hamilton Rescue Services (Fire/EMS)
101 Fort Belvoir Fire Department
102 Fort Belvoir Military Police/Security
103 Fort Belvoir Military Police/Security Alternate
105 Fort Belvoir Unknown user/usage
110 Fort Belvoir Airfield Ops
111 Fort Belvoir Engineering/Maintenance
112 Fort Belvoir Security
113 Fort Belvoir Engineering/Maintenance
114 Fort Belvoir Engineering/Maintenance
115 Fort Belvoir/Fort Meade Radio Technicians
120 Fort Belvoir Unknown user/usage
126 Fort Belvoir Fairfax County Police (Mount Vernon/Franconia) Patch <Channel 2/6>
135 Fort Belvoir Unknown user/usage
136 Fort Belvoir Unknown user/usage
201 Pentagon FPS "Pentagon Control"
271 Fort Meyer Engineering
306 Fort Meyer FD Fire <Ops 1>
311 Fort Meyer Military Police/Security
312 Fort McNair Military Police/Security
330 Fort Belvoir Unknown user/usage
426 Fort Meyer Transportation
482 Fort Meyer Ceremonial Operations
610 Fort Detrick Police Dispatch
611 Fort Detrick Police <Tac 2>
612 Fort Detrick Police <Tac 3>
650 Frederick County Fire Dispatch Patch
651 Frederick County EMS Patch <EMS-10>
653 Frederick County Fire Patch <Tac 30>
654 Frederick County Sheriff Dispatch Patch
659 Unknown user/Maintenance
700 Fort Meade Fire Communications
701 Fort Meade Fire/Unknown usage
702 Fort Meade EMS Dispatch
706 Fort Meade Fire Administration
711 Fort Meade Military Police Dispatch
712 Fort Meade Military Police <Tac 2>
713 Fort Meade Military Police Traffic <Channel 2>

714 Fort Meade Military Police Investigators <Channel 3>
715 Fort Meade NCIC Operations
720 Fort Meade Telecommunications
721 Fort Meade Telecommunications
723 Fort Meade Law Enforcement [Tentative]
726 Fort Meade Public Works [Tentative]
740 Fort Meade Military Police Canine Units
746 Fort Meade Emergency Operations Center
748 Fort Meade Military Police <Tac 4>
749 Fort Meade Military Police Talk <Channel 9>
752 Fort Meade Military Police Supervisors
753 Fort Meade Wachenhut Security (Gates)
754 Fort Meade Desk Operations
779 Fort Meade Fire R&E
1004 Fort A.P. Hill Range Control
1005 Fort A.P. Hill Range Control
1009 Fort A.P. Hill Training Base
1013 Fort A.P. Hill Police/Security
1018 Fort A.P. Hill Fire
1022 Fort A.P. Hill Engineers
1058 Caroline County VA Fire Dispatch Patch
1059 Caroline County VA Sheriff Dispatch Patch
1060 Medcom (Medical Communications) Patch
1061 State Interdepartmental Radio System (SIRS) Patch (39.540 MHz)
1100 Fort Hamilton Military/DoD Police
1116 Fort Hamilton Radio Testing
8627 Fort Meade Military Police Dispatch
8638 Fort Meade Fire/Unknown usage
8639 Fort Meade Fire/Unknown usage
8640 Fort Meade Fire 2/Unknown usage
8644 Fort Meade Fire/Unknown usage

I would like to thank our *MT Fed File* columnist, Chris Parris, and several other readers who wish to remain anonymous for their help in preparing this profile on the Joint NCR trunk radio system.

❖ More 380 MHz LMR in the DC Area

The Joint National Capital Region trunk system isn't the only 380 MHz LMR system in the DC area. Andrews AFB appears to be migrating their older 400 MHz trunk system to the new LMR band. Here are the details of that system. Again thanks to Chris Parris for verifying the system information on a recent trip to the area.

System ID: 017a

P25 WACN: BEE00

Site 101

385.2125/395.2125c 385.3125/395.3125c
385.9000 /395.9000 385.9125/395.9125
386.0375/396.0375 386.2000/396.2000
386.3375/396.3375 386.5000/396.5000
386.6375/396.6375 386.8000/396.8000

At presstime we do not have any talkgroups to share, so if you monitor this system regularly, we would like to hear from you. You can write us at the email address in the masthead.

We also are aware of another 380 MHz system associated with Fort Meade in Maryland. This appears to be a separate TRS from the JNCR System 007 mentioned above. While we do have quite a few details about the system, we do not

have enough at this writing to present this Fort Meade system for publication. Once we get a few more items finalized, *MT Milcom* will feature this system as well.

❖ Call for Monitors

I am looking for monitors with digital trunking capability to check on some new 380 MHz LMR trunk radio systems in the Colorado Springs area, Eglin/Hurburt, Jacksonville, and Pensacola areas. If you would like to help, please contact me at the email address in the masthead.

❖ More HF Milcom

I had quite a few nice comments about the HF Milcom frequencies printed in our May column. So, for those of you who chase military comms in the shortwave spectrum, here is our second installment of HF Milcom frequencies.

DISA Non-secure Internet Protocol Router Net (NIPR) ALE/USB

3068.0 4745.0 5684.0 10600.0 10830.0
11199.0 13242.0 17973.0 20631.0

DISA Secure Internet Protocol Router Net (SIPR) ALE/USB

3113.0 5702.0 5902.0 8968.0 9044.0
15091.0 17976.0 27870.0

German Coast Guard SITOP-A

1616.7 1916.7 2072.1 2505.0 2671.3
3829.5 4555.2

Georgia Military ALE/LSB/USB

5GS Net 3541.0 3652.0 3723.0 3824.0
4555.0 4065.0 4605.0 4721.0 5131.0
5321.0 5415.0 5572.0 5762.0 6341.0
6451.0 6523.0 7033.0 7415.0
8GS Net 3565.0 3645.0 3745.0 3855.0
4535.0 4545.0 4625.0 4645.0 4735.0
5235.0 5320.0 5351.0 5425.0 5780.0
6351.0 6551.0 6583.0 7045.0 7425.0
7545.0

ART/SE2 Net 5103.0 5203.0 6203.0

BR1 Net 4015.0 4125.0 4500.0 4505.0 4550.0
4780.0 4970.0 5125.0 5290.0 5330.0
5335.0 5400.0 5425.0 5430.0 5455.0
6650.0 6995.0 7000.0 7125.0 7255.0
9125.0

GS1/MB1 Net 3605.0 4075.0 4123.0
4235.0 5120.0 5235.0 5465.0 6210.0
6283.0 6305.0 7555.0 7673.0 8123.0
8210.0 9137.0 9305.0 10173.0 10273.0
10470.0 11110.0 11235.0

LEN Net 3700.0 3755.0 3785.0 4015.0
4505.0 4780.0 4970.0 5200.0 5290.0
5335.0 5530.0 6255.0 6695.0 6855.0
6950.0 7500.0 7580.0 7705.0 7725.0
7780.0

UK DHFCS ALE Network ALE/USB

2216.0 3226.0 4168.5 4226.5 4239.5
5268.5 5295.0 6251.0 6416.5 6873.5
7535.0 7635.0 8107.0 8182.0 9019.0
10344.5 10575.0 10893.5 12230.0
14485.5 14508.5 16402.0 16606.0
18403.5 20168.5 20328.5

US Army Aviation ALE/USB

CONUS 4032.5 4446.5 4790.0
5337.0 5750.0 5881.5 8050.0 8161.5
10670.5 11575.0 11630.0
Bosnia-Herzegovina 4073.0 5135.0
Iraq 4073.0 5101.0 10134.0
South Flight Following Facility 5310.0
[Soto Cano AB, Honduras]

US Army Command Emergency Operations Net ALE/USB

6767.5

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

HD Radio Rules Released

Last time, I speculated that the HD Radio rules would be released around the beginning of April, and nighttime digital broadcasts would begin in early May. Boy, was I wrong! The rules were finally released on May 31st... I think that means nighttime digital AM will have begun by the time you read this – but I'm no longer willing to bet on it!

There's not much new in the release, beyond what you read in June. A few bits of additional information that did come out:

Last time I reported that HD stations will be required to carry at least one free stream, simulcasting their analog signal. The final rules specify that this stream must be at least comparable in audio quality to the analog signal. Stations cannot "starve" their free stream of bandwidth to make more subchannels possible. The FCC asked for more comment on whether there should be limits to how many pay radio services may be offered by HD Radio stations. One suggested limit was 20-25% of the available bandwidth.

Last time I reported that the station identification announcements required on analog stations will also be required of digital stations – and if the station operates multiple program streams, it must run identification announcements on all streams. The final rules also specify that the identification announcements on digital streams must specify that they are digital streams. However, these announcements may also be made through the "Program Associated Data" ("text ID"). It is not entirely clear whether they mean that the entire identification announcement may be made with the text ID, or only the specification that you're listening to a digital station...

Negotiations with Canada and Mexico are continuing. Canadian engineer (and DXer) Barry McLarnon argues that U.S. nighttime IBOC operation is in violation of the U.S.-Canada bilateral agreement. This agreement allows transmission of something other than an amplitude-modulated signal in the AM broadcast band only if "...the energy level outside the necessary bandwidth does not exceed that normally expected in [an amplitude-modulated signal]..."

IBOC carriers are, of course, well outside the necessary bandwidth for an amplitude-modulated signal. IBOC proponents would argue that at any given instant, the energy level outside the necessary bandwidth doesn't exceed that normally expected in an amplitude-modulated signal. IBOC opponents would argue that aver-

aged across any reasonable amount of time, it does far exceed that level.

LPFM and FM translator stations will be allowed to operate IBOC. (Some commenters had suggested translators be required to operate IBOC if their primary station did!) The Commission does state that IBOC operation may not be practical for low-power LP10 stations; their digital power would be limited to 0.1 watt and might be impossible to pull out of the noise. Right now that's a moot point, because there are no LP10 stations, and the FCC has been dragging their feet on authorizing them.

As I wrote last time, I do not expect the new rules to result in a huge stampede towards HD Radio/IBOC operation. I believe most stations that plan HD operation have already implemented it. The one dramatic change you'll notice is nighttime operation on AM stations. It will be very interesting to see what happens, in terms of interference, after these new rules go into effect.

One of the positive sides of the massive ownership consolidation in the radio industry is that, when nighttime AM IBOC is widely deployed, many of the stations being interfered with will be owned by the same company whose stations are doing the interfering. It is rumored that in one case, a company that acquired an AM IBOC station turned the IBOC off in order to eliminate interference to a co-owned station 20 kHz away in a nearby city. Will we see more of this once Cumulus and Clear Channel realize they're interfering with their own stations?

A late-April Reuters article cites Ford, BMW, and Hyundai as planning to offer HD Radios in their cars. Chrysler and GM are being more cautious, with Chrysler estimating a decision will be made in November. GM says HD receivers are expensive and uncertain to generate enough revenue to pay for themselves.

Another article, on MP3 Newswire.net, reviewed the Accurian, Boston Acoustics, and Polk HD radios. Testing in central New Jersey – between New York and Philadelphia – the reviewer could only receive three reliable HD signals. (WFAN-660, WOR-710, and WAWZ-FM 99.1) External antennas improved reception considerably.

❖ Weird Frequencies

The 1017 kHz frequency cited for the new station on Guam is not a typo. AM stations outside ITU Region 2 (the Americas) operate not on 10 kHz channels, but 9 kHz. 990, 999,

1008, 1017, 1026, etc... This does raise a bit of a dilemma in U.S.-controlled territories in the other Regions: stations must operate on 9 kHz channels, but digitally-tuned radios shipped from the U.S. tune 10 kHz channels. But you'll also notice that every 10th channel is the same in both systems. (990, 1080, 1170, 1260, 1350, etc.) Some stations have recently changed frequency in order to land on one of these channels.

❖ Canadian AM News:

predictable and otherwise...

Your best bet at a Nova Scotia logging is going away. CFDR-780 Dartmouth has been granted permission to move to 88.9 FM. Another popular Canadian DX target, CJOB-680 Winnipeg, has also filed for an FM signal – but CJOB does not plan to abandon their AM signal (at least not yet). They want the AM 680 signal to continue to serve outlying towns, while a 100kW FM transmitter on 106.3 would serve the city of Winnipeg and nearby communities.

Here's something that doesn't happen very often: a traveler's information station (TIS) changing format! CFYZ-1280 was authorized in the mid-1980s to operate from Toronto's Pearson International Airport, providing flight and related information to airport customers. This spring, management of the station was handed over to Newsroom Productions Inc., who flipped to a business-news format. The call letters have been changed to CFBN.

Such a change would not be permitted in the U.S., where these stations generally hold a different type of license and are limited to the non-commercial broadcast of travel and emergency information. CFBN holds a regular broadcasting license, making this move possible. (It should be noted, a very few U.S. stations with regular broadcasting licenses have adopted traveler's information formats; such stations can change format at will.)

❖ Retro Radio

Between 1960 and 1982, WABC-770 was the Top 40 rock station for New York and much of the Northeast. It is, of course, no surprise that the audience for popular music on AM dried up years ago, with most of the big Top 40 stations of the 60s and 70s moving to a news/talk format. WABC is no exception; they went talk in 1982.

Every Memorial Day, the music comes back. WABC's annual "Rewind" event has

proven enormously popular with radio fans. Indeed, the station has since added a regular four-hour oldies show every Saturday night.

As you might guess from the call letters, WABC is owned by ABC, the American Broadcasting Company. ABC owns a number of other major radio stations – one of which is WLS-890, Chicago. If you grew up in the Midwest in the '60s or '70s, you know of WLS the same way Easterners know of WABC: as the Top 40 station *everyone* listened to.

And this year, WLS ran its own Memorial Day Rewind program. Many of the names were very familiar to this Wisconsin native: Larry Lujack, Tommy Edwards, Fred Winston, John (Records) Landecker, and Lyle Dean. It was a real nostalgia trip, hearing music on the Big 89 again. Unfortunately atmospheric conditions weren't very good this year – a Mexican station was coming in almost as well as WLS, and both were being clobbered by splatter from the local station on 900 – but there's always next year! (...or the Internet stream...)

❖ Radio Station Starts Forest Fire

2007 has been a very bad year for wildfires. One of the more destructive fires was on Santa Catalina Island off Los Angeles, where 4,750 acres were burned and one home on the outskirts of Avalon was destroyed. News reports indicate the fire was started by crews cutting metal guy wires for the towers of KBRT-740. The radio station itself was not damaged by the fire, but the power poles bringing electricity (and phone lines, for audio) to the transmitter did burn.

❖ DX, among the stone men

Kriss Larson KR6ISS recently returned from a visit to Easter Island, off the coast of Chile in the Pacific. Kriss's attempts to DX longwave didn't come off so well – he was staying a mile from the island's 3 kW navigation beacon, which badly overloaded his radio – but AM broadcast DX was quite good. Sitting in bed with a portable radio, Kriss was easily able to receive KCBS-740 and KGO-810 from San Francisco, and XEPRS-1090 Tijuana.

Kriss sent reception reports to all three stations, and received a cordial reply from KCBS

Chief Operator Andrew Ellis, NO6E. Andrew says KCBS's nighttime directional pattern points almost right at Easter Island – not because KCBS wants to serve the island (there aren't any ratings diaries down there!) but because the station must protect Canadian stations from interference. The KCBS verification also included a QSL card (there aren't many stations left that have QSL cards!) claiming to be the world's oldest broadcasting station, operating continuously since 1909. The station has been KCBS since 1949; before that it was KQW – and before that, "FN" or "San Jose Calling," in the days before licenses were required...

Till next month

Have you tried DXing IBOC? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmith@monitoringtimes.com. Good DX!

REFERENCES:

<http://americanbandscan.blogspot.com>
My AM DX blog
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Final IBOC/HD Radio rules
www4.plala.or.jp/nomrax/ITU_Reg.htm
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WLS Big 89 Rewind
<http://news.moneycentral.msn.com/printarticle.aspx?feed=OBR&date=20070426&id=6807502>
Reuters article on slow deployment of HD Radio in cars
www.mp3newswire.net/stories/7002/hd-radio.html
MP3 Newswire review of HD receivers
www.cfbnnews.com/
CFBN-1280, Toronto

NEW AM STATIONS ON THE AIR

Deer Lodge, Mont.	1400	KBCK	1,000 ND (rumored to be country)
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NEW AM STATION PERMITS GRANTED

Leone, Am. Samoa	900	5,000/3,000 ND
Gibsonia, Fla.	700	2,500/250 DA-2
Savannah, Ga.	1520	50,000/700 DA-2
Pocomoke City, Md.	1070	500/250 DA-2 (call letters WBey granted)
Houghton, Mich.	1340	1,000/720 ND
Bemidji, Minn.	1300	2,500/600 DA-2
Bemidji, Minn.	1400	1,000 ND
Elko, Nev.	1460	2,500/250 DA-N
Hawthorne, Nev.	1490	790 ND
Greenville, R.I.	1140	27,000/1,200 DA-2
Garapan, Saipan	1440	3,000/500 ND
South Boston, Va.	1400	1,000 ND (call letters WAJL granted)
Rhineland, Wis.	640	620/400 DA-N

NEW AM STATION APPLICATIONS DISMISSED

Ridgecrest, Cal.	1400
Steamboat Springs, Colo.	1340
Alpine, Tex.	1550
McNary, Tex.	1260

APPLICATIONS FOR NEW AM STATIONS

Kenai, Alaska	840	10,000/1,900 ND
Bishop, Cal.	1490	1,000 ND
Carbondale, Colo.	1240	1,000 ND
Agana, Guam	1017	250 ND
Hilo, Hawaii	1450	5,000 DA-2
Petal, Miss.	1520	50,000/700 DA-3 (Petal is near Jackson)
Kerrville, Tex.	1590	920/250 DA-N

AM STATIONS MOVED TO NEW FREQUENCIES

Tuba City, Ariz.	760	KTBA	from 1050kHz, reducing power to 250/60 ND
Fordyce, Ark.	1590	KBJT	from 1570, increasing power to 4,700/35 ND
Honolulu, Haw.	880	KHNR	from 870, reducing power to 2,000 ND

FREQUENCY CHANGES GRANTED FOR AM STATIONS

Roanoke, Va.	1290	WOWZ	from 1280 at Appomattox; 10,000/17 ND
Victoria, Va.	650	WHAN	from 1430 at Ashland; 50,000 DA-D

CALL LETTERS ASSIGNED TO NEW AM STATIONS

Saraland, Ala.	770	WFOA
Orono, Me.	1530	WFGO

OTHER STATION CHANGES

AM stations requesting frequency changes:

Waynesburg, Penna.	1210	WANB	5,000 D (from 1580 kHz)
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AM stations granted moves to new cities:

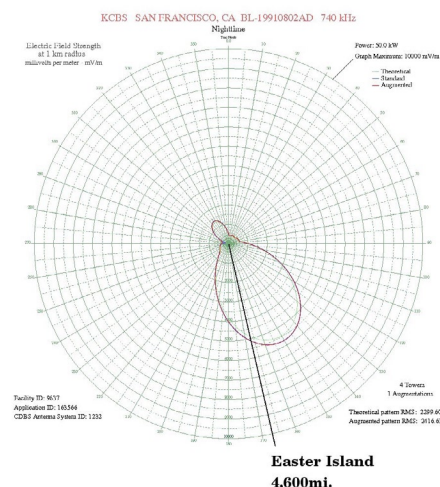
Shenandoah, Tex.	1380	KRCM	to move from Beaumont, 75mi. east, and reduce power to 250/69 ND
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AM stations requesting moves to new cities:

Carlsbad, Tex.	1590	KEAS	to move from Eastland, 118mi. to the northeast, and increase power to 1,000 D
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AM station moves dismissed:

Revere, Mass.	950	WROL	would have moved from Boston and increased night power to 5,000 watts
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What is "Airspace"?

We are familiar with the earth's surface being divided up into countries, states, counties, cities, national and state parks, embassy property, international waters, etc., each with set boundaries. Pilots instead deal with an array of well defined, three dimensional chunks of sky, each with its own classification, set of rules, and extent of involvement with air traffic controllers.

You will hear different classes and areas of airspace mentioned in pilot-controller communications. Learning what to expect and how to interpret those communications will increase your listening enjoyment. Let's take a look!

❖ Altitude

Since airspace floors and ceilings are defined by altitude, we need first to cover some aspects of altitude. There are three primary ways that altitude can be described.

Above Ground Level (AGL) is the easiest to visualize. Just like it sounds, it is the height that an aircraft is above ground. If a plane is flying absolutely level over hill and valley, its AGL altitude will be constantly changing based on the varying height of the terrain.

Mean Sea Level (MSL) uses a different reference. It is the distance above an averaged, calm sea. This also applies even when way inland, as if an ocean existed at that location. Look up Denver International Airport via AirNav.com, www.airnav.com/airport/KDEN and you will see that an aircraft sitting on the runway is at an MSL altitude of 5431 feet, while at zero feet AGL.

Flight Level (FL) can be a bit more involved. When you hear "Flight Level two three

zero" (FL 230), is the plane at 23,000 feet MSL or isn't it? Sometimes it's yes and sometimes no, but first let's talk about altimeters.

❖ Altimeters

Aircraft altimeter readouts are based on barometric pressure. The higher the altitude, the lower the air pressure. The altimeter translates the air pressure in a dash-mounted instrument readout in the cockpit.

The altimeter is only accurate when it is calibrated or "set" to the barometric pressure for the local area where the aircraft is flying. Barometric pressure varies from area to area and with changes in the weather, so frequent updates and altimeter adjustments are required.

Controllers at airport control towers and at Terminal Radar Control (TRACON) facilities will frequently give the current altimeter setting by saying something like, "Altimeter two nine eight six." The pilot then turns a small knob on his altimeter until the digits read 29.86. Once set, the altitude readout is correct while the plane is in the area and the barometric pressure remains unchanged.

By agreement, something interesting happens at a *Transition Altitude* – which is 18,000 feet in the U.S. and southern Canada. When aircraft climb above 18,000 feet MSL, pilots adjust their altimeters to 29.92, no matter what the current local barometric air pressure reading is. Airliners and other aircraft on long flights pass through so many areas and weather conditions that this procedure saves a lot of hassle.

Since all planes above 18,000 feet do this, a plane at FL 310, for example, will be at the same MSL altitude as all other area aircraft at

FL 310, which will be somewhat close to but not necessarily right at 31,000 feet MSL. When they descend back down below 18,000 feet, they go back to the local barometric pressure setting.

❖ Classes of Airspace

Letters "A" through "G" are used as designators for classes of airspace, with the exception of Class F, which is not used in the U.S. The least restrictive is Class G and the most restrictive is Class A.

Class A Airspace

Class A airspace goes from 18,000 feet MSL up to FL 600 over the entire United States and out twelve nautical miles offshore – before it becomes international airspace. Class A airspace is where you will find most airliners, cargo planes, and military aircraft during the "enroute" phase of long flights.

All flights in Class A airspace must be under Instrument Flight Rules (IFR), by IFR rated pilots, and in aircraft that meet certain requirements. All IFR flights must remain in radio contact with Air Traffic Controllers which, at this altitude, will be those at Air Route Traffic Control Centers (ARTCCs).

For an ARTCC map, see: www.wrh.noaa.gov/zoa/CWSU_MAP.php. Rest your cursor over the three-letter identifiers to reveal the ARTCC names.

Jet Routes (jet aircraft highways in the sky) exist only in Class A airspace and are depicted on *IFR Enroute High Altitude* charts.

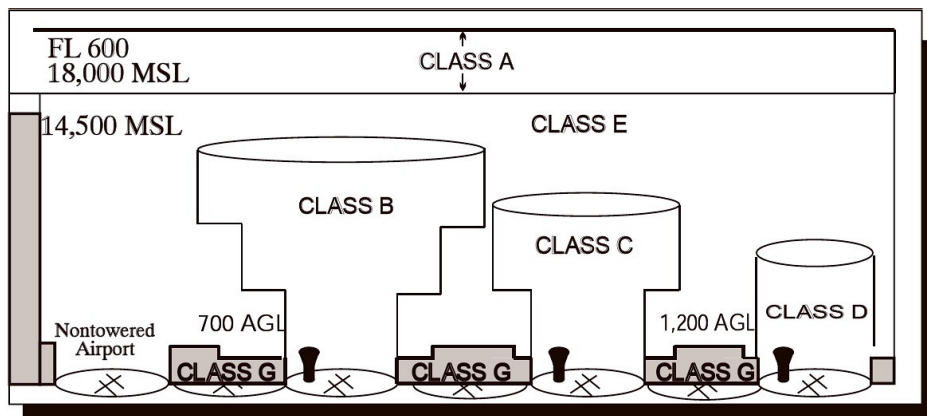
Most, but not all ARTCC frequencies in Class A airspace are in the 132 to 136 MHz range.

Class B, C, and D Airspace

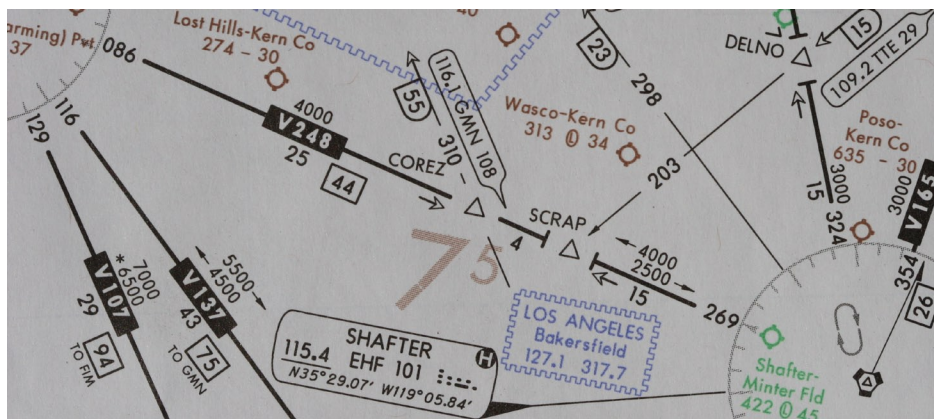
These three classes of airspace relate only to airports. See the airspace graphic for the relative shapes and sizes. Real-world airport airspace may have more complex shapes.

Class B airspace surrounds the nation's busiest airports. Pilots must receive clearance (permission) from Air Traffic Control (ATC) to enter Class B unless on an IFR flight plan. Examples of Class B airports are Atlanta Hartsfield-Jackson (ATL), Chicago O'Hare (ORD), Dallas-Fort Worth (DFW), Los Angeles (LAX), Las Vegas McCarran (LAS), Houston (IAH), and Denver (DEN).

Established VFR (Visual Flight Rules) Corridors pass right through the airspace of some Class B airports and require no ATC contact. Controllers keep IFR flights away from



Class E Airspace fills most of the sky up to 18,000 feet / up to Class A. Airports with operating control towers have Class B, C, or D airspace. Class G covers most of the ground and has the fewest restrictions. Image courtesy FAA.



This view is from an IFR Enroute Low Altitude chart showing Victor Airways in Class E airspace, V248 as an example. It has a similar look to an IFR Enroute High Altitude chart showing Jet Routes in Class A airspace.

these corridors. Pilots in such corridors are urged to use 122.75 MHz to exchange aircraft position information with other pilots also in the corridor.

Class C airspace surrounds moderate sized airports with operational control towers and Approach and Departure Control radar services. An ATC clearance is not required to enter Class C airspace, but radio contact with the facility providing ATC services is required.

Class D airspace surrounds yet smaller airports with operational control towers. The airspace usually goes from the surface to 2,500 feet AGL and the shape is more cylindrical. As with Class C airspace, radio contact with the facility providing ATC services must be made before entering the airspace. When a part time Class D tower closes, the airspace reverts to Class E.

Class E Airspace

Unlike airspace Classes B, C, and D, Class E airspace is not exclusively associated with airports. It is as if Class E were the total environment into which the others were inset; that is, Class E is what is under Class A and fills in and around all the other classes of airspace.

The ceiling of Class E airspace is 18,000 feet MSL where it meets the floor of Class A airspace. The floor of Class E airspace is mostly 1,200 feet AGL. The floor drops to 700 feet AGL when near Class B, C, and D airport airspace. Below the 1,200 and 700 foot floors is Class G airspace (see the airspace graphic). Class E goes to ground level in some places and it begins again above FL 600, at the ceiling of Class A.

Jet Routes exist in Class A airspace. Class E airspace is the home of Victor Airways which appear on *IFR Enroute Low Altitude* charts (see chart image).

In Class E airspace, aircraft can fly VFR, weather permitting, and are not required to be in radio contact with controllers, or they may fly IFR, which requires pilot certification and radio contact with controllers.

Class G Airspace

Many small private planes fly in Class G airspace, which is like the frosting on a big cake that follows the contour of the land. In

most places, Class G is from the ground up to 1,200 feet AGL. Planes can fly over mountains in Class G airspace and be at MSL altitudes in thousands of feet.

Most communications from VFR flights in Class G airspace are the self announcements on UNICOM and MULTICOM frequencies relating to intentions to land or depart from small airports with no control towers. The intentions and position reports are for the benefit of other planes in the area. You will find them and other interesting things within the 121.6 – 123.575 MHz range.

❖ Special Use Airspace (SUA)

Special Use Airspace is intended to confine certain military, Department of Energy, and U.S. Secret Service activities, and to provide levels of restricted entry to those not participating. SUA includes Warning Areas (offshore), Restricted Areas, Prohibited Areas (sensitive ground facilities), Military Operations Areas (MOAs), Alert Areas, and Controlled Firing Areas. You will hear controllers and civilian pilots make reference to them as you listen.

Sectional charts show SUA lateral boundaries with magenta comb-like borders for MOAs and blue for the other SUA areas. Each chart has a table listing the areas included on it by number, altitude floor and ceiling, scheduled time of operation, Controlling Agency / Contact Facility, and frequencies (typically one VHF and one UHF). Here are a couple of examples:

Restricted Area:

R-4811 TO 15,000 0800-1500 MON-FRI
OAKLAND CNTR 125.75 319.8

MOA:

HUNTER LOW 1500 AGL TO 6000 INTER-
MITTENT BY NOTAM OAKLAND CNTR 128.7
307.0

Some SUA areas, when active, are very hazardous to be in and/or relate to concerns of national security. Pilots can pass through some of them when inactive, or even when active in the case of Alert Areas, but pilots simply must not go where they are not supposed to go. To quote from a *Sectional* chart:

"All aircraft operating in the U.S. national airspace, if capable, will maintain a listening watch on VHF guard 121.5 or UHF 243.0. It is incumbent on all aviators to know and understand their re-

sponsibilities if intercepted. Review 'AIM' section 5-6-2 for intercept procedures. Additionally, if U.S. military fighter jets intercept an aircraft and flares are dispensed in the area of that aircraft, aviators will pay strict attention, contact air traffic control immediately on the local frequency or on VHF guard 121.5 or UHF 243.0 and follow the interceptor visual ICAO signals. Be advised that noncompliance may result in the use of force."

Military Training Routes (MTRs)

MTRs are routes, not areas, but present their own hazards to civilian pilots. In the FAA's words:

"National security depends largely on the deterrent effect of our airborne military forces. To be proficient, the military services must train in a wide range of airborne tactics. One phase of this training involves 'low level' combat tactics. The required maneuvers and high speeds are such that they may occasionally make the avoid aspect of flight more difficult without increased vigilance in areas containing such operations. In an effort to ensure the greatest practical level of safety for all flight operations, the Military Training Route (MTR) was conceived."

A VFR MTR is designated as "VR" and an IFR MTR as "IR." Both are shown by number on *IFR Enroute Low Altitude* charts using brown lines. The charts list MTRs in a table such as: VR-331 200 AGL to 6000 and IR-203 7000 TO 12000.

❖ NOTAMs and TFRs

Notices to Airman (NOTAMs) contain all manner of notices relating establishments, discontinuances, interruptions, and changes to procedures, services, conditions, or facilities, or to hazards affecting flights.

NOTAMs are the vehicles for Temporary Flight Restrictions (TFRs) which relate to an area of airspace described in three dimensions. Examples are outdoor laser light shows, sporting events, presidential movements, large fires (smoke and firefighting aircraft), disaster incidents, unmanned aerial vehicle (UAV) activity, military exercises, etc.

RESOURCES

Airspace –

www.fs.fed.us/r6/fire/aviation/airspace/web/guide/Chapter03.pdf

46-page, 3.2 MB PDF Well done, includes graphics and examples of charts.

NOTAMs and TFRs –

www.fs.fed.us/r6/fire/aviation/airspace/web/guide/Chapter06.pdf

34-page, 1 MB PDF

Current TFRs –

<https://pilotweb.nas.faa.gov/>

<http://tfr.faa.gov/>

www.aopa.org/whatsnew/notams.html

Aeronautical Information Manual (AIM)

www.faa.gov/airports_airtraffic/air_traffic/publications/

A reference of considerable value to the serious listener. Can be accessed on-line form or as an 8 MB PDF download.

LF Receiving Antennas

When it comes to success on longwave, nothing is more important than the antenna you use. I hear from many newcomers who are unable to receive anything below 500 kHz except noise and perhaps a few local beacons. These problems are often caused by a poor antenna. This month, we'll explore two popular antennas for longwave reception – Random Wires and Ferrite Loops. Next month we'll discuss two additional types of loops, as well as Active Antennas.

❖ The Random Wire: Radio's Workhorse

I call this antenna a "workhorse," because it functions on many bands besides longwave and can even be used for amateur MF/HF transmitting when paired with a tuner and a good Earth ground. Some folks loosely refer to *all* wire antennas as "longwires," but to meet the criteria for a longwire, an antenna must be a wavelength or more – something that is possible on shortwave, but is rarely the case on LF (a wavelength at 175 kHz is 1750 meters – roughly a mile long!).

If you have the room, I recommend putting up a Random Wire antenna of 75 to 150 feet for all-band reception (see Figure 1). Even if you're planning to add additional, band-specific antennas later on, a random wire will give decent performance over most parts of the spectrum and will serve as a general-purpose antenna.

You can get all of the parts needed to build a wire antenna at your local Radio Shack or hardware store. Almost any kind of wire can be used – bare or insulated (except you should use insulated wire for the lead-in). I've had good results using galvanized electric fence wire (not aluminum) available at farm & home centers. This wire is inexpensive, strong and easy to solder when new.

Insulators can be purchased outright, or you can make your own by drilling two holes through a piece of Plexiglas or short sections of PVC pipe. Almost any non-conductive material will work. For support ropes, I recommend using

a weather-resistant type such as black Dacron. I had an antenna up for over seven years using this type of rope and it shows no signs of wear. It is commonly seen at hamfests and is also advertised in many ham radio magazines.

Random Wire Performance

Your success with a random wire antenna depends heavily on your location. City and suburban dwellers may find this type of antenna to be a bit noisy amidst the sea of TVs, light dimmers, fluorescent lights and other static-generating devices. However, in rural or semi-rural environments a wire antenna that is up high and in the clear can work extremely well. I heard my first Lowfer station (225 miles away) on a 100-foot wire antenna several years ago.

If noise is a problem, be sure to "clean" your own house first. Start by turning off dimmers, motors and other possible offenders while monitoring the radio, and see if you can eliminate the noise. Even if you can't get rid of it entirely, you might be able to reduce the noise to an acceptable level.

Random wires can show directional properties, but it is very difficult to predict the response of a given installation due to variables in frequency, height above ground, and wire length. Such discussions are beyond the scope of this article, but there are excellent books that explore the subject in detail, including the *ARRL Antenna Book*.

❖ Loop Antennas

As one gets more serious about longwave, there are other antennas that should be considered. Loops, for example, provide solid benefits that will be of interest to low band connoisseurs. The primary benefit of a loop is *directivity*. It can be rotated to null out interference or "pest" signals while focusing on a desired signal. This technique is used by many DXers to log two or more stations on a single frequency.

A second benefit is low noise pickup. Their small size (relatively speaking) and closed-circuit design make them less of a "noise collector" than a 150-foot wire strung across a backyard. Signals may be somewhat weaker on a loop – unless it is amplified – but the *signal-to-noise ratio* is frequently much higher, and this is preferable to just having strong signals. After all, what good is an S9+ signal when it is covered with noise?

There are at least three types of loops that are popular today: Ferrite Loops, Multi-turn Tuned Loops, and Broadband Loops. The **Ferrite Loop antenna** is more common than you may realize. In fact, most households have at least one, well hidden inside an AM radio. These are the small

black rods you have probably seen wound with fine enameled wire. The rod itself is typically made of a nickel-zinc mix that increases the inductance of the windings and concentrates an electromagnetic field around the antenna. In operation, ferrite loops provide sharp nulls off their ends, and give a maximum response to signals approaching from their "broadside" planes.

Ferrite rods are among the smallest loops around, but they are generally not very efficient. An exception to this rule is an externally-tuned ferrite loop specifically designed for LF reception. These antennas typically couple to a set's internal ferrite rod via mutual inductance, or connect to the receiver with a short coax cable. Their larger size and tuning capability often provide greatly enhanced reception as compared with a stock internal antenna.

At present, commercial sources for high performance ferrite loops are limited. One firm that does carry them is RadioPlus+ Electronics of Pensacola, FL (www.dxttools.com). If you prefer conventional mail, send an SASE to them at 3635 Chastain Way, Pensacola, FL 32504. This firm has had difficulty procuring parts for their loops in recent years. I recommend checking on availability and delivery times before placing an order.

❖ Mailbag

We are pleased to hear from Bob Kastelec, WB9TIK (WI), who has recently become interested in low frequency listening. He uses a Grundig Yacht Boy YB400 portable, as well as a Kenwood R-2000 with an active antenna. He is also in the process of building a loop for the broadcast frequencies.

Bob, I hope you will consider adding some turns to that loop so that it will tune the longwave frequencies. We'll be talking more about that next month in this column. The list below shows some of the beacons that Bob has been able to hear so far.

Freq.	ID	Location
200	HXF	Hartford, WI
206	RA	Racine, WI
242	GM	Milwaukee, WI
260	BL	Milwaukee, WI
329	LLE	West Bend, WI
341	LDM	Ludington, MI
344	UNU	Juneau, WI
350	ME	Chicago, IL

To format your logs, you can download a template at www.monitoringtimes.com/html/below_500_khz.html

That's it for August. See you next month!

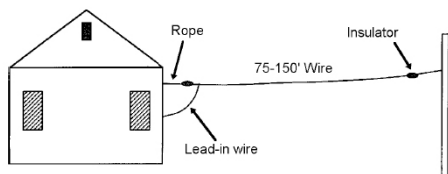


Figure 1. Random wires offer good all-around performance for receiving, and should be a part of any listener's antenna farm.

WHRI Interferes with CHU

Neither Canadian time signal **CHU** nor United States shortwave broadcaster **WHRI** are unlicensed pirates, but they are squabbling over rights to a frequency. **WHRI** has announced future plans to interfere with **CHU** through high powered broadcasts from the United States on 7335 kHz. Raymond Pelletier of Frequency and Time Institute for National Measurement Standards National Research Council Canada in Montreal circulated this response widely in the DX community, originally through the *Ontario DX Association*:

"CHU has a licence to broadcast on 7.335 MHz and this frequency has been registered with ITU, HFCC, FCC and other broadcast authorities. This, however, does not guaranty that we own this frequency, for all international purposes. We must now fight for it, with the FCC.

"I have sent several letters to WHRI, but their chief engineer has not replied to me. I have also sent a letter to the FCC stating the use of our service on this band and our long standing service at this frequency. They have yet to respond.

"We must now go through all politically correct channels to resolve this dispute. But the members of your association can use other means to declare their dissatisfaction with the interference from WHRI. Have your interested members send email to WHRI (lsarkisian@leseae.com) and the FCC (thomas.lucey@fcc.gov)."

❖ New FRW Editor

Free Radio Weekly newsletter has announced an addition to their editing staff. Long-time pirate DXer Ed Insinger has joined their rotating staff of editors. If you have contributions for this valuable, weekly newsletter and would therefore like to be added to the distribution list, EInsinger@vrxus.JNJ.com is the e-mail address for that purpose.

❖ Clandestine Web Links

Finn Krone reports that he maintains a variety of links to clandestine radio stations on his personal web site from Denmark. His direct link is at the www.krone-web.dk/Radio%20links/Clandestine%20radio.htm

One of Finn's links goes to the web site of Andenet Le Democracy, an anti-Ethiopian clandestine that we have only occasionally mentioned in *MT*. We see their logo here this month. Their web site features streaming audio of their broadcasts at www.kinijit.org/Home.asp They announce a current schedule of 1600 UTC on 15260 kHz on Wednesday, Friday, and Sunday. On DXplorer, Arnaldo Slaen of Argentina points out that this one



uses 250 kW from the Samara transmitter site.

❖ Padula Receives 8,145th QSL

Veteran DXer Bob Padula from Australia reports that he has received his 8,145th shortwave broadcast QSL. His QSLs include shortwave broadcast, medium wave AM, utility stations, pirates, and clandestines. He reports that he has verified 1,015 stations in 229 countries. For shortwave broadcast stations he says that he received QSLs for 76% of the reception reports that he mailed out. *Monitoring Times* congratulates Bob on this distinguished performance in DXing.

❖ Odd Jammer

On DXplorer, both John Figliozzi and Vladimir G. Titarev report hearing "a very strange sounding music loop consisting of four notes with sort of a background as if it were being played on an accordion-like instrument with one hand playing the four notes and the other providing the background."

This one has been logged at 0500 UT Sunday on 9765 kHz. Vlad reports that this is a jammer from Zimbabwe.

❖ Airborne Radio Martí

Terry Kreuger reports that he is still hearing the quasi-clandestine **Radio Martí** broadcasting to Cuba via their airborne transmitter on 530 kHz. Outside Florida this may be a tough catch around 2200 UTC, but it is worth thinking about as a novel DX target.

❖ What We Are Hearing

Monitoring Times readers heard nearly thirty different pirate radio stations once again 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 such as Labor Day. 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.

Black Lodge Radio Dakota- American Indian music and political advocacy. They still say that you have to give your land back to the Indians if you want a QSL. (None; report to the FRN web site)

Captain Morgan- Rock music and audio from the old

Twilight Zone TV show. (None; report to the FRN web site)

Channel Z Radio- Sometimes rock music and sometimes relay other North American and European pirates. Recent shows featured a mailbag segment. (channelzradio@gmail.com)

Derby Shortwave- We received additional logs of this seasonal sports news station, replaying the Kentucky Derby horse race, complete with a vocal rendition of "My Old Kentucky Home." (derbyshortwave@yahoo.com)

Dried Kangaroo Radio- Another new one with a "loon call" interval signal and renditions of the Canadian national anthem. A computer voice provides the IDs. (Unknown)

Grasscutter Radio- Classic rock music and occasional two-way QSOs with other pirates (grasscutterrado@yahoo.com)

Ground Zero Radio- Mostly rock, but the old propaganda film of Burt the Turtle telling children to "duck and cover" during atomic attacks is also common fare. (Announces defunct Elkhorn)

High Frequency Research Radio- The consensus is that the full ID of this new station is not just "Research Radio." Most of their broadcasts have been rock music. (Unknown)

MAC Shortwave- Paul Star appears on several frequencies such as 3275, 6850, and 6925 kHz with his slick replica of the old top 40 am format on commercial radio. (macshortwave@yahoo.com)

Maple Leaf Radio- This relatively new Canadian pirate normally features rock oldies music. (radio.mapleleaf@gmail.com)

Northwoods Radio- This rock music pirate with the "loon call" interval signal remains active "from the Great Lakes." (northwoodsradio@yahoo.com)

Radio Fish Head- This new one has been showing up repeatedly with rock and pop music. (Unknown)

Radio Ice Cream- The Ice Cream Man programs rock music that features children who like music and ice cream. (Belfast)

Radio Maple Leaf- They sign on with the Canadian national anthem, followed by promotion of pirate radio and rock music. Harald Kuhl also heard this one from Germany. (radio.mapleleaf@gmail.com)

Radio Mosiach & Redemption- Sometimes called Lubivitcher Radio in the DX press, this ultraconservative Jewish religious pirate still shows up occasionally on 1710 kHz. Web site at www.radiomoshiach.org/ lists Moshe Ezagui as their founder, and they announce future plans for shortwave, FM, and "other broadcast methods." They announce a phone number of 201-298-WMCA. (None, but the web site accepts financial donations)

Radio First Termer- Several versions of this veteran pirate have been broadcasting lately. It features coverage of pirate stations operated by American soldiers in Viet Nam during the war. Some newer segments were produced by National Public Radio. (Unknown)

Radio 6X- This new one features ancient rock music oldies. (Still Unknown)

Sunshine Radio- Their friendly female announcer programs classic rock music. (sunshineradio@yahoo.com)

The Crystal Ship- The "Voice of the Blue States Republic" with "The Poet" programs left wing political commentary and rock music on randomly selected frequencies including 1710, 3346, 3275, 6875, 6925, 7576, and 9057 kHz. (Belfast and uses tcshortwave@yahoo.com)

Continued on page 61

Collectable Ham Radio?

Let me tell you a story.

It was around 1976 or so. I had just graduated from college and, among other things, sat for my first amateur radio license (WN2GHA). While I looked into the "real" job market and the possibilities of Graduate School, I worked in the last Lafayette Radio store in the State of New Jersey. It was the height of the CB craze and I was racking up commissions selling Hy Gains out the front door while our staff technician was modifying them out the back door. Interesting times.

While doing my turn at cleaning the stock room, I came across a small unopened box. The label read AMECO AC-1 Novice Transmitter Kit. I blew the dust off and took it to the manager. I said I'd like to buy it. I was a Novice and I was in need of a transmitter. As I recall it listed for around \$30. My boss let me have it for \$25.

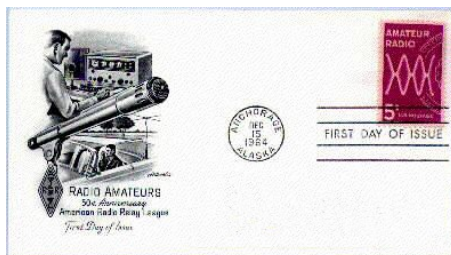
I took the kit home and had it assembled in an evening. Tuned it up into a light bulb (those were the days) and let it loose on 40 with a hand key and a couple of surplus crystals borrowed from a friend. After a few months I moved on to a VFO based transmitter and the AC-1 went on the shelf. A couple of years later I sold it at a hamfest for the \$25 I had paid for it and thought nothing more about it. That is, until I saw the same rig going for hundreds of dollars not too long ago on Ebay.

How was I to know that this modest little two tube kit would become so collectable and have a nearly cult-like following? Had I left it unopened, I could have probably made 10 times what I had paid for it.

At the end of the day, it is still a fairly simple two tube design that I could probably whip up out of my junk box. BUT!! It wouldn't be.....*Collectable*.

So what differentiates "collectable" radio gear from the plain old "used" equipment market? Many times I have mentioned in the column how much radio you can get for your money by carefully following the used gear market. I suppose you could call a piece of equipment collectable when its value starts to rise instead of fall with its age.

Take the AC-1 once again as an example. It is a very simple 15 watt crystal controlled transmitter. The \$250 or more that a prime AC-1 can command in the online auctions would easily buy a nice, late 1970's, fairly high end transceiver with 100 watts and a few basic bells and whistles. You could pick up a good Kenwood TS-520 and have enough left over for a couple of spare 6146B finals to keep it



Not up to collecting vintage Ham Radios? How about vintage Ham Radio Stamps?

chugging along.

The Collectable world of amateur radio is somewhat different than many other antique/historical/value-added-with-age pursuits. In the ham radio world, collecting does not usually relegate a piece of equipment to a glass case or a shelf. Hams who collect vintage radio gear, more often than not, feel obliged to bring the gear back into full service, restoring the equipment to as close to original specs as possible or better. Then they get it on the air. Some of my most enjoyable QSOs have been with folks who put fine old transmitters and receivers on the air.

Reasons for collecting vary as much as anything else in the ham radio world. I know a couple of folks who became excited (perhaps obsessed is a better word) with getting back examples of all the equipment they had in their first shack. Some people become enamored with a particular brand and try to get one of everything. Lots of folks love Heathkit gear.

I sort of fell into collecting as part of my love for QRP operating. I own all three Heathkit HW series 5 watt transceivers (HW-7, HW-8 & HW-9) and their respective accessories. I didn't buy them as an investment; just to play radio with the classic "Hot Water" QRP gear. They are considered very collectable. I just think of them as a lot of fun.

❖ Where tinkerers dare to tread...

Some collectors take the position that their equipment should be restored to its original condition only. Some folks like to improve and even modify their equipment. I enjoy taking things apart and tweaking them, so you can pretty much guess on which side of the fence I come down on this topic. Have you ever tried to get on a crowded band with the unmodified receiver section in a HW-7? That way lies madness!

Besides, I can appreciate a fully restored Ford Model T as much as I can a well built Hot Rod set up on a T body and frame. Both are works of art. The same goes for ham radio. I would also point out that it is probably very hard to find many examples of older radio equipment that have not been modified, either by the original owner or any number of folks that had the radio in the past. Our ham radio fore-parents had a great tradition of tweaking, improving, and trying new things with their gear. In this age of "appliance operation," the old ways are actually refreshing. Therefore, restoring radios with known or novel modifications does not usually deter from their value as collectables if the mods are done cleanly and correctly.

Collectable is not necessarily the same as *expensive* or *valuable* in the ham radio world. While many older rigs can demand a healthy price in fully restored condition, there are many pieces that can be had for a reasonable price if you are willing to put a little sweat equity into bringing the unit back to full song and service. If you follow my colleague Marc Ellis' *Radio Restorations* column with any regularity, you know that it can be challenging, but also great fun to refurbish older gear. Web sites and books on the subject of restoring radio gear abound.

❖ Collectable Peripherals

There are other ham radio related collectables that can be less expensive for someone just getting their feet wet in the collectable radio world. In past columns I have mentioned key collecting. There are dozens of fine, relatively low cost examples of Morse code keys and bugs you can go after, either on line or at ham fests. A good start is the venerable (and fairly common) Military issue J-38. A small shelf above your operating position can hold an entire key collection.

Even smaller, but no less fun, is collecting amateur radio related postage stamps. There are dozens of stamps, commemorating everything from Marconi to the most recent IARU conference. While by no means a serious philatelist, I have managed to pick up about 15 or so radio hobby related stamps over the years. I have these framed and on display with my various radio related rewards. They make great conversation starters with hams and non-hams alike.

To segue from stamp collecting, there is growing interest in collecting antique and unique QSL cards. Some very nice examples of QSL cards from the 1920s can be found at the Harvard Wireless Club Web site <<http://w1af>>.

harvard.edu/qs1-antique.html>

Interestingly enough, you probably won't find many examples of antique QSL cards on sale at the tables of your local hamfest. Hams tend to keep such things in the family. Many a QSL card is discarded or turns up as part of an Estate Sale. In this way cards are sold out of the ham radio community by families to non-ham collectors. A better place to go looking is in antique shops or postcard collecting conventions. I have found more than a few nice old cards poking around traditional yard sales and non-ham swap meets.

WEBSITE OF THE MONTH

As I mentioned earlier in this article, the AMECO AC-1 has quite a following. There are dozens of folks dedicated to keeping these little peanut whistle, two tube transmitters on the air. A quality working original AC-1 is both rare and expensive. But, there are clone kits and even versions just built from the original schematics and manuals that get you into the AC-1 spirit. One of the best places to get your feet wet in the AC-1 community is the Yahoo Group dedicated to this rig. It can be found at:

<http://groups.yahoo.com/group/amecoac1/>

If you are not familiar with Yahoo Groups, you will need to establish yourself with a name and password and then ask permission to join this particular group. And while you are looking over the postings and information about the AC-1, don't forget that Yahoo Groups has dozens of ham radio related forums dedicated to all aspects of the amateur radio hobby. You will find ham groups full of hints and tips for many receivers, transmitters and transceivers. You will also find sections dedicated to particular modes of operation and contesting. I don't own an AC-1 any more, but this site makes me wish I had one in my shack once again.

HAM RADIO BOOK OF THE MONTH

The ARRL INSTRUCTORS MANUAL for the Technician Class License Courses
Third Edition, Edited by Mike Spencer
WABSM

84 pages and CD ROM
\$15.95 plus shipping and handling
The American Radio Relay League
225 Main Street, Newington, CT 06111-1494
www.arrl.org/ 1-888-277-5289
ISBN: 0-87259-981-7 ARRL Order No. 9817

August is a good time for ham clubs or dedicated individuals to start thinking about offering an entry level ham class. All you need is a little space to do business and then you can put the word out to future hams in your area. The current crop of Technician Class handbooks offers an easy path for self study, but many folks do a much better job with the test if they sit through well conducted formal classes.

The ARRL publishes a fine Instructor's Manual in support of their basic Tech Class handbook *The ARRL Ham Radio License Manual*. This manual gives an instructor (or

group of instructors) all the information they need to conduct a successful ham class.

The book begins with suggestions on how to structure the course over the time you plan to allot to the project. The manual suggests breaking the information down into 14 separate lessons and gives all the information on how to use the material in the license manual to build the knowledge base of your students through to their formal test session.

There is a chapter that gives hints to first time instructors and class organizers. This section is written by Peter Kemp KZ1Z and should be required reading for anyone trying to set up a ham class for Technicians or even any higher class license.

The manual also includes practice tests to allow students to get a feeling for what the VE test session will be like. The sample tests reflect the current FCC Technician Class Question Pool.

The Manual comes with a CD ROM that includes colorful Microsoft™ PowerPoint slide presentations. The CD ROM also includes graphics and illustrations that appear in *The ARRL Ham Radio License Manual* so they can also be used as presentation screens or handouts for your class sessions.

Yes, yes, yes, I know there isn't any code testing any more. That doesn't mean you still can't give folks a taste of the fun of CW. The CD ROM includes a Morse Code Course. This can be useful as a class in itself – a great way to get No-Code folks to become Know-Code folks.

The ARRL provides limited rights to reproduce and distribute the information in the manual so you need not fear copyright infringement as you run your classes. Just be sure to take the time to read their expectations and limitations. You will find nothing there you can't live with.

So stand up in your next ham club meeting and say (to paraphrase Spanky and Our Gang) "Hey Kids...Let's put on a Ham Class!"

Have fun! I'll see you at the bottom end of 40 meters.

UNCLE SKIP'S CONTEST CALENDAR

10-10 Int. Summer SSB Contest
August 4 0000 UTC – August 5 2359 UTC

European HF Championship
August 4 1200 UTC - August 4 2359 UTC

North American QSO Party (CW)
August 4 1800 UTC - August 5 0600 UTC

ARRL UHF Contest
August 4 1800 UTC - August 5 1800 UTC

ARS Spartan Sprint (CW)
August 7 0100 UTC – August 7 0300 UTC

North American QSO Party (SSB)
August 18 1800 UTC - August 19 0600 UTC

Ohio QSO Party
August 25 1600 UTC – August 26 0400 UTC

Hawaii QSO Party
August 25 0700 UTC - August 26 2200 UTC

Outer Limits continued from Page 59

Undercover Radio- Dr. Benway transmits rock music, discussions of his travels, and other pirate fare, sometimes from a mobile transmitter. (Merlin and uses undercoverradio@mail.com)

Voice of Captain Ron Shortwave- The Captain is back with hard rock music. He reports that he is using a new antenna. (captainron6955@hotmail.com)

WBNY- The very active Commander Bunny, often IDing as Radio Bunny, is the head of the Rodent Freedom Fighters and allied monkeys. The news this month is that he has been announcing an address repeatedly. (Belfast)

WEAK- This veteran pirate still transmits rock music programming. (weak-chicago@yahoo.com)

WMPR- Their well known "dance music" techno rock format has been using male and female announcers for "You're Invited" identifications. (None, QSLs only rarely at the Kulpville Winter Shortwave Listeners Festival).

WNSR- Little is known about this new station that has been programming rock oldies featuring lyrics about the days of the week, such as "Monday, Monday." (Unknown)

Wolverine Radio- Their classic rock music selection is similar to what used to be common on the FM bands. (Still Unknown)

WTCR- Using a slogan of "Twentieth Century Radio," and a MGM trumpet fanfare interval signal, Dr. Morbius plays rock music from "the 1900's." This one has a good signal and has been widely heard. (Belfast)

WTPR- The continual warning from "Tire Pressure Radio" is that if you listen to their shortwave pirate broadcasts, then all the air will leak out of the tires in your car. Many ignore this dire warning. (Belfast)

❖ 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 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 announced as a no longer valid address, although a few pirates announce it, and some claim to still be getting replies through it.

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 EInsing@vrxus.JNJ.com. A few pirates will sometimes QSL reports left on the outstanding 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: Kirk Allen, Ponca City, OK; Ken Backer, Milton, Ontario; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Richard Cuff, Allentown, PA; Gerry Dexter, Lake Geneva, WI; Rich D'Angelo, Wyomissing, PA; John Figliosi, Halfmoon, NY; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Harry Helms, Smithville, TX; John Herkimer, Caledonia, NY; Ed Ininger, Summit, NJ; Terry Kreuger, Clearwater, FL; Finn Krone, Denmark; Harald Kuhl, Goettingen, Germany; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Tewksbury, MA; Allen Lutins, Johnson City, NY; Greg Majewski, Oakdale, CT; Kevin Mikell, Chicago, IL; A. J. Michaels, Blue Ridge Summit, PA; Bob Padula, Melbourne, Australia; John Poet, Belfast, NY; Martin Schoech, Eisenach, Germany; Lee Silvi, Mentor, OH; Brian Smith, Toronto, Ontario; Vladimir G. Titarev Kremenchuk, Ukraine; Andy Walker, UK; John Wilkins, Wheat Ridge, CO; and Joe Wood, Greenback, TN.

Shocking Experiences - Thoughts on Antenna Safety

Once when I was visiting my old friend Sam Bailey, KC7EVX, (SK), in his radio shack, we noticed an occasional popping or snapping sound coming from behind his transceiver. A little checking led to the conclusion that lightning discharges in an electrical storm in progress were building up charges on his antenna, and these charges caused sparks to jump from the antenna lead-in to his ground connection! We didn't want to get electrocuted, so we waited until after the storm had passed, and then installed a switch for grounding his antenna lead-in when he wasn't operating. And, after that, he was careful not to operate when a storm was coming on.

We should all follow the safety rule Sam then devised. That is, *to never operate our radio, or try to hook up, disconnect, or otherwise deal with an outdoor antenna or its lead-in during a storm.* Even a little storm.

Just consider what happened to Clarence Reece, a high school pal of mine. We were into building crystal-set receivers. A long, high antenna is desirable for a crystal set. So Clarence put up a sizeable antenna and ran the lead-in into his room. We didn't know much about antenna safety then, and during a thunderstorm the lead-in of the antenna was lying in Clarence's room unattached to anything. As he described it to me,

a lightning bolt flashed outside and a ball of fire came off the end of that wire and bounced around in his room for a few moments! After the storm, that antenna was taken down, and Clarence's radio interests waned considerably.

In another example of Mother Nature's might, the antenna tower of a ham friend of mine, Lee St. Clare, W7AX, took a direct lightning hit. His neighbor happened to see the strike and said that the tower actually lit up with the electrical discharge. The strike must have been mainly to the tower rather than his antenna or cables because, although one of the tower's ground leads was disintegrated, Lee's lightning protection (gas-discharge devices) prevented any major damage to his equipment.

Sam A. Barr, a *Monitoring Times* reader, recently wrote me the following: "In your Feb. discussion, you mentioned lightning protection. I thought that you might mention that wind can generate an electrical charge, particularly on a long (random) wire antenna. I once put up a 210 ft longwire. And in high winds, particularly dry wind, it would generate enough power to arc from the center to the shielding of my lead-in coax." Sam also reports that the charges on his antenna also blew out the first FET in his Sony 2010 receiver!

❖ On the Other Hand...

The above examples of the effects of atmospheric electricity all ended with relatively minimal damage. Sadly enough, this is not always the case, and many examples of serious and extensive damage to persons and equipment – and even death – have been reported over the years.

Unless your antenna system is as protected and as lucky as W7AX's was, then even a near miss to your antenna or lead-in will often destroy a radio connected to the antenna. A lightning bolt struck in the front yard of one of my neighbors. The current it induced in his house wiring took out his TV receiver, computer, telephone, and some other appliance that I've forgotten. And that was not a direct hit, just a near miss!

❖ So What Can We Do?

There are several things that we can do to reduce the likelihood of injury to ourselves and damage to our equipment. The simplest is to disconnect the antenna from our rigs and connect it to a ground connection during the time we are not operating. Make the connection with a heavy conductor such as large-diameter copper wire, copper strap, or the braid of old, large-size coax. A ground connection can be obtained by driving

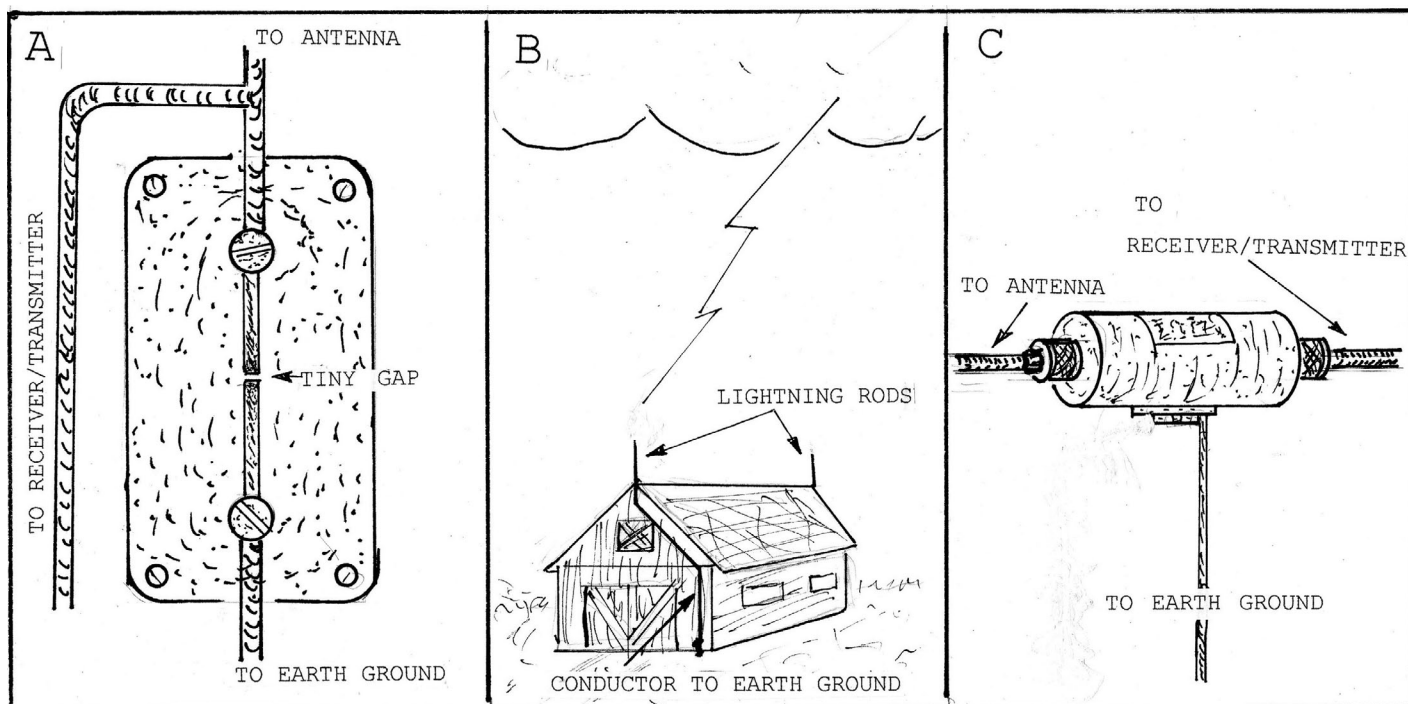


Fig. 1. A lightning arrester (A), a lightning rod (B), and a gas-discharge lightning protection device (C).

This Month's Interesting Antenna-Related Web site:

For more information on lightning-damage prevention:

www.astronwireless.com/aboutlightning.html
www.arrl.org/tis/info/pdf/0206056.pdf
www.arrl.org/tis/info/pdf/0207048.pdf
www.polyphaser.com/technical_notes.aspx

RADIO RIDDLES

Last Month:

I asked: "Obviously for weak-signal reception antenna gain is often an important consideration. On the other hand, certain kinds of low-gain antennas can often do a much better job of weak-signal reception than will an antenna with much higher gain. Why?"

Well, last month we were discussing reception at VHF and higher in frequency. However, at HF and lower in frequency the received-noise level is greater, and, because the dominant noise is a received signal, increased gain doesn't improve the signal-to-noise ratio (S/N). On the other hand, because directive antennas reduce noise and other interfering signals arriving from their non-favored directions, they reduce the overall received-noise level.

Typically, their gain also increases the strength of the signal toward which their major lobe is oriented. Thus, the desired signal's

an 8 to 10 ft long copper-clad steel rod into the earth. Some experts even recommend using two or three of these rods all connected together by heavy wire.

Spark-gap lightning arresters (fig. 1A) have been around for a long time. They offer some protection for tube-type equipment, but to protect modern, solid-state equipment we need

strength is emphasized while received noise is minimized and S/N is increased. This improves quality of reception.

The Beverage and the small, desk-top loop antennas are low-gain antennas which offer certain highly-directional characteristics (lobes or nulls). Where received-noise level or other stations cause interference to the desired station, these low-gain antennas can often provide better reception than do some other antennas that have considerably higher gain.

This Month:

Lightning affects more than safety in radio work. As mentioned in the answer above, increasing antenna gain is of little value for improving reception at some frequencies, but at other frequencies it can improve reception significantly. What does the occurrence of lightning around the earth have to do with this frequency-dependent effect?

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.

protective devices that fire at a lower voltage. Gas-discharge protectors (fig. 1B) are effective protective devices, and they do fire at lower voltages than do lightning arresters. No device can give protection against all possible lightning damage. However gas-discharge protectors have an excellent reputation for giving maximum protection to today's solid-state equipment, as well as tube-type equipment. They are available from various electronics suppliers.

Lightning rods, not to be confused with ground rods, are elevated, with a sharp point at their tip. They are connected to ground rods by heavy conductors (fig. 1C). Atmospheric electrical charge is said to be "drained off" to ground by the sharp points of these devices, reducing the likelihood that the area around will receive lightning strikes. Because they are above the building which they protect, if a strike does occur, they are more likely than the building to attract the charge. They then provide a convenient, low-resistance path to the earth, hopefully preventing damage to the building to which they are attached.

❖ Other Kinds of Grounds

What we've been discussing above is electrical grounding, whose purpose is to reduce the probability of lightning-related damage or injury. These grounds are different in construction and function compared to some other kinds of grounds, such as those of grounded, quarter wavelength, or vertical antennas. Such grounds, and their interaction with the ground, are essential to the optimal functioning of certain antenna systems. We'll discuss the idea of grounds as they affect antenna function in a later column.

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Recapping the BC-348

Last month, we removed the front panel, tubes, and various access plates from our BC-348-R and did some preliminary cosmetic work on the panel. By circuit-tracing some remaining wire stubs, we also “reverse engineered” the strategy used by the previous owner of the set in installing the now-missing a.c. supply. This month’s session will be focused on recapping the radio.

❖ Paper Caps in Mica Clothing

In the BC-348, as in some other military radios, the paper capacitors used for bypass, coupling, etc. are housed in rectangular plastic shells that make them look as if they are micas. Restorers who make this assumption and decide that they are low-risk usually regret it.

In fact, these units are as notorious for failing as the infamous Sprague “Black Beauty” (otherwise known as “Bumblebee”) capacitors encountered in our previous (Trans-Oceanic) restoration. Any conscientious restoration of a radio harboring the “quasi micas” must include the replacement of every one of them.

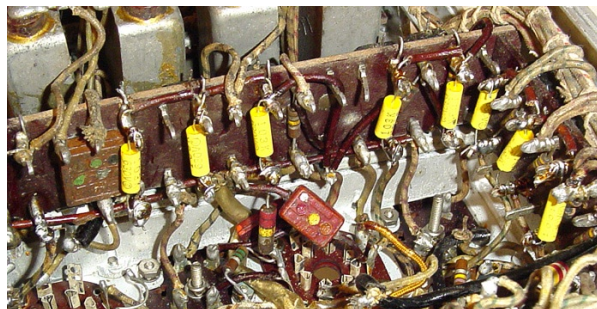
When I got my first good look at the innards of the BC-348 with capacitor replacement in mind, I was taken aback. Most of the troublesome paper caps were tightly wired to “resistor boards,” as they are called in the manual, that are diabolically mounted so that access to the capacitors is blocked by various structural elements.

At first I thought that I might gain access by removing the resistor board mounting screws (quite a job in itself – involving snaking a screwdriver through packed wiring and also getting a grip on the sometimes-almost-inaccessible mounting nuts). After disconnecting some of the wiring at

the top of these boards, I thought I *might* then be able to tilt the boards over so I could reach the capacitors. However, I soon realized that two of the boards were mounted in such a way that either one would interfere with the tilting of the other.

❖ Repopulating the Resistor Boards

I couldn’t imagine a military repair technician – perhaps under the incredible pressure of working in a battle zone – being able, in a timely manner, to find and swap-out a buried capacitor that had gone sour. Not even with the amazingly detailed repair manual provided. And at first, I didn’t see how I myself could manage the recapping without dragging this project on for so long that you, my readers, would get bored out of your skulls. Then I saw a way of accomplishing the task that would not only save time, but actually make the job go faster than it would in a conventionally-wired set.



Here are two of the resistor boards after they were populated with new capacitors.

I’m including a close-up of a section of the largest resistor board so you can see my strategy. At the top of the picture, you can see the tops of three of the inaccessible capacitors – all are definitely untrustworthy paper caps.

Notice that each has a lead that is bent over the top of the board and soldered to a terminal lug on the other side. Though not visible in the picture, a lead from the bottom of the capacitor is similarly bent around the bottom of the board and soldered to another terminal lug. It’s not apparent because of the angle of the photo, but the two lugs are far enough apart to accommodate the small size of a modern replacement capacitor.

To replace each capacitor, then, I could clip its top wire, disconnecting it from the terminal lug. This would effectively remove the capaci-

tor from the circuit even though its bottom wire would still be connected to the other lug. The new capacitor could then be wired across the two terminal lugs – both of which are readily accessible.

There are ten paper capacitors, all .01 mfd, mounted on three resistor boards in the main chassis (i.f. and audio stages) of the set. As each of these was disconnected, I checked it for leakage and rated capacity. I was amazed to find that, without exception, the leakage of each was so high that it sent the meter on my capacitor tester off scale in the wrong direction.

Furthermore, not one of the capacitors opened the “eye” of the capacitance bridge either at .01 mfd or at any value on any scale!

Without exception, these components were acting more like high-value resistors than capacitors. As I was going through all the boards, I smiled when I found that one of the original capacitors had already been swapped out using the method described – except that the previous owner had managed to remove the old cap through a convenient opening nearby. It sure couldn’t have helped much!

❖ The Other .01s

Besides the ten .01 mfd capacitors on the main terminal boards, there was one associated with a tube socket on the main chassis and six more on the small shelf holding the tubes for the r.f. and converter stages of the receiver. The one on the tube socket was no problem to change, but the ones on the tube shelf were a little harder. For one thing, each fit so tightly between its mounting/solder lugs that it was impossible to get in to cut its leads.

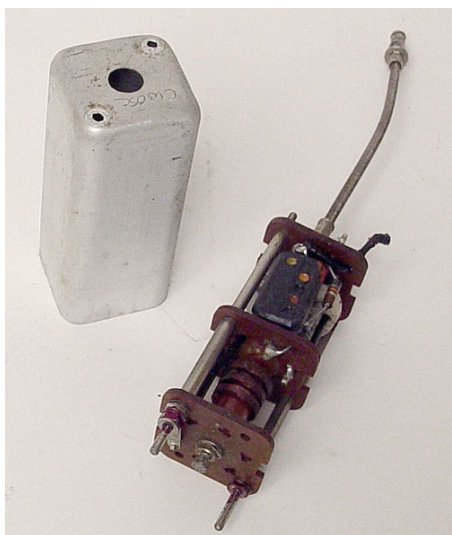
And the capacitors were stacked so tightly against each another (three one side of the chassis and three on the other) that they were almost impossible to move. Somehow I managed to wiggle each of these capacitors back and forth enough so that its leads broke off. Again, I felt very sorry for the technician in the wartime repair depot who might have needed to replace just one of these caps – say at the bottom of a stack.



The r.f. and converter tube shelf with six new capacitors (three on each side) installed on the old terminal lugs.



Inaccessible capacitors (top part of picture) were removed from the circuit by cutting their leads where they wrapped around the top of the resistor board. This made it possible to install new caps on the other side of the board (see text).



The c.w. oscillator module removed from its can. Original paper capacitor still in place. The flexible cable at the top connects with the front panel bfo control.

I'm including a picture showing the tube shelf with the new capacitors installed. Sharp-eyed readers will note that these caps look different from the ones seen installed on the main resistor boards. The reason: I had just about exhausted my supply of axial lead .01s on the resistor boards and had to switch to a back-up supply of radial lead .01s for the tube shelf.

This accounted for 17 of the .01 mfd caps in the set, but the parts list called for an 18th – which was, unfortunately, hidden inside the can holding the c.w. oscillator circuitry. That can was nestled among a couple of i.f. cans and one holding the crystal filter. I was able to pop the cover off the c.w.o. can without disturbing the other ones, and then I was able to lay eyes on the last of those .01 mfd nasties.

However, being able to see this problem cap and being able to remove and replace it were two different things. There just wasn't enough clearance for me to get my hands in there. I was going to have to remove the entire assembly from the radio.

This was, frankly, an unpleasant little task because of the dense, tight wiring to – and surrounding – the four leads to be removed under the chassis. I had to cut part of the binding of a cable harness to get access, and I also had to cut two of the four leads. I would later have to lengthen each of those to make it long enough to be reconnected.

❖ Other Paper Capacitors

I'll report on the repair and reinstallation



The bank of 0.5 mfd paper bathtub capacitors. After doing some testing, I'm hoping that all might still be ok.



Just a few of those paper-caps-that-look-like micas originally used in the BC-348. If you ever work on a set using these, you know what to do!

of the CW Oscillator can next month. But just now I was curious to see how many other paper capacitors remained in the set for me to deal with. The parts list showed no less than seven two-section .5 mfd caps – fourteen in all! These turned out to be a group of bathtub capacitors (caps sealed in metal cans) located at the back of the main chassis next to the power/interface plug.

I checked a couple of these for leakage and capacity. I think they are close enough to the leakage standard of 2k megohms to be worth a try and they're "on the button" as far as capacity value. I believe I'm going to leave the whole lot in place and troubleshoot them later only if they seem to be causing problems.

❖ Hi-Rez Manual Source

By the way, here's another word of advice to those of you looking to download a BC-348 manual. Last month, I advised you to go to the BAMA mirror site at <http://bama.edebris.com/manuals/>. There you will find a collection of military manuals unparalleled in scope.

However, to make sure uploading and downloading times are of reasonable length, these manuals were not scanned at the highest resolution. Many of the photographs, especially of dark objects, are almost unreadable black blurs.

But, just the other day I discovered the James A. Moorer BC-348 page (www.jam-minpower.com/main/bc348.jsp). There you will find a selection of manuals superbly reproduced at high resolution. I located a manual for the BC-348-H, which I know from my research to be identical to my BC-348-R (see the May 2007 column). It took my DSL connection over an hour to download its 162 MB (I broke for dinner while it was going on). But the results were well worth it.

The photos in my printout show all the sharpness and detail one could ask for. A complete, well-illustrated manual is really a great help when working on an unfamiliar radio!

❖ Tubes Pass the Test

The last project I took on in this work session was just to test the eight tubes. All of them checked out perfectly – not a weak one in the bunch. That's at least somewhat of a sign that the previous owner had powered up the set correctly and used it intelligently.

Working on a war surplus set that has no doubt passed through the hands of one or more ham or SWL experimenters with unknown

degrees of competence is always a bit dicey. Careful as one's own work might be, the results might still turn out to be unsatisfactory if the previous owner has made a wrong connection or left something out. Then it becomes necessary to try and troubleshoot the maze of semi-inaccessible parts and tightly cabled wiring. But, I guess that's really part of the fun of radio restoration!

Next month, we'll finish up the repair and reinstallation of the c.w. oscillator can, complete the cosmetic work on the front panel, and reinstall the panel on the radio. We'll also decide what sort of power supply to use and perhaps get that together so that we can try the set out.

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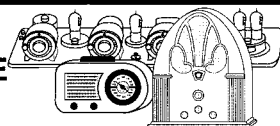
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Polk Audio's I-Sonic AM/FM/HD/XM/CD/DVD and MP3 Player

By Ken Reitz

Whew! That's a mouthful! There's no point waiting to the end of this review to get to the heart of the matter: The Polk Audio I-Sonic is the most ambitious, most accomplished, best sounding and most expensive of the HD Radio table-top sets.

❖ Unparalleled Audio

If you're happy with the Bose Wave sound, you're getting about half of what the I-Sonic delivers. It's an amazing four speaker system featuring left and right front, left and right rear, full range, hi-fi speakers and a patented, bottom fired, bass port, all of which combine to provide a sphere of sound emanating from the I-Sonic. This radio has a well balanced amplifier with plenty of power, which sounds as good at low volume two feet away on a desk as it does at high volume from across the room.

Polk Audio has designed the I-Sonic as a premium audio center capable of playing CDs, listening to HD Radio, hooking up your MP3 player, or flipping through the channels from XM satellite radio. You'll get the same great audio out of all of these music sources – but wait, there's more! Just hook up your TV set to the "S" video output and you can watch your favorite DVDs through this system as well.

❖ Features upon Features

As indicated in the title of this review, the list of product features on the I-Sonic is impressive. No other radio even comes close. It tunes AM/FM and HD Radio channels with an amazing 30 station presets done in three pages of 10 each. You can mix AM/FM, HD Radio and XM channels, so that, if you're going through the presets, the radio switches automatically from analog AM, FM, HD Radio and any XM channel you program in. No other radio lets you do this.

XM satellite radio functions are built-in to the I-Sonic software and remote control, but you'll have to buy the XM mini-tuner package which includes and XM antenna with CNP-1000 plug for



XM Mini-Tuner Docking Station with XM antenna and XM Passport add a new dimension to this multi-faceted radio. A Sirius satellite radio docking station is also available. Your choice for either one: \$59.98. Subscription fees extra. (Courtesy: Polk Audio)



the jack on the back of the I-Sonic and an XM subscription cartridge, known as an XM Passport. However, if you prefer, you can add a Sirius satellite radio home docking station as you would to any stereo receiver, and I-Sonic sells such a unit on their web site. Of course, whichever you choose you'll have to subscribe to either service.

The CD player functions as any other CD player. Though it plays only one CD at a time, it can be configured to wake you as an alarm. The alarm (you can set two) – if not turning on your favorite CD, XM or an HD channel – is a pleasant yet persistent chime, something that other radios should have done years ago. Audio from CDs played on the I-Sonic is outstanding.

The DVD player uses the same slide out tray as the CD player and plays only standard definition DVDs, not high definition DVDs, but does play the wide screen (16:9 ratio) format if you're plugging the I-Sonic into a wide-screen set. The audio from the DVD player is not surround sound, but is the same quality as the radio, CD player or satellite receiver.

All functions, including reverse, fast forward, and stop are controlled by the remote. Video displayed through the I-Sonic via the RCA video output jack or the "S" video output is excellent. You may also connect the audio output from the DVD player directly into your TV set or larger stereo.

I think you'll find that the audio from the I-Sonic is better by far than the stereo speakers built into most TV sets. In fact, most new wide screen TV sets have audio outputs which let you listen to the TV audio through better stereos. Over-the-air TV broadcasts were greatly enhanced by taking the audio from the TV and playing it through the I-Sonic. Cable-TV and satellite TV audio is also enhanced in this way.

Listening to an iPod or any other MP3



Ultra-modern design, luxurious audio, full function, credit card sized remote and capability for HD Radio, XM satellite radio option and iPod or other MP3, CD and DVD player. Polk Audio's I-Sonic does it all. (Courtesy: Polk Audio)

player is done by plugging an actual iPod docking station (not included) or the output of any other MP3 player into the AUX2 jack on the I-Sonic. You'll use your I-Sonic remote to control the other audio functions. I also found this was a great way to stream audio via the Internet. Use the included mini-to-mini stereo patch cord for this purpose.

The I-Sonic is the perfect desktop radio; you just have to have access to an outdoor antenna to take advantage of FM reception.

The blue LCD display is the same standard as used on all the other HD Radios, but Polk Audio has made the graphics much easier to read and the screen can be adjusted to be less obtrusive and yet maintain a readable contrast. The display includes a signal strength indicator, external antenna indicator, HD Radio text (when transmitted), the station frequency and the time. The clock is manually set. Alarm settings are stored in a non-volatile memory.

All functions done on the credit-card-sized remote control are duplicated on set-top buttons. And, while it's a little difficult to navigate via those buttons, remember that Bose has stripped the buttons off their new Wave Radio completely.

Analog and HD Radio reception was among the best I've tested. My location requires the use of an outside amplified antenna, which I have on a rotator to help zero in on those elusive HD Radio signals. As expected, HD Radio reception was not as good as analog. Nearby FM HD Radio signals came in well and the audio was great. But, trying for those distant (100+ miles) stations was disappointing. That's not the fault of this radio, though, as no other HD Radio I've tested could do any better.

Analog AM at night was very good. I especially appreciated the higher audio quality when listening to AMers still bothering to broadcast music. Listening, for example, to the Grand Ol' Opry on WSM using a tunable AM loop antenna was a joy. I was unable to tune any AM HD Radio signals night or day, which is not too surprising since the nearest Amer transmitting in HD Radio format is 60 miles away.

❖ Is There a Downside?

Yes, there is a downside to the I-Sonic. Without antennas, this radio is deaf as a post. As with all HD Radio sets, you'll need all the antenna you can get to receive HD Radio signals on either AM or FM bands. As with all the other manufacturers, Polk Audio includes an AM external non-tunable loop and a folded dipole "T" antenna for FM reception. Unless you're in a suburban location you won't get much on those, either.

Listeners in rural areas will need a roof mounted, amplified FM antenna for HD Radio reception. There is an "F" connector for an FM coax antenna lead. While there is a built-in ferrite loop antenna, you'll need a good, tunable AM loop antenna to receive AM analog stations during the daytime, and it's a real plus even at night. There are screw terminals on the back of the radio for a direct AM antenna hook-up.

As with all other HD Radios made today, there are two peculiarities in radio reception involving the digital processing. The first is that the audio is slightly behind that of an analog radio. You'll never notice, though, unless you have an analog radio in the same room tuned to the same station. The resulting echo effect will force you to turn one or the other off.

The second is that the processing can be clearly heard as a sort of whirring sound in the background when the volume is turned up and the radio is tuned in between stations on either the AM or FM band. This effect is less noticeable on some sets, but on the I-Sonic it is more in evidence. Of course, when tuned to a solid analog or HD Radio channel, there's no such effect. You will not hear this effect when tuning XM channels, the CD or DVD player.

And, finally, navigating the LCD on-screen menu is not intuitive. This is mostly due to having so many functions on this radio that it requires going through pages of menus to get to the screen you want. You might consider it a problem if you consider of a wealth of features a problem!

❖ Final Word

At the beginning of this review I mentioned that the I-Sonic was the most expen-



sive of the table-top HD Radio sets and it is: \$599.95. If you're looking for best counter-top/desk-top/dresser-top HD Radio on the market, the I-Sonic is for you. If you've got limited space, don't have room for a full sized stereo system but care about audio quality, the I-Sonic is for you. It's perfect for small apartments, RVs or dorm rooms.

The I-Sonic comes loaded for most of your audio needs. But, there are some options you may also want, including an iPod docking

station (\$79.99), Sirius Satellite Radio Tuner bundle (\$59.98), or XM mini-tuner and docking station (\$59.98).

When ordered through the Polk Audio web site (<http://I-Sonic.polkaudio.com>) shipping on the I-Sonic is free and you get a 30 day, 100% guarantee: your money back including return shipping. As this is written there is also a \$50 mail-in rebate offer from HD Radio but it is due to expire the first week of July. However, there may be other rebate offers in the future, and it pays to check their web site for details.

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FM 87.7-107.9 MHz

Antennas:

AM built-in ferrite core
AM screw terminals (AM antenna switch to go from internal to external AM antenna)
FM 75 Ohm "F" connector
XM antenna input (requires XM Passport or CNP-1000 antenna)

2 Auxiliary Inputs:

1 3.5 mm stereo input (for MP3 player)
2 RCA inputs

Video output:

"S" Video cable port
RCA Video jack

Audio Output via left and right RCA jacks
3.5 mm headphone jack

Dimensions: 14.5" W x 9.75" D x 4.75" H
Weight: 9 lbs. 4 oz.

MT REVIEW

Going Mobile with HD Radio

By Ken Reitz KS4ZR

Last year (*MT* April 2006) I reviewed the Kenwood EZ500 car stereo with the KTC-HR100MC HD Radio tuner which I had been using as a home receiver listening to HD Radio broadcasts. At the time the piece was written, October 2005, it was the only HD Radio receiver available and there were very few HD Radio stations on the air.

Since then, the market has been flooded with many home HD Radio receivers and there are now more than 1,300 HD Radio stations on both AM and FM bands throughout the U.S.

There have been some new developments in the mobile car stereo market, but in general HD Radio car stereos lag behind table-top sets by about two years. There is only one auto maker (BMW) which offers HD Radio as an option. Apparently car makers are more impressed with satellite radio than with the potential of HD Radio. Meanwhile, tens of millions of car owners might consider adding HD Radio to their cars via an after market converter.

Since April of '06 the EZ500 has been replaced with several other Kenwood products (see graphics), and the HD tuner is now the KTC-HR100TR. The tuner is only available for Kenwood brand car stereos and is compatible with most Kenwood HD-ready radios made since 2003. However, there are several other tuners for other specific brands of after market car stereos: The Alpine TUA-T500HD for select, compatible Alpine car stereos; Eclipse HDR105 for Eclipse car stereos, the Sony XT-100HD for Sony brand after-market car stereos, and Directed Car Connect Universal Add-On HD Radio Tuner. The Sony unit works with most Sony brand car stereos manufactured after 2005 which are satellite-ready.

The Directed unit uses a wired FM modulator which goes directly into your receiver via its AUX inputs. If you don't have such inputs, your best bet is to use a wireless FM modula-

tor. However, in my opinion it's generally best to avoid using a wireless FM modulator for HD Radio, because today's units are now under-powered and have notoriously poor quality audio, which won't do justice to the HD Radio signals they'll be feeding into your car stereo.

I found all available at Crutchfield, the national electronics outlet at www.crutchfield.com and selling for under \$200.

Recently, the built-in radio in my old 1978 Toyota Celica finally croaked after 29 years. I saw this as a great opportunity to update the old car to the new HD Radio standard, so I dusted off the Kenwood EZ500 with attached KTC-HR100MC HD tuner and set off to bring the '78 into the new century.

❖ Getting Started

If you're considering adding HD Radio to your ride, first consider what your time is worth. I made some inquiries locally and found an installer who would do a standard car stereo installation for \$45. That sounds reasonable to me. The cost would rise if I had extra amplifiers or other devices for them to contend with. If you do it yourself, you can expect to spend two or more hours doing the installation. The best part about having experts do the installation is that the work is guaranteed.

My own installation was going to require cutting an opening in the center console to accommodate the much larger new radio, so the pro option was out. If you opt for the pros, add that to the total to get an idea of how much the whole project will cost.

The last time I did a car radio installation (*MT* June 2006), I was putting a Sony XR-CA660X AM/FM/SW radio in my other car, a 1985 Toyota Celica. The first thing I did in both instances was consult the doctor – the

Installldr.com to be exact. This site lists all automobile makes, foreign and domestic, and gives you printable .pdf files showing the wire connectors used in your car, a list of the pin designations and how they relate to typical new radio equivalent wire colors. Go to www.installldr.com and click on your car's make.

You may also benefit from an automotive repair manual for



An even cheaper Kenwood KDC-MP203S is satellite and HD Radio ready at \$129.99 at Crutchfield. It's also XM or Sirius-ready with a built-in CD player. HD Tuner required for HD reception is extra. (Courtesy: Crutchfield)

your particular year and make. This is different from the owner's manual. An automotive repair manual is used by mechanics for directions on how to replace a heater core or do a general engine overhaul, for example.

I use the Haynes publications manual because they have excellent photos and wiring diagrams on an 8.5" x 11" page. Of particular interest are the pages with the entire chassis electrical system in schematic diagram. It's possible to trace every wire to every connection in your car, should you need to. To locate such a manual for your car, check out your local bookstore or automotive repair store.

There are complications you'll have to deal with if your car is, say, from this century: extra speakers, alarm systems, motorized antenna and possibly outboard amplifiers. Since my car has none of those things, it was fairly simple. But, before you do anything else, pull the negative cable off the car battery so you don't accidentally short out a connection.

Following the instructions in the car stereo manual, the diagrams in the repair manual, and the sheet from installldr.com, you should have the radio wired up in an hour or so. I found that half the time was spent trying to pry loose the old antenna, speaker, and power cables from



Kenwood EZ500RB replaces the EZ500 with virtually identical features. It's a low cost entry into the world of mobile HD Radio for \$145 from Online Car Stereo.com. The HD Radio tuner is extra. This model is also Sirius-ready and has a built-in CD player. (Courtesy: Kenwood USA)



The Sony XT-100HD, at \$99.99, works with after-market Sony brand car radios. (Courtesy Sony)

MANUFACTURER SPECIFICATIONS

Tuning Range:
AM 530-1700 kHz (10 kHz steps)
FM 87.9-107.9 MHz (200 kHz steps)
CD Player:
Digital Filter: 8 times over sampling
Freq. Response: 10 Hz - 20 kHz
Audio Amp:
50 Watts x 4
Aux. Input:
Max. Voltage: 1,200 mV
Input Impedance: 100 kOhm
Operating voltage: 11-16 V DC
Current Consumption: 10 A
Installation size:
7" W x 1 15/16" H x 6 5/16" D
Weight: 2.87 pounds

the original radio. At one point I was literally sitting upside down in the front passenger seat with my arm snaking up through the dashboard to pull the wires.

In the '85 installation the original car stereo was exactly the same size as the new one and there was no trouble getting it situated. The '78 installation was a lot harder and required removing the center console and cutting a 7.25-inch notch in the top to make room for the radio. Even so, it sits out about an inch and a half from the front of the dash. Well, it's the only place it could go!

If you have a modern car this shouldn't be a problem; you'll be able to simply swap out the radios. Then again, yours may be like many new cars with a seemingly sealed dash and, of course, the anti-theft device which will no doubt go off when you remove the original radio. If you can't figure out how to disable it, your best bet is to take it to the pros.

❖ Kenwood HD Radio Features

The actual Kenwood HD Radio tuner is a 7.5" x 5.5" x 1" box which connects to your "HD-ready" radio via a special 16-ft long cable with 13 pin connectors at each end. One end plugs into your radio and the other end into the tuner. It uses the amp and speakers to give you the audio. Your car's antenna plugs into the tuner box, not the actual radio. There is a 20-ft car antenna coax cable which allows you to put the tuner box anywhere in the car and still reach the radio. Without the tuner box, your HD-ready radio is just another radio.



Kenwood KTC-HR100TR (\$159.99 at Crutchfield) is the HD Radio tuner section for the EZ500 or most other Kenwood car stereos equipped with an HD Radio tuner jack going back to 2003. (Courtesy: Kenwood USA)



Directed "Car Connect" adds HD Radio capability to any built-in or after market car stereo for \$159.99 at Crutchfield. Turns any car stereo with AUX inputs into an HD Radio receiver. This unit is not satellite ready. (Courtesy: Crutchfield)

The Kenwood EZ500 is typical of modern after-market car stereos. It has a built-in CD player, AUX input for additional audio (an MP3 player could be plugged in here with an adapter), it's satellite-ready (in this case Sirius), it has a connector for a multi-disk changer and an output for a separate woofer. That's actually quite a lot of car electronics for less than \$200.

Other features on this radio include white dot-matrix LED display which can scroll text from CDs, satellite radio, or HD Radio source; equalizer modes which let you tailor the sound for your ears or your speakers' capabilities. It lets you name your favorite stations, using a text entry system, and comes with an infra-red remote control.

❖ Tuning HD Radio in the Car

I've written many reviews about HD Radio reception from home and the mobile experience is no different. In the city where the signals are strong, there are many HD Radio and multicast channels to be found. The audio is outstanding (even through the small, paper cone, original 1978 speakers), though the amp in the Kenwood, at 25 watts per channel, could easily blow the speakers into dust.

Away from the city, the HD signals came and went and it was pretty obvious when they did. The audio would have that expansive, clear HD Radio sound and then go back to analog FM. Worse, the multicast stations would drop out entirely and the signal would revert to the main analog channel. I tried using an antenna pre-amplifier and it made a noticeable improvement as long as I was parked, but out on the road in the country with curves and hills, the HD part of the signal came and went anyway.

That's the big problem with HD Radio. If you spend your days and nights traveling in a 30 mile radius of a major city with numerous multicasting HD Radio stations, you will love having an HD Radio in your car. But, if you spend most of your time further away, you'll spend more time listening to analog radio.

The big advantage to putting an HD Radio in your car is that they have built-in CD players and, as the EZ500 does, they are satellite ready, which in the end saves the day for those of us not living within easy reception distance of a major metro area. We've still got the satellite radio option. Meanwhile, having added HD Radio to my '78 Celica, I've now got the same HD Radio options as a brand new BMW!

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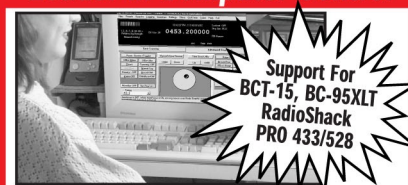
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Antennas for BC-Band Crystal Sets

By Phil Anderson, WØXI,
Xtal Set Society¹

In real estate, the mantra is “location, location, location.” We know location affects price.

When receiving radio signals, the chant is “antenna, antenna, antenna!” Size, length, shape, and orientation matter. This is particularly true when using a crystal set, since the electrical characteristics of the antenna can affect frequency tuning range, sensitivity, and level of interference.

Characteristics of the standard dipole and vertical antennas, shown in Figure 1, are most suitable when full length and appropriate height are used for the receiving frequency. The length of a standard dipole is one-half the wavelength of the received signal. Height is normally set at about a quarter-wavelength above ground. A feed line (such as coax) connects the antenna to your receiver. A standard vertical has a height of a quarter-wavelength, and the bottom is set near ground. Table 1 lists wavelength, dipole length and quarter-wavelength for a number of frequencies.

Table 1: Wave Lengths

Band	Lowfer	BC	BC	BC	160-M	80-M	40-M
Freq kHz	175	500	1000	1500	1800	3500	7000
λ meters	1714	600	300	200	160	80	40
$\lambda/2$ feet	2674	936	468	312	260	134	67
$\lambda/4$ feet	1337	468	234	156	130	67	33

The wavelength of a radio signal is determined by dividing its speed of travel – the speed of light – by its frequency. The wavelength of a 1500 kilohertz (kHz) signal (at 1500 on your AM dial) is calculated as follows:

$$\text{Wavelength } (\lambda) = 3 \times 10^8 \text{ meters/sec} \div 1500 \text{ kHz}$$

$$\lambda = 200 \text{ meters, or } 624 \text{ feet.}$$

Clearly, most folks don't have enough room, high enough poles, or lack of subdivision regulations to erect such a large antenna in their back yard! An alternative is to revert to a short vertical or L-shaped antenna, as noted in Figure 1. This choice has consequences but is workable. Let's compare the short L antenna with ideal and shorter quarter-wave verticals. See the sidebar for a review of coordinates used to describe antennas.

A full (ideal) vertical at 1500

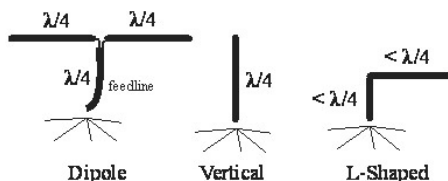


Figure 1: Dipole, Vertical, and L-Shaped Antennas

kHz would be roughly 156 feet high! It would receive signals from all directions just off the horizon (ϕ) and to a lesser and lesser degree from sources above the horizon. No signals should be heard coming from directly above. The terminal impedance of the ideal vertical is roughly 32 ohms of resistance with no reactance, easy to match to a transmitter or receiver.

The elevation receive pattern (also called the elevation power pattern) for a shorter vertical is somewhat degraded, as shown in Figure 2. Still, the same elevation pattern applies, whether looking E-W, N-S, or some other pair of map angles (ϕ & $\phi+180$ deg). Note that signals received from close to the horizon are reduced, as compared with the ideal vertical. Maximum reception is from an upward angle of elevation ($\pi - \theta$), again for all map directions (ϕ). In addition, the impedance of the antenna is affected.

When the antenna is shorter than a quarter-wavelength, the impedance develops two components: resistance and capacitive reactance. As the antenna is made shorter and shorter, the resistance becomes smaller and the capacitive reactance larger. A twenty foot vertical at 1500 kHz has a resistance of less than one ohm and a reactance of -2823, as

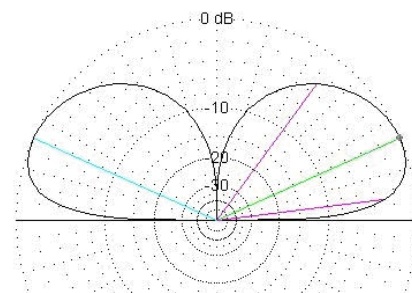


Figure 2: L-shaped Antenna Elevation Pattern, 20 Feet UP, 20 Feet Out.

shown in Table 2. This antenna is very hard to load for transmission; is usable for reception; but the reactance may detune a crystal set attached to it.

Not hearing much on such a short vertical, listening enthusiasts often resort to erecting an antenna that has both vertical and horizontal segments. Such an antenna is called an L Dog-Leg. If you add enough to the horizontal section to complement a short vertical segment, the characteristics of this antenna get a bit better.

Refer again to Table 2. Here we list the calculated² resistance and capacitive reactance of seven different L antennas. The first is simply a 20 foot vertical with zero horizontal extension. The second goes up 20 feet and then out an additional 20 feet. Note that the resistance at the terminals of the antenna increase slowly to around 1.4 ohms when the vertical portion of the L is kept at just 20 feet but the length is extended. As the vertical portion is increased to 80 feet, the terminal resistance, Rant, becomes 10. At a quarter-wavelength Rant will be about 32 ohms.

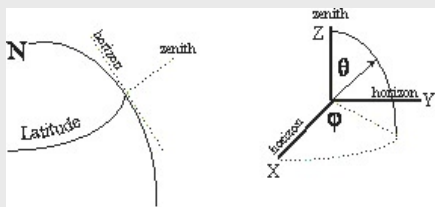
Also, note that the reactance is largest and capacitance smallest when the antenna is shortest. At just 20 feet in height, the reactance is -2823 and corresponding capacitance ~ 38pf. While adding horizontal length to the antenna – say from your house to the back fence – will not appreciably increase the terminal resistance, it does increase the capacitance and decrease the reactance.

Decreased reactance tends to decrease the tuning effects of the antenna on the LC tank circuit of a crystal set attached to it. Hence, it's worth it to add length horizontally to the antenna, even without adding height. The capacitive reactance of a short antenna also changes with

Table 2: Characteristics of L-Shaped Antenna at 1500 kHz

1500 kHz L-shaped Antenna above Average Ground					
Antenna vertical	X up	Y out	Rant ohms	Xant ohms	C pf
A	20	0	0.4	-2823	38
B	20	20	0.8	-1423	75
C	20	40	1.1	-899	118
D	20	60	1.2	-611	174
E	20	80	1.4	-417	255
F	60	40	7.6	-444	239
G	80	20	10	-443	240

ANTENNA COORDINATES



An antenna power pattern (in three dimensions) represents the radiation properties of an antenna as a function of position (spherical coordinates). These spherical coordinates are similar to those used for geography: azimuth angle (ϕ) is equivalent to longitude; elevation angle (θ) is the complement of latitude (90 degrees - latitude). To those we add the distance, r , from the antenna (the origin) to each point of measurement.

The measurement surface for ground-located antennas traced out for all azimuth and elevation angles is a hemisphere. The measurement surface for an antenna in space would be a sphere.

Power patterns are typically presented in two two-dimensional plots: elevation and azimuth. The azimuth plot traces out the relative power for a given elevation angle for all angles of the azimuth. You can "see" the plot by looking down upon the antenna from its zenith. For example, if the power delivered is equal for all azimuth directions at a given elevation, then the azimuth plot is a circle.

The elevation plot traces out the relative power of a given azimuth angle for all degrees of elevation. You can "see" the plot by looking at the antenna perpendicular to the azimuth angle (from the side). For example, if the power delivered is equal at all elevation angles for a given azimuth angle, the plot will be a semi-circle.

frequency; hence, additional detuning of a set can be expected when tuning across the BC-band. Antenna tuners and traps can be added to reduce these affects; that's a topic for another time.

Footnotes:

- 1 xtalset@sunflower.com; www.midnightscience.com
2. Calculations made using the EZNEC program written by Roy Lewallen, W7EL.

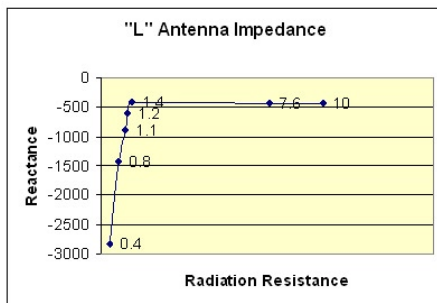


Figure 3: Terminal Resistance & Reaction of L-Shaped Antenna

Update on INMARSAT

By Bob Grove

It has been quite a while since we have covered communications via INMARSAT (International Maritime Satellite). Our February 1994 issue contained a comprehensive overlook, but things have changed a lot since then. Recent inquiries prompted some successful experimentation in signal recovery.

What and where is INMARSAT?

The primary service is for deep-sea vessels requiring reliable communications with land-based stations without having to resort to HF and its unpredictable propagation and interference. Voice and data are the primary signal contents. In the past, users have included vessel passengers and crew, intercontinental telephone, government, military and others as well.

Several satellites in the system allow global coverage over the Atlantic, Pacific and Indian oceans. The one that we on the East Coast can monitor is stationed over the equator at 54 degrees west longitude, 0 degrees north latitude. For me in Brasstown, NC, that puts its coordinates at 135 degrees azimuth (compass bearing), 38 degrees elevation (above the horizon). Other INMARSAT satellite locations are available from the Internet. (Also see this month's *Computers & Radio* software review for a useful tool in satellite location.)

What part of the spectrum?

Uplink frequencies to the satellites are in the 1600 MHz range, and it downlinks to surface stations in the 1500 MHz range (see table 1). Additional 3 and 6 GHz bands are utilized as well.

Can the communicators be heard?

Yes and no. There are plenty of buzzes, chirps, glide tones, clicks and other sounds typical for digital communications, but during the hour or so of logging more than 60 signals, no analog FM voice was heard, although it was once prevalent. The transmissions probably aren't all encrypted, but a good digital demodulator is required to convert the digital contents back to readability.

It must be kept in mind that U.S. privacy laws prohibit the monitoring of satellite phones and scrambled communications.

What are the antenna requirements?

The signals can be heard on any receiver or scanner capable of tuning the 1.5 GHz spectrum, provided it is fed by a high-gain antenna. We selected the Directive Systems 2045 Loop Yagi; it's ten feet in length but weighs only 3 lbs, and provides 20 dBi gain (see accompanying photo). Pointed accurately at the bird, the stronger channels as shown in bold on the accompanying chart were readily received.

But, for better signal recovery, especially of the lower-power channels, a good, low-noise amplifier (LNA) is strongly recommended. For that task, we selected the Down East Microwave 1520LNA with an impressive 25 dB gain and their matching BT power inserter that let us feed the operating voltage into the coax right at the receiver, so the LNA can be mounted on the antenna to overcome transmission line loss.



Zeroing in

Selecting a position that faces the satellite (in this case, just outside my garage door!), we used a compass to find the initial bearing. After that, it was merely a case of tilting the antenna upward to intercept its position while listening to one of the high-powered channels for maximum signal strength.

It is also recommended that after the azimuth/elevation coordinates are set, the antenna be rotated on its own axis for any necessary polarization correction that might enhance the signal further.

In an era of diminishing VHF/UHF analog communications, perhaps things are "looking up!"

(For the technically competent and experimentally curious listener, the antenna system described above is available for under \$500 at Grove Enterprises 1-800-438-8155, but there's only one in stock!)

Table One

ACTIVE INMARSAT FREQUENCIES DURING SAMPLE PERIOD

Frequencies in MHz (Strongest signal frequencies in bold)

1525.700, 1525.950, 1526.888, 1526.950, 1526.988, 1528.325, 1528.388, 1528.525, 1528.575, 1528.625, 1528.675, 1529.425, 1530.125, 1531.125, 1534.375, 1535.125, **1535.185**, 1536.700, 1537.563, **1537.700**, 1537.825, 1537.926, 1537.970, 1538.038, 1538.120, 1538.125, 1538.163, 1538.380, **1539.525**, **1539.555**, 1539.585, 1539.685, 1539.756, 1539.765, 1539.775, 1539.785, 1539.788, 1541.280, 1542.500, 1544.520, 1544.950, 1545.020, **1545.125**, 1545.155, 1545.165, 1545.205, 1545.793, 1546.048, 1546.060, 1546.063, 1546.092, 1546.140, 1546.175, 1546.520, 1546.560, 1546.600, 1546.610, 1546.663, 1547.830, 1548.015, 1548.350, 1548.905, 1548.975, 1548.990

Not Your Father's Satellite Tracking Program Nova for Windows

Last month we investigated listening to Jupiter's naturally occurring radio signals. This month we'll stay up in the heavens, but a bit closer to Earth. Our targets are Earth orbiting satellites, some of which provide radio signals that can be monitored with VHF/UHF receivers and scanners. Tracking these artificial moons and helping us monitor their radio signals is the function of a program called Nova for Windows, from Northern Lights Software Associates. (P.O. Box 321, Jamesville, NY 13078; 315-345-6991, nlsa@nlsa.com).

Over the years we have reviewed quite a number of satellite tracking programs. So is Nova any different from the rest? Let's put the latest version 2.2b (build 48) through its paces and see.

❖ Not a Lightweight

Billed as "Real Time Tracking of an Unlimited Number of Satellites" on its website, Nova makes some big claims. Weighing in at a little over 14MBs, Nova is not a small program. Downloading Nova using a dial-up connection takes patience. Is it worth it? Hold on.

A free demo version is available that's fully functional, except it does not save your settings between runs. If you are a satellite monitoring aficionado, you *will* want to store the many parameters which personalize Nova to your geography and exact interests.

For this column we used the registered version of Nova. It was run on a PC with a 1.6 GHz Duo Core T2060 CPU, 1.4GB of RAM with a Vista Home Basic operating system.

The authors of Nova say that the current version of Nova operates under Windows 98 through XP. Vista seems to work fine with Nova, but their final word on Vista is still being evaluated. They recommend that Vista users turn off the User Account Control. We encountered no Vista related installation or operational problems.

Let's preface our discussion of Nova by stating that this program is so feature-rich that we will only have space for a cursory look at some of its many features.

❖ WhereRU?

Nova can be run without any setup using the default parameters. However, unless you are located in Syracuse, New York (the home of Nova), you should at least customize the program to your geographical location and choose your satellites of interest.

The first is easily accomplished via the

splash screen that appears when Nova is run. I found it easier to "base" the operation of Nova around its Rectangular Map display, Figure 1.

Don't concern yourself with all the details of this busy looking display right now. We'll get back to it. For now, just look at the Command Line at the top. Selecting "Setup" and then "Observers" allows the user to choose a location from a comprehensive list of international cities. If you know the exact longitude and latitude of your location you can add it to the program's database of cities.

❖ Who RU Tracking?

In a similar manner, under "Setup" when we select "Satellites," the program provides us with over 9500 satellites and celestial bodies that we can choose to track. No, that's not a typo mistake. The program actually has 9605 objects in its database and the user can add new ones as they are launched. Nova provides one-click updates of Keplerian orbital satellite data from three free pre-programmed websites. Other methods of updating Nova's database are also possible.

Thoughtfully, Nova catalogues the satellites into groups. The first is "Amateur," which includes satellites capable of operation in the internationally designated Ham radio VHF/UHF bands. At one time 28 ham satellites were in operation. However I'm not sure of their current status.

Next up are GOES—Geodetic Earth Orbiting satellites that are primarily used for weather and observing earth resources. Typically, temperature, water vapor and cloud cover imaging are some the "published" targets of these satellites.

Iridium birds are used commercially and by the US military for voice, data, paging and who knows what else. Currently they consist of a constellation of Low Earth Orbit (LEO) satellites.

GPS, the next group, is now part of our common language. The Global Positioning Satellite constellation of navigational satellites is used commercially and by the US Military.

Orbcomm is a company which operated a constellation of LEO satellites for asset tracking and messaging.

And finally, Inmarsat's geostationary birds provide geostationary birds provide communications and navigational services to land, sea and

air based customers. (See page 71 on INMARSAT monitoring.)

To use Nova we must, of course, pick which satellites we wish to track. The user can pick them from the existing satellite database, create their own satellite groups, modify existing groups or add a new satellite. We will investigate Nova's capabilities in this short article by looking at a number of Nova's function screens.

Let's start by tracking all twenty-five Amateur satellites (and the international space station) in Nova's database from a Concord, New Hampshire, observation location.

❖ Using Nova

Once again take a look at our busy Figure 1, Nova's rectangular map display. But this time, look at the map detail. Displayed is the current real-time position of all twenty-six Ham satellites relative to an observer based in Concord, NH. A small square box at the center of the map indicates the observer. The circles around each satellite represent the "footprint," the area of the Earth that is visible from the satellite at any particular moment.

In Figure 1 we can see that LO-18 and LO-19 are within range of Concord. OSCAR 23 (Orbiting Satellite Carry Amateur Radio), to the North, is also in range.

Since we have chosen to track LO-19, its data relative to our location is displayed in the boxes on the right in Figure 1.

❖ Speak to Me

Nova has a nice feature that verbally announces when selected satellite(s) are coming into range (called acquisition of signal, AOS). The program can also announce loss of signal,

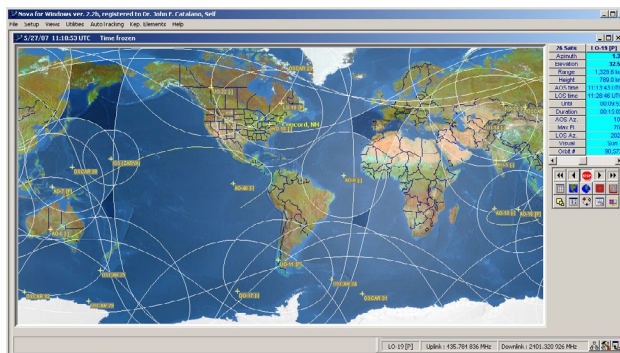


Figure 1 Nova For Windows' rectangular map screen – Not just another satellite tracking program! Notice LO-19 positioned north of Concord.

LOS. For example, the user will hear “LO-19 is rising” when it first comes into view.

Before we leave Figure 1, take a look at the lower right of the display. Here we have chosen to display the uplink and downlink frequencies for satellite LO-19. This is a condensed version of the “Frequency” display, which is selected from the “Utilities” menu in the Command line. The full “Frequency” screen also displays frequency shift due to Doppler effect.

This effect is due to the object moving past a stationary observer. Think of the sound of a train whistle as it goes by you. Its pitch (frequency) goes up as it moves toward you and down as it moves away. A similar thing happens to the frequency of the radio waves emitted from a satellite.

We have looked just one of many possible user defined configurations of the rectangular map display.

❖ “Earth to Nova”

Now check out Figure 2. This is the exact same display of satellites as in Figure 1. However, now we have a three-dimensional perspective from a position above the earth. Here we can again see LO-18 and LO-19. We can also change our distance above the earth using a Zoom function. Our viewing position can also be rotated, yielding some very interesting views of LO-19 relative to the observation site.

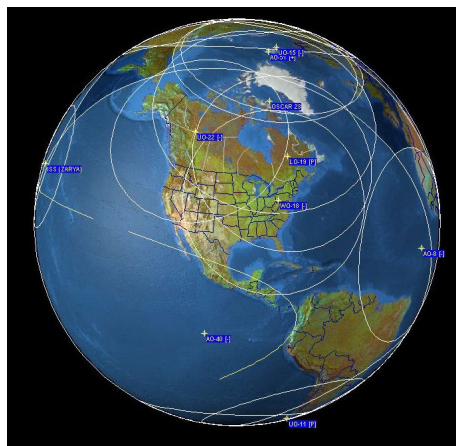


Figure 2 – Figure 1 viewed in three dimensions.

As with all of Nova’s screens, this beautiful display can be configured to show many different and useful parameters. For example, it can display just the footprints of satellites within range of the observer. Elevation contours and ground tracks can also be displayed. This program is *full* of user-controlled options!

The so-called Radar map in Figure 3 displays satellites’ positions using concentric circles to indicate elevation above the horizon. The observer is at the center and North is at the top of the map. Therefore, the outer edge of the map is the observer’s horizon and center of the Radar map is overhead of the observer. You can find LO-19 on the second ring directly above the center of the rings.

❖ The Noisy Sky

Our solar system, and the universe in

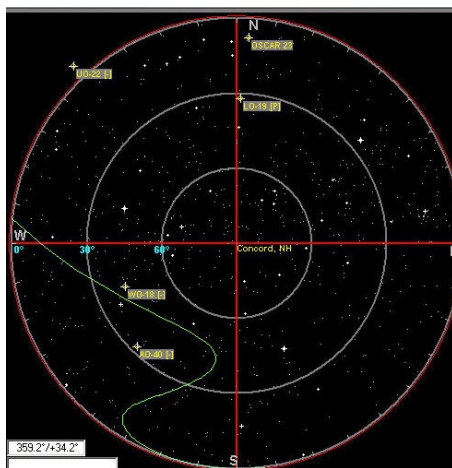


Figure 3 – “Radar” Map. The center of the circles is directly overhead of the observer. The numbers at lower left locate LO-19: North (359.2 degrees) and 34.2 degrees above the horizon.

general, has many sources of radio signals. Last month we saw how Jupiter emits signals from UHF down to shortwave frequencies. There are many other sources, including planets, our sun, other stars and intergalactic plasma gases. All of these signals together result in areas of the sky with various background “noise” signal levels. This background noise can make reception of space transmissions difficult, even for relatively close earth orbiting satellites.

The Sky Noise display, Figure 4, maps predictable areas of high noise. Then it overlays our satellite’s position so we can estimate how difficult monitoring a specific satellite and a specific time will be.

Figure 4 displays sky noise sources at 136 MHz in real time. It can also be configured for background noise at 50 or 400 MHz. Each contour line in Figure 4 represents regions of equal noise.

We are in luck. The highest noise signal is 3600 at the bottom center-left. But LO-19 is currently in one of the quietest parts of the sky. LO-19 can be found at the top-center of Figure 4 in a noise region of only about 300.

The Figure 4’s coordinate system should be familiar to astronomy buffs. It plots declination on the Y-axis against right ascension on the X-axis, or horizontal axis. And, of course, there are many configuration options to this screen.

❖ Controlling Radios

The feature which attracted me to Nova was that it interfaces to a number of programs, allowing automatic tuning of radios to satellite frequencies. This is a first for me in satellite tracking programs!

The list of compatible programs includes: W6IHG Radio Tuner, Uni-Trac 2003, TRX Manager, RATS, FT SuperControl, and Ham Radio Deluxe. Ham Radio Deluxe, HRD, is a

free program that controls Icom, Kenwood, Yaesu and a few other manufacturers’ receivers. Time did not permit us to try out this feature of Nova.

If readers have experience using this function of Nova with any of these programs, please E-mail me so we can share it with everyone. Right now, let’s leave it as a possible topic for a future column.

❖ Additional Features

Here is a quick run-through some of Nova’s function we did not have space or time to cover.

As we have seen, all of Nova’s screens can be configured for multiple satellites. What I did not mention is that they can also be configured for multiple observers. This is a nice feature for people on the move, multiple listening locations, or when targeting a specific area for ham contacts via satellite.

A dynamic, real-time chart of satellites with the time to acquisition of signal (AOS), duration in range and time of loss of signal (LOS) is a very quick, easy and useful feature.

The “Quick Visibility Check,” accessible under the “Utilities” menu, puts a check mark next to every satellite in the database that is above the observer’s horizon, in near real-time. That’s some feat! Sitting and watching checks come and go next to satellite names every 10 seconds or so is very interesting.

And if you have an antenna rotator that can be controlled by a computer, Nova can perform this function as a satellite comes in range. See their website for the hardware requirements.

But we still have not covered all of Nova’s features.

❖ Summary

Perhaps by now you can tell I was very impressed with Nova. If you do any form of satellite monitoring, or are a ham that enjoys making contacts via satellites, or are thinking about doing either, you *MUST* try Nova. I think you’ll agree it has lots of unique features.

Nova For Windows version 2.2b (build 48) can be found at www.nlsa.com. Here you can download the non-parameters-saving demo. For \$59.95 you can get the registration codes to unlock all of Nova’s features. Give Nova a try and let me know what you think. Till next time, keep looking up.

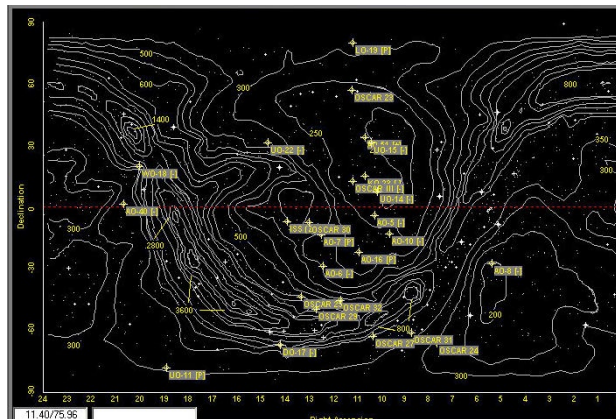


Figure 4 – The “noisy” sky map showing sources of background signals centered at 136 MHz. Signal levels go from a high of 3600 to a low of 300 near LO-19 (top-center).

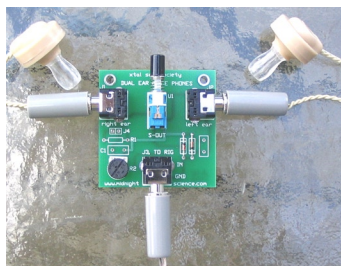
What's NEW

Tell them you saw it in Monitoring Times

Dual-Earpiece Headphone Kit

This month's *On the Bench* column discusses antennas to use with crystal radios. Another accessory that will also improve your signal reception is a headphone for both ears. The Xtal Set Society has such a set in kit form – the Dual-Earpiece Headphone Kit, XS-DE.

It works by interconnecting



two traditional crystal ear pieces, so you can use both ears; the signal will sound as if it is inside your head, less “brassy,” and you’ll hear less background noise. The kit may be used with crystal sets or other audio devices with 8-ohm or “phone” outputs, thus giving you inexpensive headphone listening.

The kit features a 2 by 2-inch printed circuit board, three 3.5 mono-jacks, a toggle switch, back-to-back 1N914 diodes, and a thumb potentiometer. The DPDT-switch enables a series or parallel connection of the ear pieces. The pot and diodes are used to limit volume; and the pot has some effect on the “timbre” of voices heard.

The kit includes two crystal ear-pieces and three mono-plugs but does not include cable and connectors for your crystal set or radio. Assembly time is roughly 25-minutes.

XS-DE, Dual-Earpiece Headphone Kit, \$19.95 plus \$4.95 shipping/handling. Orders may be placed via the website catalog at www.midnightscience.com. For additional information, visit the site or email xtalset@sunflower.com. The Xtal Set Society, P.O. Box 3636, Lawrence, KS 66046, 405-517-7347.

Traveling the Hi-Tech Way

This month, Ken Reitz reviews what's available for listening



to HD-Radio in the car. But that's not the latest in hi-tech travel. For example, thanks to Autonet Mobile you'll soon be able to power up an in-car router and turn your car into a WiFi hotspot, allowing multiple connections using 3G and 2.5G cellular data networks.

Imagine you (or the grandkids) being able to use a laptop computer, mobile media player, Wi-Fi camera, Wi-Fi phone (like the VoIP Skype Phone), stationary videogame console, or handheld gaming unit in the car as you travel! Autonet Mobile provides continuous connectivity in 95% of the U.S., but you do have to subscribe to Autonet Mobile as your service provider.

For more information, check out www.goautonet.com

Domestic Broadcast Survey 9

As the prime DX listening season nears, it's time to remind hobbyists of the latest publication from the Danish SW Listener's Club International. *Domestic Broadcasting Survey* (DBS) 9 is ready for the season, and it remains an excellent reference source.

The 9th Edition, edited by DSWCI Anker Petersen, is divided into four parts. Part 1 lists broadcasting stations sorted by-frequency from 2310-5699.8 kHz. Part 2: Domestic stations on international bands 5765-17890 kHz. Part 3: All active Clandestine stations with schedules and identifications. Part 4: Deleted frequencies between



2 and 30 kHz, which have not been reported during the past five years.

This new survey is based upon official sources, DX bulletins and current schedules. Listings are in an easy to follow format, sorted by frequency, kW, country, station and operating schedules. Also included are parallel frequencies and operating format.

The Last Log column shows the last month and year the station was heard before the DBS printing deadline. Those stations that have not been logged have been moved to Part 4.

The 40 page edition is available by email as PDF format (about 330 kB). A few limited print editions are also available. Funds should be sent to: DSWCI, c/o Bent Nielsen-Treasurer, Egekrøgen 14, DK 3500 Værløse, Denmark. Email edition: DKK 40,000 or US \$7.00 or Euro 5.00, GP 4.00 or SEK 50,000 or 5 IRCs. Printed edition: DKK 75,000 or US \$12.00 or Euro 10,000; GBP 7.00 or SEK 100,000 or 10 IRCs. Payment in cash notes are accepted whereas checks are not accepted.

The Domestic Broadcast Survey 9th edition remains an excellent source to aid in your listening sessions. Every dedicated DXer should keep this fine publication in their listening post. Thanks to Anker Petersen and his dedicated monitors for another accurate and valuable reference aid. To view a sample page of DBS 9, refer to: www.dswci.org/

– Gayle Van Horn W4GVH, reviewer

ARRL Antenna Book

Without question, the single most important consideration for a radio installation next to the equipment is the antenna. Hams, SWLs and scanner listeners alike have learned that without an effective antenna, transmission and reception are marginal at best.

While it is possible to purchase commercial antennas, communications hobbyists often prefer to make their own, but comprehensive guides to antenna design at virtually any frequency are hard

to come by.

For decades, the leading publication on antenna design for radio amateurs has been the *Antenna Book* published by the American Radio Relay League (ARRL). With a \$44.95 cover price, this exhaustive reference is a small fraction of the cost of other textbooks on specialty subjects.

Nearly 1000 pages in girth and liberally illustrated, the new 21st Edition is accompanied by a CD-ROM of the encyclopedic reference and it is fully searchable. Chapters are conveniently assembled by topic and a large index allows convenient retrieval of areas of interest.

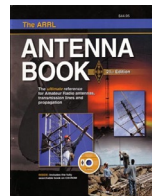
All topical chapters are liberally illustrated, and cover such interest areas as basic design, antennas by frequency range, direction finding, beams and non-directional antennas, loops, multiband antennas, portable and mobile/maritime antennas, radio wave propagation (including global tables), transmission lines, repeater antennas, space communications, and even tables of sources for related products.

For the mathematically adventurous reader, the *Antenna Book* covers advanced techniques as well, such as Smith Chart analyses and construction articles for test equipment like a vector network analyzer, noise bridge, time-domain reflectometer, VHF/UHF power calorimeter, HF wattmeter, and an SWR bridge.

For the long-time radio enthusiast, the availability of the *ARRL Antenna Book* is nothing new, but this latest edition improves upon its former self with additional construction pages. And for the newcomer to antennas, the *Book* is a vast new world of experimentation and knowledge.

If you are looking for the biggest bang for the buck in an antenna reference work, the *ARRL Antenna Book* wins hands down – there's nothing better on the market. \$44.95 plus \$10 shipping from the ARRL, 225 Main Street, Newington, CT 06111-1494.

– Bob Grove, reviewer



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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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MT: EDITOR'S DESK

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<http://mt-fedfiles.blogspot.com/> - by Chris Parris

MT: MILCOM

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Larry's Monitoring Post

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