

Scanning - Shortwave - Ham Radio
Equipment - Computers



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The Shuttle Returns to Flight

Also in this issue:

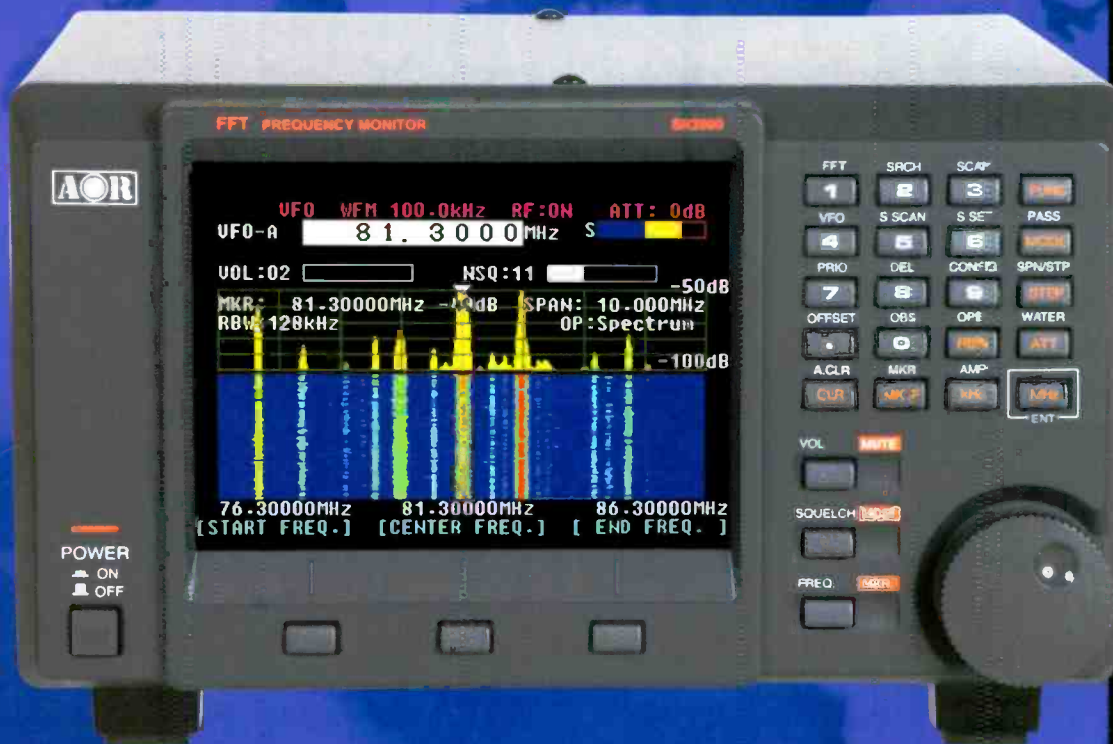
Islands On The Air
Ham Radio's Digital Modes
The ICOM 746PRO as a Communications Receiver
Monitoring Transoceanic Flights



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SR2000
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And much more!

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Check out this remarkable receiver at www.winradio.com/g3



Cover Story

STS-114 - NASA's Return to Space

By Larry Van Horn

It's been a long two years since the shuttle's last, disastrous flight. All the intervening hard work to make future shuttle flights safer will shortly be put to the test as Discovery approaches the launch pad.

A lot has changed in NASA communications as well. Monitoring Times has been providing hobbyists with shuttle support frequencies ever since our inaugural issue, and we continue that tradition in this article. Also see this month's Utility World and Milcom columns. Story starts on page 10.

On Our Cover: Through the open doors of the Vehicle Assembly Building can be seen the second redesigned External Tank (ET-121). (NASA Photo)

C O N T E N T S

Every Island Tells a Story 14 By Ken Reitz

Remote islands have always been a favorite target for amateur radio operators, but the sheer number of these entities and the countries that claim them is dizzying. The Islands On The Air (IOTA) society organized the chaos and turned it into a fine art which any radio hobbyist can enjoy.

From Antarctica to the tiniest tip of a volcano poking out of the ocean, we'll take you island hopping via radio to some of the most popular Islands On The Air.

The Digital Ham Revolution 17 By Larry Van Horn

No one who loves radio is unaware of the digital revolution that has been taking place in communications and even in broadcasting. Ham radio operators – always on the cutting edge of new technology – have had their impact in this field as well. Personal computers have made digital communications accessible to any ham, but some modes have proven more popular than others.

As we trace the evolution of digital technology in radio, we'll look at the various modes, what you need to get on the digital bandwagon, and some website links for further exploration.

Reviews:

Why would you buy a ham radio just for its receiver? Well, why not? Our review of the receiver side of Icom's IC-746PRO proves you can get generous features and excellent quality at a price competitive with communications-grade receivers. (See page 70.)

Bob Grove says, "Next to a good receiver, a spectrum analyzer is the most valuable piece of test equipment that a serious monitor of the radio spectrum can own." Following a discussion of the difference between spectrum analyzers and oscilloscopes, Bob puts the new AVCOM PSA-37XP spectrum analyzer to the test (page 69).

Because he knows from experience how much hard work and sacrifice goes into creating software programs, John Catalano hesitated before pitching hundreds of old disks into the trash. Were any of these old DOS programs still viable in today's Windows environment? Turn to page 72 to see whether any programs survived their brief reprieve!

Poles apart from DOS programs in sophistication is PC Frequency Manager from IFS, which includes everything from databases to propagation prediction to receiver control. The first of two parts appears on page 31.



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Address: 7540 Highway 64 West,
 Brassstown, NC 28002-0098
Telephone: (828) 837-9200
Fax: (828) 837-2216 24 hours
Internet Address: www.grove-ent.com
 e-mail: mt@grove-ent.com
Editorial e-mail: editor@monitoringtimes.com
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Owners
 Bob and Judy Grove
 judy@grove-ent.com

Publisher
 Bob Grove, W5JHD
 bobgrove@monitoringtimes.com

Managing Editor
 Rachel Baughn, KE4OPD
 editor@monitoringtimes.com

Assistant Editor
 Larry Van Horn, N5FPW

Art Director
 Bill Grove

Advertising Svcs.
 Beth Leinbach
 (828) 389-4007
 bethleinbach@monitoringtimes.com

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EDITORIAL STAFF Email firstlast@monitoringtimes.com

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Digital marvel

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 - Built-in Cell Phone Charger
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 AC adaptor (not included)

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6 colors: Metallic Red, Metallic Blue, Metallic Pearl, Metallic Bronze, Yellow, and Sand.



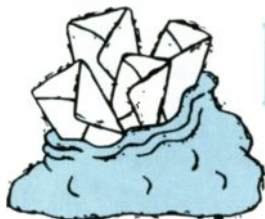
FR100

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

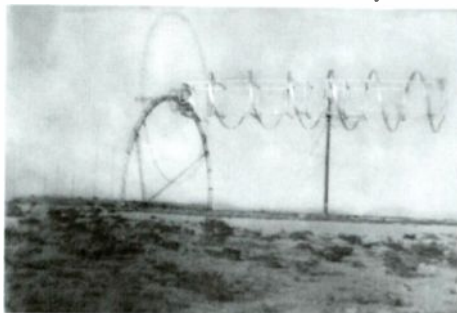
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LETTERS TO THE EDITOR

Mystery Antenna

"...the picture of the large helical antenna on the 'Letters' page of October 2004 *MT* submitted by Jesse Wadsworth, WA6CQE, is believed to be the work of the Late Oliver Swan. This particular antenna was used for long-distance reception of TV signals for local cable systems.



"Oliver Swan owned an antenna company (c. 1970) located in Stockton, CA, and manufactured antennas for television and amateur use. This could very well be one of Mr. Swan's creations."

— Roger Pience N1XP, Maine

Roger is the only reader to come up with a specific idea of this antenna photographed in 1968 west of Roswell, NM. If anyone has anything more definitive, he'd welcome additional information. Meanwhile, we thank Roger for coming up with a reasonable answer to a mystery antenna that had most of our readers stumped.

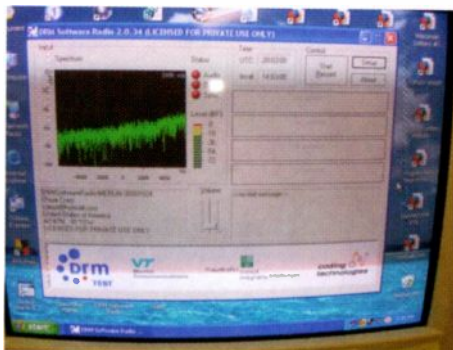
Two Views on DRM

"I became an SWL at the age of 14 ... I am now the ripe old age of 56 and would like to comment on Digital Radio Mondiale.

"I have bought the DRM software to listen to this new form of broadcasting on shortwave. So far every DRM broadcast has been well away from the others broadcasting DRM. I would like to see two broadcasting side by side within the 10 MHz scale to see how much interference they give each other. I would like to see two broadcasting on the same freq. and let's see what happens. I think it is time to have a ground swell of SWL start sending letters to the FCC and all the governments involved with the broadcasting



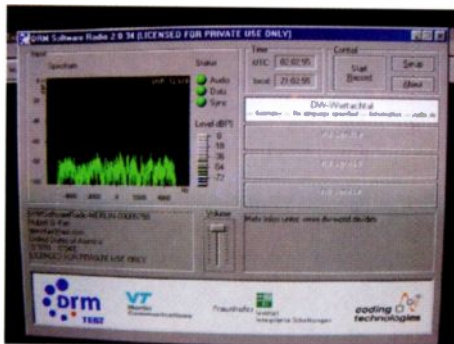
of DRM. I think it is time to tell them what we think and that this is not going to work but only to kill the hobby.



"With DRM we will no longer be able to listen to weak stations. DRM drops out when the signal is weak or it bounces, so what good is it? DRM signal is dropped more than it is [audible]. Gone will be the days of listening to faint signals. All that will be left will be the sound of coffee grinders, drowning out everything around them. I have listened to signals from Bonaire, Neth. Antilles, Canada's worthless splatter Sackville (there should be a law ...), Kuwait, Luxembourg... As you can tell by now I do not believe that DRM is the savior of shortwave.

"Sorry, I believe just the opposite. DRM will be the end of shortwave as it is now. All you're going to have is sporadic signals, and coffee grinder noise and interference on a scale as never before. I say, put DRM in its own band or set frequency and keep it there. And if they can live up to what they promise, then we can think about letting them move to other frequencies. Let's face the facts: the only ones benefiting are the salesmen and companies selling the DRM equipment to broadcast this crap. Let's also face the fact that a lot of the struggling and small watt stations low on money to change over to DRM will just give up and stop broadcasting. Has anyone stopped to think what does that do for shortwave? That means everyone loses."

— Oscar Crary, Holmen, Wisconsin



"Thanks for a great publication! Several months ago you ran a series of articles on DRM

and really got me interested in this new technology. I have been listening to DRM from the Canadian station in Sackville for several months now. Tonight I received the station from Wertachtal, Germany, on 3995 kHz. As you can see from the screen photo of the software program, I have all 'Green Lights' and am receiving the audio and data perfectly. The receiver is a Ten-Tec RX-320D and the antenna is a GAP Vertical Titan DX. I am sure a lot of amateur radio operators have been wondering what the 'noise' was on 3995!

"I [also] enjoyed Glenn Hauser's article on DRM in your February issue."

— Glenn Farr N4AK, Travelers Rest, SC

Unauthorized Utilities in Ham Bands

"I would like to thank [Hugh Steman] for the August 2004 *Utility World* column about some of the intruders which are known to invade the exclusively-allocated Amateur Radio bands.

"Your article was well-researched and very balanced, and provided an excellent overview of the intruder problems facing Amateurs in many parts of the world today.

"It is a fact that many Amateurs are unaware of the sources of interference which they experience while DXing or ragchewing with their friends. Thank you for bringing this problem to the attention of your many readers.

"I have already alerted my colleagues in IARU (International Amateur Radio Union) to your article and I will make brief mention of the article in my next issue of the IARU Region 2 Monitoring System Newsletter so that others will learn of it also."

— Martin H. Potter VE3OAT

Kaito WRx911

"Please pass on my thanks to Eric Bryan for his review (October 2004). After reading it I was prompted to buy one. I found one at <http://surpluscomputers.com>, a Yahoo Store, for \$15.99 plus \$7.00 shipping. It arrived in a little over a week and is working as advertised. I am not sure it's worth \$30.00 but it is certainly worth \$15.99, which means the Chinese are probably selling it to the American retailers for less than \$10.00."

— Martin Gallas, Jacksonville, IL

We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, 7540 Highway 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com. Letters may be edited for length and clarity. Happy monitoring!

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Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery. For maximum scanning satisfaction, control your Bearcat 245XLT from your computer running Windows. Order Scancat Gold for Windows, part number **SGFW** for \$99.95 or the surveillance enhanced version with audio recording part number **SGFWSE** for \$159.95.

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| Bearcat BCI25D APCO Project 25 digital software card..... | \$299.95 |
| Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner..... | \$139.95 |
| Bearcat 250D 1,000 ch. TrunkTracker III handheld scanner..... | \$339.95 |
| Bearcat 245XLT 300 ch. TrunkTracker II handheld scanner..... | \$189.95 |
| Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner..... | \$84.95 |
| Bearcat Sportcat 200 alpha handheld sports scanner..... | \$159.95 |
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| Sangean ATS818 45 memory shortwave receiver..... | \$139.95 |
| Uniden WX500 Weather Alert with S.A.M.E. feature..... | \$39.95 |

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PASS channels: 50 per search bank + 50 for VFO search
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Frequency Coverage:
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SPACE

Shuttle vs Soyuz

Although there have been only two astronauts manning the International Space Station since the US space shuttle has been grounded, they have occasionally found time to talk to school students around the world via the onboard amateur radio station. One recent contact was between the ISS and students from St John's School in Houston, Texas. One student asked Expedition 10 Commander Leroy Chiao, KE5BRW, about the differences between traveling into space aboard the Russian Soyuz vehicle and the US space shuttle.

Chiao explained, "The Russian rocket, because it doesn't use solid-rocket boosters, is actually much smoother. It's liquid engines the whole time and just feels a little bit different ... Also, because it's a missile ... the actual trajectory is a little bit different than of the shuttle, so we actually pull a few more Gs." Even so, both take the same amount of time to get into space – about eight and a half minutes, Chiao said. For more information on amateur radio contacts with the space station, go to <http://www.arrrl.org/ariss>

FCC

Martin to Lead FCC

The White House has picked Kevin J. Martin to succeed the agency's outgoing chairman, Michael K. Powell. Martin does not require Senate confirmation because he already is a commissioner member. Indications are that Martin will continue the FCC's more stringent enforcement of indecency regulations and may be more open to concerns about interference from broadband over power lines (BPL).

One Republican seat is open on the five-member commission, but the third Republican commissioner, Kathleen Q. Abernathy, may also choose to step down later this year. Democratic commissioner Jonathan S. Adelstein was recently reappointed to a five-year term; Democrat Michael J. Copps' term expires in June but may be renominated.

Software Radios Reined In

The Federal Communications Commission issued an order to prevent software-defined radios from being modified by users to affect the RF operating program and keep the technology in line with FCC rules, specifically frequency restrictions in the United States.

The FCC is afraid that possible software modifications to a programmable radio could make it too easy to violate the spectrum restrictions and cause interference.

Active efforts are currently underway both in industry forums and standards bodies to adopt internationally accepted standards for software defined and cognitive radios.

Software Radios Hit Snag

In January, the Defense Department told Boeing, the Joint Tactical Radio System's prime contractor, to put a hold on development of the software radio system in favor of refining work already done in preparation for an 18-day test in April of "Cluster 1" – three five-channel ground/vehicular JTRS radios, one seven-channel tactical air control party radio, and the JTRS software communications architecture and information assurance features. Analysis and evaluation of the test results in August will help determine the ultimate fate of the JTRS program.

The JTRS project is behind schedule and over budget, while troops in the field need more immediate delivery. DOD officials had planned to replace 750,000 tactical radios with 180,000 software-defined radios, which could operate in battlefield environments and across a wide swath of the radio frequency spectrum.

"Evolving security requirements, known design changes and extended formal testing have added cost and schedule to the program," Army officials said in a statement.

This marks a sharp reversal of fortune for JTRS, which was hailed by Pentagon officials in 2002 as a "transformational" program that would underpin an interconnected "network-centric" military force.

AMATEUR RADIO

Military Appreciation Day

Last year on Memorial Day, Emery McClendon KB9IBW and several other local hams in Fort Wayne, Indiana, set up operations outside Memorial Stadium during a Fort Wayne Wizards baseball game to enable people to talk with US soldiers at military bases in the US and overseas. Amateur Radio Military Appreciation Day (ARMAD) was initiated last year by Emery McClendon, a former aircraft refueler. It is held on Memorial Day weekend in conjunction with National Military Appreciation Month.

McClendon organized ARMAD "to encourage amateurs worldwide to use our hobby to express thanks as a public service for those that serve in the military, including active duty, veterans and retirees."

At this year's event on May 28, activity is expected to increase exponentially, following exposure on the "America Supports You" website. "Last year, we had more than 25 different groups in the U.S. and about 15 foreign countries participating in ARMAD," McClendon noted. "We expect participation to triple for the 2005 event." For current information on how to participate, go to the event site at <http://www.freewebs.com/kb9ibw/>

Islands on the Air

In the list of rare, remote DX islands, such as those mentioned in this month's feature article, are the Navassa and Desecho Islands. Representative Nick Rahall (D-W.Va.) has introduced Bill H.R. 298 into the 109th Congress, with co-sponsorship

by Representative Richard Pombo (R-Calif.). This bill requires the U.S. Fish and Wildlife Service to allow public access to the islands, which would open the door to Amateur Radio expeditions. The KPI/5 Project Team in conjunction with the Lone Star DX Association asks your help to ensure passage of this Bill in the House of Representatives by contacting your representative to encourage him or her to support H.R. 298. For more information visit <http://www.kp1-5.com>

Hamvention Awards

Dayton Hamvention's 2005 Amateur of the Year is Alan S. Kaul, W6RCL, of La Canada, California. Hamvention is recognizing Kaul for his ongoing dedication to educating radio amateurs about the many facets of ham radio and to publicizing Amateur Radio through the media. Kaul is a West Coast Producer for *NBC Nightly News*.

This year's Dayton Hamvention Technical Excellence Award winner is Jerry Sevick, W2FMI, of Basking Ridge, New Jersey. Sevick is well-known in ham radio technical circles for his many publications on such topics as baluns and ununs and vertical antennas and he also serves as an ARRL technical advisor.

The recipient of the Dayton Hamvention Special Achievement Award is D. Bharathi Prasad, VU2RBI, whose work in organizing the DXpedition to the Andaman and Nicobar Islands and subsequent emergency communication efforts in response to the December tsunami have already been lauded in *MT*.

OTHER NEWS

ANARC to Be Disbanded

At the Winter SWL fest in Kulpville, PA, March 12, members of the Association of North American Radio Clubs (ANARC) board and club representatives met and, in a unanimous vote, felt that the time had come for the dissolution of ANARC. The report sent to member clubs by Dr. Harold Cones expressed the consensus that ANARC's only useful function is to operate a club promotional web site. Since not all clubs were present, a grace period was allowed for votes from clubs not represented before the decision becomes final.

Recognizing that the web site is a valuable tool for North American radio clubs, the intent is to continue its operation with funding from the North American Short Wave Association (NASWA) and the Winter Fest. All radio clubs, not just former ANARC members, will be encouraged to establish a listing on the web site at no charge.

ANARC's annual Don Jensen Distinguished Service Award (given this year to Rich D'Angelo), will continue under the new name of The North American Radio Clubs Distinguished Service Award, and will be open to outstanding hobbyists from all wavelengths.

Radio Rumors

A number of shortwave radios have recently



TJ Skip Arey signs a copy of his "Radio Monitoring" book for Kevin Carey at Winterfest 2005. Both are columnists for Monitoring Times and gave presentations at the 'Fest.

gone out of production. These include the Icom IC-R75, PCR-1000, blocked versions of the IC-8500 and IC-R10, and the Drake R8B. Many of the models are still available through distributors. The AOR 7030PLUS is no longer available from AOR

USA, but can still be purchased from the UK. The only dedicated shortwave desktop receiver now left in the marketplace is the JRC NRD-545.

The new, intriguing Grundig E1XM radio was expected to be available by presstime.

BBC World Service Cuts

According to the BBC web site, starting March 27, there will be adjustments to the BBC World Service shortwave schedules "to reflect global changes in audiences' use of short wave."

The number of hours broadcast on shortwave in English and Spanish to Central and South America and the Caribbean will be reduced to two daily blocks in the early morning and evening. The shortwave service to Brazil in Portuguese will cease altogether.

Shortwave in English to Europe will be reduced to two daily blocks in the early morning and evening. There will be no Arabic Service overnight broadcasts to the Middle East from 2300 GMT to 0200 GMT.

No changes were reported to broadcasts to Africa, Asia, or Afghanistan.

"Communications" is compiled by editor Rachel Baughn KE4OPD, from news clippings provided by our readers. Thanks to this month's fine reporters: Anonymous, Azizul Alam Al-Almin, Harold Cones, Norman Hill, Jonathan Kammen, Allen Lutins, Sterling Marcher, Ken Reitz, Doug Robertson, Doug Smith, Robert Thomas II, Larry Van Horn, Peter Vieth, Ed Yeary, George Zeller

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STS-114 – NASA's Return to Space

By Larry Van Horn, N5FPW

It has been a little over two years since that dark Saturday in January of 2003, when the Space Shuttle *Columbia* broke up upon reentry over the southern United States. This tragic accident resulted in the loss of the seven STS-107 crew members and the shuttle orbiter they were flying in.

During the intervening period, the National Aeronautics and Space Administration (NASA) has been through an extensive accident investigation, a rigorous internal audit of how the agency does business, and a redesign of some of the key shuttle systems that contributed to the loss of the *Columbia*.

When the crew members of the Space Shuttle *Discovery* lift off late this month from NASA's John F. Kennedy Space Center, Florida, they'll be supported by two years of hard work by tens of thousands of people determined to make the space shuttle safer. NASA has upgraded flight hardware, as well as visual tracking and inspection equipment, to ensure that mission STS-114, the "Return to Flight," is successful.

Results of the Accident Investigation

The *Columbia* accident revealed a major problem with the insulating foam that cov-

ers the rust colored external tank. Investigators found that foam falling off the tank during the launch phase of the STS-107 mission had damaged *Columbia's* left wing, letting superheated gases inside during the reentry phase of the mission. Redesigning the external tank became a top priority in the Agency's "Return to Flight" work. NASA engineers have made dozens of changes to the tank design in the ensuing months since the accident.

Another major safety improvement to the space shuttle fleet is the expanded use of enhanced imaging equipment to record the launch of *Discovery* as it roars into the sky and glides through space.

At Kennedy Space Center, NASA has upgraded the short-, medium-, and long-range tracking camera systems around the Center's launch pads 39A and 39B, along with those lining the nearby Atlantic coastline. The addition of nine more camera sites will provide unprecedented views of *Discovery's* launch, allowing engineers to clearly observe the flight high into the sky.

The shuttle fleet and launch hardware also received new imaging equipment with the installation of a digital external tank camera and new "Canadarm" inspection boom.

Making the most of current consumer photography equipment, the orbiter's external tank camera has been switched from film to a digital model. Located in the rear underbelly of the orbiter, the camera is similar to a standard 35-mm model and snaps a series of photos as the tank separates from the orbiter. With the previous film camera, flight engineers had to wait until the shuttle landed to retrieve

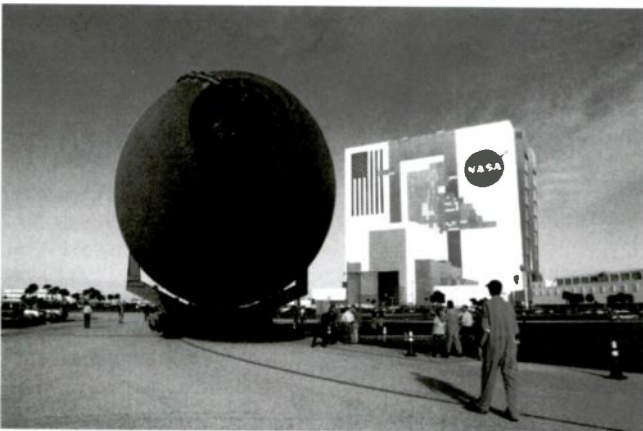
the negatives and develop photos. With the simplicity and increased speed of a digital system, the image files will be easily transmitted back to Earth shortly after a shuttle reaches space.

Once in orbit, the visual inspection of the orbiter will continue with the help of a new piece of robotic technology. During the STS-114 mission, the "Canadarm" located inside *Discovery's* payload bay now includes the Canadian-built Orbiter Boom Sensor System. The boom extension houses a camera and laser-powered measuring device that astronauts will use to scan the orbiter's exterior. The boom attaches to the end of the existing robotic arm and doubles its length to 100 feet long. The extra length will allow the arm to reach around the spacecraft for the best possible views. With the new boom, astronauts will take a good look at features like the orbiter's leading wing edges, which are now closely watched by an advanced monitoring system.

Each shuttle orbiter's leading wing edges are outfitted with 22 temperature sensors to measure how heat is distributed across their spans. Both wings also have 66 accelerometers apiece to detect impacts and gauge their strength and location. The sensors are highly sensitive and take 20,000 readings per second. This new network of sensors running along the wings provides an electronic nervous system that gives engineers a valuable way to monitor their condition.



Through the open doors of the Vehicle Assembly Building can be seen the second redesigned External Tank (ET-121). (NASA Photo)



The newly redesigned external tank slowly moves toward the Vehicle Assembly Building, seen at right. The tank arrived at KSC after a 900-mile sea voyage aboard NASA's specially designed barge, *Pegasus*, from the Michoud Assembly Facility in New Orleans. (NASA Photo)

Inspection of the wings will continue once an orbiter returns to Earth. Technicians will use a proven method called flash thermography to examine the Reinforced Carbon-Carbon panels that make up the wing's leading edges. The technique starts by applying an intensely hot and bright burst of light to the panels. Technicians then survey the panels with a heat-sensitive infrared camera to see if any flaws appear under stress from the extreme heat. Flash thermography will reveal even small imperfections and offer technicians a powerful tool for keeping an orbiter's wings in shipshape condition.

Return to Flight from KSC

Discovery will start its return to space from launch pad 39B at the Kennedy Center sometime during a launch window that runs from May 15 to June 3, 2005. It will carry a crew of seven: Commander Eileen Collins, Pilot James Kelly, and Mission Specialists Charles Camarda, Wendy Lawrence, Soichi Noguchi, Steve Robinson and Andy Thomas.

Discovery's crew will fly to the International Space Station primarily to test and evaluate new procedures for flight safety, shuttle inspections and repair techniques.

Shuttle Launch Operations

Situated on the edge of Florida's east coast, Kennedy Space Center is the only facility in the world that launches the space shuttle.

Kennedy prepares the vehicles for each mission, operates each countdown and manages end-of-mission landing recovery activities. The Center also coordinates all expendable vehicle launches carrying a NASA payload, whether the launches take place at Cape Canaveral Air Force Station in Florida, Vandenberg Air Force Base in California, or elsewhere. Finally, as the last Earthly stop for International Space Station hardware, Kennedy prepares these elements for their missions in space.

In addition to space shuttle processing and launching, Kennedy is also NASA's preferred end-of-mission landing site for the space shuttle orbiter. Part of the Center's Landing Recovery Team – which leads the effort to safeguard the orbiter and aid the crew as they exit the vehicle – is on hand at backup landing sites around the world.

Monitoring the Launch and Landing of STS-114

Old timers will remember that in volume one, number one of *Monitoring Times*, we presented one of the most complete lists of space shuttle frequencies then in the public domain. In subsequent issues of *MT* and our former sister publication *Satellite Times*, we updated that original list first published in 1982.

In keeping with that tradition, we have included in this article a portion of our exhaustive online NASA Frequency List which is available on the *Monitoring Times* website in the MT Reference Library. The NASA Fre-

quency List has extensive information and frequencies on NASA facilities worldwide and much more. You can find that complete list at: <http://www.monitoringtimes.com/nasa.html>.

KSC and Moto

There have been significant changes in the communications systems at KSC and other areas support facilities since the last shuttle launch in January 2003. NASA has now fully installed their new Motorola Smartzone 3600-baud APCO-25 mixed mode trunk system.

This five-site system handles the bulk of the Center's wireless voice communications and supports the Kennedy Space Center Integrated Communications System (KICS).

Here are the particulars of the system you can use to program your digital, trunk capable scanner:

System: Motorola Smartzone ASTRO 3600 baud (APCO 25 Mixed mode)
Motorola System ID: 0a28
Base Frequency: Base Frequency: 406.000 MHz, Spacing: 12.5-kHz; Offset: 380

Site 1: Kennedy Space Center Main

Two simulcast remote locations: 500 foot Weather Tower (remote 1) and Communications Shop Tower (remote 2)
Frequencies (12 channels): 406.2375c 406.375c 406.4375c 406.6375c 406.8375 407.0375 407.2375 407.8375 408.0375 408.4375 408.6375 409.025

Site 2: Northern Kennedy Space Center

Location: Shiloh Tower
Frequencies (3 channels): 406.175 409.425 409.6375

Site 3: Cape Canaveral AFS

Location: Timing Tower
Frequencies (10 channels): 406.5625c 406.9625c 407.7625c 408.1625c 408.5625 408.9625 409.3625 409.7625 410.1625 410.5625

Site 4: Patrick AFB

Location: Microwave Tower
Frequencies (8 channels): 407.9625c 408.3625c 408.7625c 409.1625c 409.5625 409.9625 410.3625 410.7625

Site 5: Malabar Annex

Location: Unidentified Tower
Frequencies (3 channels): 406.3625c 406.7625c 407.1625c

Table One has a list of trunk system talkgroups reported to us by our field reporters. The list is the most comprehensive record of talkgroup identifications yet published. It is accurate as of presstime and we encourage our readers to check our online article mentioned above for any later updates to talkgroups and frequencies monitored by our field team.

At KSC and the Cape there are primary



An overall view of activity in the Shuttle (White) Flight Control Room as flight controllers participate in a long-duration simulation for the STS-114 mission. (NASA Photo)

nets that are directly related to the launch of a space shuttle or expendable rocket. These are hotbeds of radio activity and will aid the radio hobbyist in following the progress of the launch. We have included our latest list of these nets in Table Two.

Of course, there are many more frequencies along the Space Coast that should be monitored during any space launch. We do not have the room here to publish all of them in this article. Again, the best place to get updates and the complete list is on the *MT* website at the URL listed above.

If you are able to make it to the launch of STS-114 and you monitor anything new not on our list, we would like to hear from you. We appreciate any updates you may have and will publish them to the free online article on the website. You can reach us at: larryvanhorn@monitoringtimes.com.

On launch day, when the shuttle's boosters erupt with fiery thrust and shake the Florida sands, that moment will signal the culmination of more than two years of thoughtful planning and hard work. America's flagship spacecraft will once again streak back into space on a mission to the world's most unique research platform, the International Space Station. It's a mission that promises to begin with a safe and exciting reach for the sky and end with an even happier landing.

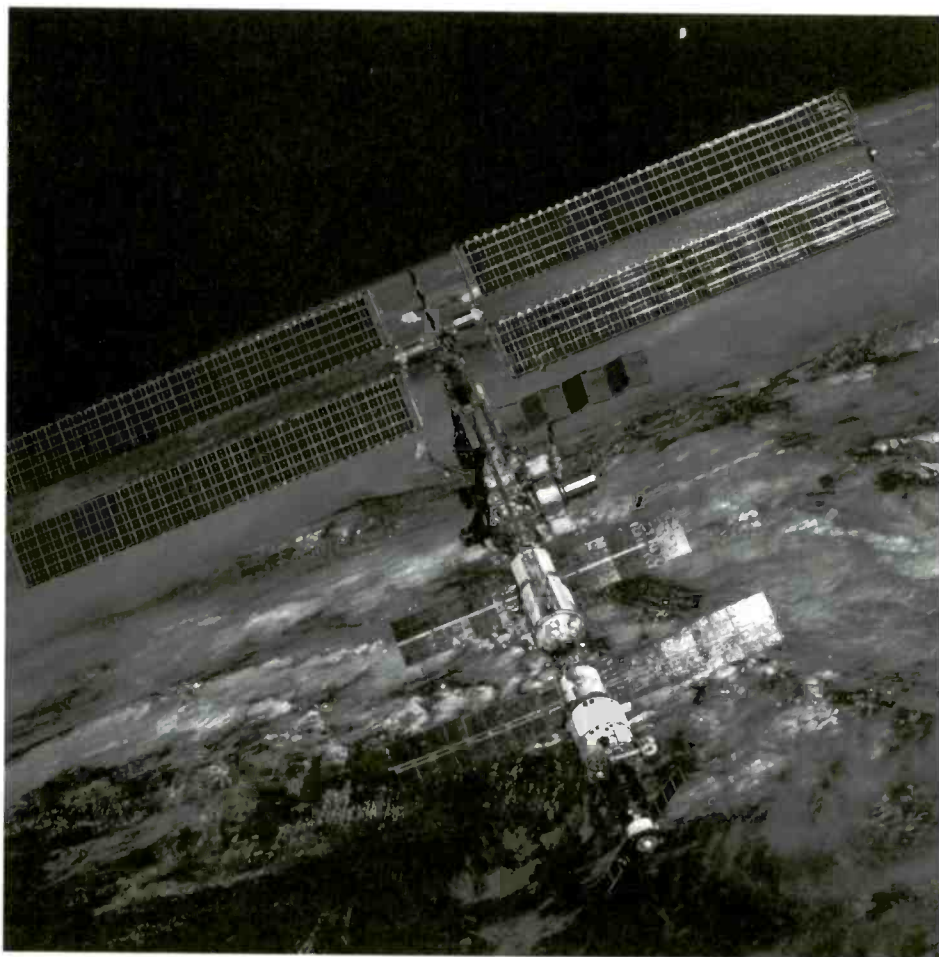
Table One: Kennedy Space Center Trunk System Talkgroups

Legend:

CCAFS... Cape Canaveral Air Force Station
 KSC..... Kennedy Space Center
 PAFB..... Patrick Air Force Base

Talkgroup Usage

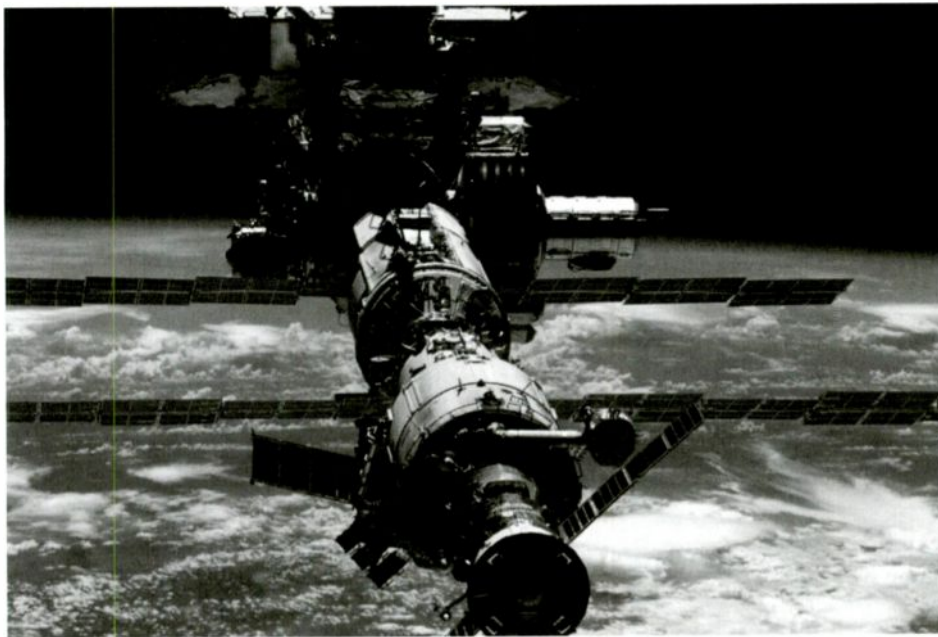
| | |
|-----|---|
| 208 | Merritt Island National Wildlife Refuge: US Fish & Wildlife (Patched/link from 165.450 MHz) |
| 272 | Merritt Island National Wildlife Refuge: US Fish & Wildlife (Patched/link from 165.450 MHz) |
| 336 | KSC Facility Operations Net <Net 107> [ex-170.150 MHz patch] |
| 416 | KSC Facility Operations Net Channel 3 |
| 480 | KSC Unknown usage <Net 207> |



Back dropped by the darkness of space and the blue Earth at its horizon, the International Space Station (ISS) was photographed by one of the astronauts aboard the Discovery after undocking from the station. (NASA Photo)

| | | | | | |
|------|---|------|---|-------|--|
| 496 | KSC/CCAFS Security <Bet 400> | | MHz] | | |
| 544 | KSC "48 to 88" | 2000 | CCAFS Security Police | | |
| 672 | KSC Xray Operations | 2016 | KSC Security Police car-to-car/es- | | |
| 976 | KSC Fire/Rescue Dispatch <Net 116> [ex-173.5625 MHz] | 2064 | cort | | |
| 992 | KSC Unknown user/usage | 2080 | KSC Security Police | | |
| 1136 | KSC Fire TAC 1/Fire Alarm Technicians "Fire Console/Alpha ##" <Net 216> [ex-173.7875 MHz] | 2096 | KSC Security Police supervisors | | |
| 1152 | KSC Fire TAC 2 | 2112 | KSC Security training (tentative) | | |
| 1168 | KSC Fire TAC 3 | 2208 | CCAFS Security TAC 1 (patch from 165.0875 MHz) | | |
| 1200 | KSC Fire Training | 2256 | KSC/Unknown usage "NASA ##" | | |
| 1248 | KSC Emergency Talk Group | 2880 | KSC Xray Operations "Xray Control" | | |
| 1296 | KSC Medical Dispatch "KSC Medical" <Net 117> [ex-173.4375 MHz] | 2896 | KSC Convoy Air-Ground | | |
| 1616 | KSC Launch Pad 39 Safety "Safety Console/Safety ##" <Net 105> [ex-173.6625 MHz, patched to 165.4125 and 173.4625] | 2928 | KSC Convoy Command Net (patch from 407.325 MHz) | | |
| 1648 | KSC Orbiter Processing Facility (OPF) Operations "Bay # Aft/Forward" <Net 110> (patch from 165.4125 MHz) | 2960 | KSC Convoy Purge Net Channel 2 (patch from 408.150 MHz)/Overhead Crane Operations | 14160 | |
| 1680 | KSC Orbiter Processing Facility (OPF) Safety Secondary "Safety Console/OPF Safety ##" <Net 205> (patch from 173.4625 MHz) | 2992 | KSC Convoy Cooling Net (patch from 409.175 MHz) | 14256 | |
| 1760 | CCAFS Safety "Whiskey Control" <Net B> [ex-163.5125 MHz] | 3216 | KSC Convoy backup | 14720 | |
| 1776 | CCAFS Safety "Whiskey Control" <Net B2> | 3216 | KSC Unknown user/usage | 16976 | |
| 1792 | CCAFS Safety/Security Police "LSE" <Net B3> | 4496 | KSC Base Communications [Moved to TG 336] | 17440 | |
| 1936 | KSC Security Police Channel 1 <Net 103> [ex-173.6875 MHz] | 3216 | KSC Unknown user/usage | 17616 | |
| 1952 | CCAFS Security Police Channel 2 <Net Z/Net 203?> [ex-165.0875 MHz] | 3232 | KSC Unknown user/usage | 17632 | |
| | | 3536 | KSC Unknown user/usage | 17952 | |
| | | 3568 | KSC Unknown user/usage | 17968 | |
| | | 5136 | KSC/Unknown usage | 17984 | |
| | | 5392 | CCAFS Environmental Health "EH Base" <Net Y> [ex-164.500] | 18000 | |
| | | 5472 | Unknown user/usage (Patched) | 18016 | |
| | | 5776 | KSC General Maintenance "Gator Base" <Net 201> [ex-171.150] | 18032 | |
| | | 6736 | CCAFS Photo/Timing "Camera Ops/Photo ##" <Net G> [ex-148.485] | 18048 | |
| | | 6800 | KSC Telemetric Net "IPPC ##" <Net 102> (patch from 165.1875 MHz) | 18064 | |
| | | | | 18080 | |
| | | | | 18096 | |

| | | | | | |
|-------|---|--|--|--|--|
| | [ex-TG 2576] | | | | |
| 7056 | KSC Crawler move (KSC-1) | | | | |
| 7072 | KSC Unknown user/usage | | | | |
| 7376 | KSC Electrical troubleshooting | | | | |
| 7696 | KSC Unknown user/usage | | | | |
| 7712 | KSC Unknown user/usage | | | | |
| 7728 | KSC Possible Convoy Operations related | | | | |
| 7744 | KSC Unknown user/usage | | | | |
| 7760 | KSC Unknown user/usage | | | | |
| 7776 | KSC Unknown user/usage | | | | |
| 7792 | KSC Unknown user/usage | | | | |
| 7808 | KSC Unknown user/usage | | | | |
| 8016 | KSC Unknown user/usage | | | | |
| 8048 | KSC Unknown user/usage | | | | |
| 8080 | KSC Unknown user/usage | | | | |
| 8112 | KSC Unknown user/usage | | | | |
| 8336 | KSC Unknown user/usage | | | | |
| 9936 | KSC Public Affairs Officer <Net 108> [ex-163.5375 MHz] | | | | |
| 10576 | KSC Cargo Operations/Payload <Net 500> (patch from 413.250 UHF-5) | | | | |
| 10608 | KSC Cargo Operations <Net 600> (patch from 413.375 UHF-6) | | | | |
| 10640 | KSC Unknown user/usage | | | | |
| 10672 | KSC Unknown user/usage | | | | |
| 10896 | KSC Rail Operations (patch from 413.125 MHz) [ex-TG 656] | | | | |
| 11536 | KSC Shuttle Landing Facility Tower (patch from 165.6125 and 128.550 MHz) | | | | |
| 11600 | KSC Shuttle Landing Facility Landing Systems (MSBLS/Telemetry) <Net 202> (patch from 165.6125, simulcast from 121.750, 128.550 and 284.000 MHz) | | | | |
| 11696 | KSC Unknown user/usage "Elevator Base" | | | | |
| 11712 | KSC Unknown user/usage | | | | |
| 12496 | KSC Launch Support Operations <Net 104> (patch from 162.6125) | | | | |
| 12528 | KSC Unknown user/usage | | | | |
| 12656 | KSC Unknown user/usage | | | | |
| 12816 | KSC Unknown user/usage | | | | |
| 12848 | KSC Unknown user/usage | | | | |
| 12944 | KSC Training Emergency | | | | |
| 13136 | KSC Transportation/Buses "CMT Ops" <Net 206> (patch from 170.175 MHz) [ex-TG 832] | | | | |
| 13392 | KSC Television Operations Secondary | | | | |
| 13776 | KSC Television Operations Primary "KSC TV" <Net 408> [ex-171.2625 MHz] | | | | |
| 14096 | KSC Utility Maintenance Net (Civil Engineers/Utilities/Parking Control) "Bravo Control/Bravo ##" <Net 101> (patch from 171.000 MHz) | | | | |
| 14160 | KSC Unknown user/usage | | | | |
| 14256 | KSC Utility Maintenance Net (Electrical) "Eagle Control/Eagle ##" <Net 301> (patch from 173.6375) | | | | |
| 14720 | KSC Unknown user/usage | | | | |
| 16976 | CCAFS Utilities "Cape Support" <Net C> | | | | |
| 17440 | CCAFS Safety | | | | |
| 17616 | CCAFS Port Control | | | | |
| 17632 | CCAFS Unknown user/usage "test counts" | | | | |
| 17952 | CCAFS Television Operations | | | | |
| 17968 | CCAFS Unknown user/usage | | | | |
| 17984 | CCAFS Unknown user/usage | | | | |
| 18000 | CCAFS Cable Installers | | | | |
| 18016 | CCAFS Unknown user/usage | | | | |
| 18032 | CCAFS Unknown user/usage | | | | |
| 18048 | CCAFS COMSEC <Net I> [ex-148.035] | | | | |
| 18064 | CCAFS Unknown user/usage | | | | |
| 18080 | CCAFS TVOC Net [possible ex-148.035] | | | | |
| 18096 | CCAFS Unknown user/usage | | | | |



The International Space Station (ISS) is viewed from the Space Shuttle Endeavour following the undocking of the two spacecraft over western Kazakhstan. (NASA Photo)

| | | | |
|-------|--|-------|---|
| 18112 | CCAFS Metrics/Optics Net "Metrics ##" | 34256 | PAFB Explosive Ordnance Disposal (EOD) Teams "EOD Control, EOD Base, EOD 1" [ex-163.375] |
| 18144 | CCAFS Launch Control Center (LCC) Timing "LCC/Timing ##" | 34560 | PAFB Unknown user/usage |
| 18192 | CCAFS Weather Net "Weather Base/Weather #" [ex-165.0375] | 34576 | PAFB Civil Engineers Dispatch "CE Control" Channel 1 [ex-171.3875] |
| 18256 | CCAFS Unknown user/usage "PC Base/FS3" | 34592 | PAFB Civil Engineers Electricians Channel 2 |
| 18272 | CCAFS Unknown user/usage "PC Base/PC6/FS3" | 34608 | PAFB Civil Engineers Channel 3 |
| 18608 | CCAFS Unknown user/usage | 34624 | PAFB Civil Engineers Channel 4 |
| 18624 | CCAFS Alarm Net | 34640 | PAFB Civil Engineers Alarm Technicians Channel 5 |
| 18672 | CCAFS Unknown user/usage | 34864 | PAFB Unknown user/usage |
| 19664 | CCAFS Unknown user/usage | 34896 | PAFB Supply/Ground Freight "COSO, Ramp 4" [ex-149.265] |
| 20176 | CCAFS Unknown user/usage "test counts" | 34912 | PAFB Cargo Deployment Function (CDF) |
| 20208 | CCAFS Utilities "Ready Base" [ex-150.250] | 34928 | PAFB Fuels (POL) "Control" [ex-165.1625] |
| 20496 | CCAFS Unknown user/usage "test counts" | 34944 | PAFB Munitions Operations |
| 20512 | CCAFS Unknown user/usage | 35216 | PAFB Unknown user/usage |
| 20528 | CCAFS Unknown user/usage | 35536 | PAFB Unknown user/usage "test counts" (secure communications) |
| 20544 | CCAFS Unknown user/usage (secure communications) | 35552 | PAFB Special Events Net (clear and secure communications) |
| 32336 | PAFB Law Enforcement Dispatch Channel 1 (clear and secure communications) [ex-173.025] | 35568 | PAFB ET Net (Exercise/Training) |
| 32352 | PAFB Law Enforcement TAC 2 (clear and secure communications) | 35856 | PAFB Tower/Ramp Control [ex-173.125] |
| 32368 | PAFB Unknown user/usage | 35984 | PAFB Runway Operations |
| 32384 | PAFB Unknown user/usage | 36496 | PAFB Deployment Control Center (DCC) (clear and secure communications) |
| 32476 | PAFB Civil Engineers "CE##" | | PAFB 920th RQW Maintenance Operations Control (MOC) [ex-149.300] (some secure communications) or the PAFB Mission Operation Support Center (MOSC) |
| 32592 | PAFB Unknown user/usage (secure communications) | 36512 | PAFB Deployment Control Center (DCC) |
| 32656 | PAFB Fire/Rescue/Crash Dispatch Channel 1 "Fire Control" [ex-164.700] | 36544 | PAFB Medical Control Center (MCC) |
| 32672 | PAFB Fire/Rescue/Crash TAC 2 | | PAFB Unknown user/usage |
| 32688 | PAFB Fire/Rescue/Crash TAC 3 | | PAFB Unknown user/usage |
| 32976 | PAFB Base Operations | 36560 | PAFB Command Net "Reef/Shark #/Shark Control" |
| 33296 | PAFB Unknown user/usage | | PAFB Base Transportation "Dispatch/Mobile 1" |
| 33344 | PAFB Unknown user/usage (secure communications) | 36816 | PAFB Unknown user/usage |
| | | 36832 | PAFB Unknown user/usage |
| 33360 | PAFB Unknown user/usage | 37776 | |
| 33936 | PAFB Medical (clear and secure communications) | 38144 | |
| 33952 | PAFB Unknown user/usage "Gator Control" (clear and secure communications) | 38736 | |
| | | 41616 | |
| 33968 | PAFB Medical Control Center (MCC) (clear and secure communications) | 41648 | |

Table Two:

Space Launch Ground Networks

| Shuttle Launch Nets Trunk System Talkgroups and Conventional Frequencies | | |
|--|-----------|---|
| Net | Talkgroup | Usage (Conventional Frequency) |
| 101 | 14096 | Utility Maintenance Net (Civil Engineers/Utilities/Parking Control) (171.000) |
| 102 | 6800 | Telemetric/Measurements/Safety |
| 103 | 1936 | Security (Law Enforcement/Patrol) |
| 104 | 12496 | Launch Support Operations (162.6125) |
| 105 | 1616 | Launch Pad 39 Safety (173.6625) |
| 106 | | Supply (170.400) |
| 107 | 336 | Base Operations |
| 108 | 9936 | Paging/PAO/Hurricane Operations |
| 110 | 1648 | Orbiter Operations (165.4125) |
| 111 | | Administration: Loan Pool (173.5375) |
| 116 | 976 | Fire/Rescue Dispatch |
| 117 | 1296 | Medical Services Net |
| 201 | 5776 | General Maintenance (170.150) |
| 202 | 11600 | Shuttle Landing Facility Landing Systems (MSBLS/Telemetry) (165.6125) |
| 203 | 1952 | Security [Tactical 2] (173.150) |
| 205 | 1680 | Orbiter Processing Facility (OPF) Safety Secondary (173.4625) |
| 206 | 13136 | Transportation (Truck)/Railroad Operations (170.150) |
| 207 | 480 | Unknown user |
| 216 | 1136 | Fire Rescue (Tactical) |
| 301 | 14526 | Utility Maintenance Net (Electrical) (173.6375) |
| 306 | | Marine Operations/Transportation (162.0125) |
| 308 | | Base Voice Paging System (170.350) |
| 400 | 496 | KSC/CCAFS Security |
| 408 | 13776 | Camera Recording Coordination Net |
| 500 | 10576 | Cargo Operations/Payloads (413.250 UHF-5) |
| 600 | 10608 | Cargo Operations Net (413.375 UHF-6) |

| Cape Canaveral/Eastern Test Range Net Trunk System Talkgroups and Conventional Frequencies | | |
|--|-----------|--|
| Net | Talkgroup | Usage/Frequency |
| Net 1 | | Canaveral Port Control 2716.0 kHz (USB) |
| Net 6 | | Cape Radio 5211.0 kHz (USB) |
| Net 7 | | Cape radio 5246.0 kHz (USB) |
| Net 8 | | Cape Radio 3041.0 kHz (USB) |
| Net B | 1760 | Safety |
| Net B2 | 1776 | Safety |
| Net B3 | 1792 | Safety/Security |
| Net C | 16976 | Utilities |
| Net D | | CCAFS Security |
| Net G | | Photo/Timing |
| Net H | | Flight Caution Area (FCA) Net (163.5875) |
| Net I | 18048 | Communications Security (COMSEC) |
| Net Y | 5392 | Environmental Health |
| Net Z | 1952 | Security |

Every Island Tells a Story

By Ken Reitz KS4ZR

When most of us see the word *island* we think of the palm tree studded jewels of the Caribbean Sea: the jade green waters rushing up to the sugar white beaches which seem to go on forever. But islands come in an amazing variety. In fact, the planet is peppered with islands ranging from the naked, rocky ramparts of the North Atlantic to the trembling tips of volcanoes in the South Pacific.

Each island has a history, a story of trade and conflict, as stepping stones on the paths of discovery across the vast oceans. Often they are tagged with exotic names reflecting their colonial heritage, such as Curacao (Portuguese), Pantelleria (Italian), and Ile Europa (a French island thousands of miles away from Europe). Sometimes they retain their original names from seemingly mystic dialects unpronounceable to English speakers.

The Radio Link

It was the invention of radio which abruptly drew these remote archipelagoes into the world fold. With the advent of shortwave broadcasting, news of the world could be heard instantaneously around the world in dozens of languages. Then the ingenuity of amateur radio operators turned radio communications into a two-way event, allowing tens of thousands into the homes of those tiny island nations.

In some cases – the West African island of Sao Tome, for example – the two communications services are combined. The Voice of America has a transmitter site on Sao Tome which downlinks programming via satellite and broadcasts to Africa from there. One of the engineers on Sao Tome is a ham who is active on the ham bands as S9SS.

Another example is Diego Garcia, an island in the Chagos Archipelago in the heart of the Indian Ocean, thousands of miles from any land mass in any direction and home to a number of military bases. One very active ham on Diego Garcia is VQ9LA, who is heard on nearly every mode and band.

Other islands have become wildlife refuges after hundreds of years of human occupation. One example is Isla de Aves (Bird Island), a tiny island in the Caribbean. Another is Socorro Island off Mexico's Pacific coast. These islands have been returned to their natural state and are

accessible only under naval escort from their respective countries.

Islands On The Air

As you might have imagined, there is an organization devoted to keeping track of the various islands of the world for amateur radio purposes. Their task is to assign a number to each and to promote amateur radio activity on them. Part of the Radio Society of Great Britain (RSGB), Islands On The Air (known by its acronym IOTA), publishes a directory of the program and issues the rules and regulations for all amateur activities on the world's islands. Details can be found at their web site: <http://www.rsgbiota.org>. Here you'll also find details on the nearly innumerable awards offered in the IOTA program.

The IOTA program was created in 1964 by Britain's leading shortwave listener Geoff Watts and it was made part of the RSGB in 1985. Today, shortwave listeners are still encouraged to tune into DXpeditions and to send their reception reports for colorful QSL cards. Tuning in the hams from these islands and receiving their QSL cards turns a daydream into a lesson in geography and world history. Here is a sample of a few of the popular Islands On The Air.

Antigua

This is the quintessential image of a Caribbean island. Antigua was home to a large indigenous population when Columbus landed here in 1493. Unimpressed by the great explorer, these people fiercely resisted Spanish attempts to conquer them. They fought hard against colonial rule for nearly 150 years and were eventually overcome by the British. Antigua once more became an independent state in 1981. Antigua is IOTA NA-100.



Antarctica

Not only a continent unto itself, Antarctica is home to countless islands and the ubiquitous penguin. The rim of Antarctica is partitioned into bases for all participating countries and their scientific expeditions. Many of the scientists are also hams who sometimes take time off from their research to work the rest of the world. The 20, 15 and 10 meter bands are the most popular for these operators, but propagation to the bottom of the planet is not often favorable. This particular QSL is from Galindez Island (IOTA AN-006) and the operator Paul (home call UX2HO) is from the Ukraine.



Aves Island

(Isla de Aves or Bird Island)

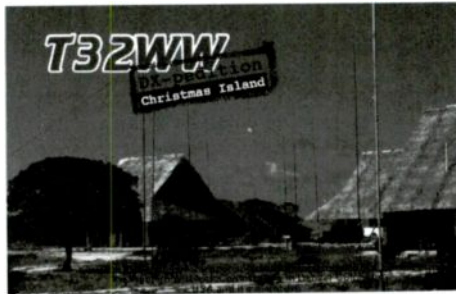
This tiny island in the Caribbean is claimed by Venezuela and has been a wildlife refuge since 1972. It is now inhabited by turtles, migratory birds and a scientific station. The island is so small there's no room for anything else. Since 1956 the Radio Club Venezolano has organized 12 expeditions to Aves, some timed to celebrate anniversaries of the RCV. The YV0D call sign was given to commemorate the 70th anniversary of RCV. The intended two-week DXpedition was cut to a mere 57 hours by one of many hurricanes ravaging the Caribbean in 2004. Since access to



the island is done only with a Venezuelan naval escort, the hams had to leave the island. They were very active while there, making 18,449 total contacts. Some also worked the naval transport on the way to Aves under the call sign YV5AJ/MM. Aves Island is IOTA NA-020.

Christmas Island/ Kiribati

Kiribati is a group of three islands (West, Central and East Kiribati) in Micronesia and is found near the crossroads of two completely imaginary boundaries: the equator and the international date line. Kiribati presents several DX entity opportunities: West Kiribati (T30), Central Kiribati (T31) and East Kiribati (T32) IOTA OC-024 which is also known as Christmas Island. World War II activity here included the battle of Tarawa in which 5,000 U.S. Marines landed to take a heavily fortified Japanese installation. After just three days six thousand combatants from both sides were dead. Australia lays claim to a Christmas Island with the VK9X (IOTA OC 002) prefix, which is just south of Indonesia and thousands of miles away from Kiribati. It's easy to get them confused.



Cyprus

Turkey and Greece have both claimed this island and the physical partition is an unfriendly one, complete with a barbed-wire-strewn no-man's-land and regular international incidents. The division is primarily due to religious differences between Greek Orthodox Cypriots and Turkish Cypriots who are Muslims. Since there's no end in sight to this predicament, the International Telecommunications Union (ITU) allows two call sign prefixes: ZC and 5B. Cyprus is IOTA AS-004.

French Polynesia

Tiny dots of land from a series of archipelagos include Tahiti (FO), the main island, and five groups of islands including Duke of Gloucester Islands (FO), Marquesas Islands (FO0), the Austrel Islands and more. Clipperton Island (also FO0), an uninhabited atoll actually off the southwest coast of Mexico is also



considered part of French Polynesia. Keeping track of the call signs from every little atoll in French Polynesia is a nightmare of bookkeeping for active DX chasers. This QSL card was from the Hereheretue Atoll (IOTA OC-052), part of the Duke of Gloucester Islands.

Ile Europa

Located in the Mozambique channel, Ile Europa lies between the east coast of Africa and the west coast of Madagascar. Long a refuge for pirates plying their trade off the coast of Africa, Ile Europa is now the site of a meteorological station which is staffed by members of the French navy. Plagued year 'round by mosquitoes, the island is the natural habitat for turtles and migratory birds. Occasionally, DXpeditions are allowed on the island, which always generates intense activity despite the fact that the call sign prefix TO qualifies only as a French call sign and not a separate DXCC entity. Ile Europa is IOTA AF-009.



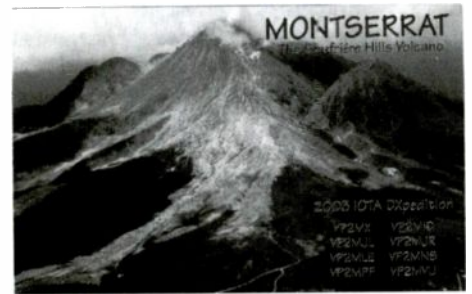
Isle of Man

Carrying the British call sign prefix of GT, the Isle of Man (IOTA EU116) is a singular rock formation right in the middle of the Irish Sea with Scotland due north, Ireland due west, England due east and Wales just to the southwest. It claims a 10,000 year history of habitation with its own currency, stamps and capital. With easy access by sea from all directions, it's easy to imagine the intrigue of thousands of years of boats sailing a criss-cross pattern from England to Ireland, Scotland to Wales back and forth. It's IOTA EU-116

Martinique

Caught in a tug-of-war between France and Great Britain during the 1800s, this beautiful island is decidedly French. Martinique was

the birthplace of Napoleon's Josephine and, like many Caribbean islands, has been the site of some volcanic activity. Mt. Pelee erupted in 1902 and destroyed the island's biggest city. The island sports the FM call sign prefix and is IOTA NA-107.



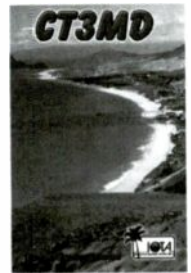
Montserrat

This beautiful island was known as "The Emerald of the Caribbean" until July 2003 when the Soufriere Hills volcano erupted. The DXpedition to Montserrat, which had been scheduled months in advance, went ahead anyway. From the VP2MVU QSL card: "The villa we operated from was only 3 miles from the volcano and was covered with about 2 inches of gray ash... This made for an interesting time setting up antennas and radios..." Montserrat is also often devastated by hurricanes and is IOTA NA-103.



Pantelleria Island

Calling itself "African Italy" Pantelleria is an Italian island so close to Africa that on a clear day the coast of Tunisia can easily be seen. Occupied through the ages by Phoenicians, Greeks and



DX Windows

These frequencies are known as "DX Windows" and should be reserved for DX (foreign to U.S.) stations. Even though the frequency may appear to be unoccupied at your location, there may be a DX station operating which you can't hear. So, to be on the safe side, stay off the DX frequencies unless you're actually working a DX station on it. There are also unofficial, but still honored, IOTA frequencies on some bands. Look for IOTA stations and DXpeditions here as well.

| Band | Frequency | Notes |
|------------|--|---|
| 160 meters | 1830-1850 | CW and SSB DX window. |
| 80 meters | 3790-3800 | SSB only. IOTA SSB: 3755 CW: 3530. |
| 40 meters | 7000-7035 | CW. No SSB DX window but DX is often found split. |
| 30 meters | Limited to non-phone modes only. | No DX specific window. IOTA: 10.115 |
| 20 meters | 14.195 | SSB DX window. Main IOTA SSB frequency is 14.260. CW: 14.040. |
| 17 meters | No specific DX window. | IOTA SSB: 18.128, CW: 18.098. |
| 15 meters | 21.295 | SSB DX window. IOTA SSB: 21.260, CW: 21.040. |
| 12 meters | No specific DX window. | IOTA SSB: 24.950, CW: 24.920 |
| 10 meters | No specific DX window but SSB DX often between 28.400-500. | FM simplex calling frequency is 26.600. IOTA CW: 28.040 |

Romans (among others), this island of volcanic origin saw its peak in population in 1950 at just over 10,000. There are now around 7,000 inhabitants. Pantelleria Island is IOTA AF-018.

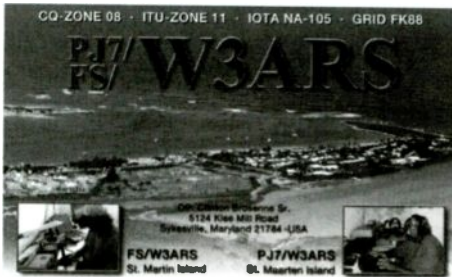
Porto Santo Island

One of the islands in the Madeira Archipelago, Porto Santo is credited as being the first stepping stone on the route of the great period of discovery. It is said that Porto Santo was discovered by Portuguese sailors in 1418 when their ship was blown there by a fierce storm. About 5,000 people live on this rocky island, now an extinct volcano with very little vegetation. Porto Santo is IOTA AF-014



Rotuma

The Rotuma Island group consists of one large volcanic island surrounded by eight smaller islands. Though occupied for hundreds, if not thousands of years by natives of the South Pacific, it was "discovered" by a British naval party in 1791 who were attempting to find the mutineers from *HMS Bounty*. Of course, they didn't find them on Rotuma, but the island soon became a popular haven for sailors on the run and escapees from Australia's penal colonies. Rotuma is IOTA OC-060.



St. Martin/St. Maarten Island

It's easy to get confused about this island. It carries two amateur radio prefixes: FS and PJ. If you are familiar with call sign prefixes, you know that an "F" indicates French assignment and "P" indicates Dutch assignment. That's the story of this island. Said to be the smallest island ever to be divided by two countries, it's been shared peacefully by the French and Dutch for 350 years. The highest point on the island is Pic Paradis at 1,400 feet above sea level. St. Martin/Maarten is IOTA NA-105.



Socorro Island

Socorro is one of four volcanic islands in the Revillagigedo archipelago. In 1994 it was declared a "biosphere reserve" for scientists who study the habitat of the Socorro parakeet and dove, among other birds native to the archipelago. It also hosts a small Mexican naval base which was established in 1954. Since its discovery in 1533 it had been inhabited by an assortment of people ranging from sheep farmers to pirates. It has an active volcano which last saw action in 1848. Socorro Island is IOTA NA-030.

QSLing the Islands

Most DXpeditions to the islands are happy to verify reception reports from shortwave listeners, but you'll have to observe the same rules which apply to hams trying to verify a two-way contact. These rules are normally posted on the DXpedition's web site or a designated verification call sign announced on frequency and found on <http://www.qrz.com>.

Some will QSL only via the route specified on-air. Others will QSL "via the bureau" which means that you may send your report through your outgoing QSL bureau (see <http://www.arri>

[org/qslbureau](http://www.qslbureau)). Here you'll also find specific rules for the size of your reception report so pay attention to that as well. It's very useful to mention the radio you were using and antenna along with your name and location. If you are sending your verification direct (not through the bureau) you must include a self-addressed envelope (SAE) and \$2 (U.S.) in order to receive your QSL card through the mail. If you don't do these two things your card will be sent via the bureau which could take one to two years to receive.

Some DXpeditions are annual affairs but others are rare. Some are mounted by active DX clubs such as Northern California DX Foundation which raises money to launch DXpeditions to different parts of the world each year. Some DXpeditions are privately funded. They are often just a couple of friends who are all hams and want to travel. But, doing this takes a lot more effort than just remembering to pack your radio gear as you get on the plane. Most countries require application for a local amateur call long in advance of your arrival. There is usually a fee involved and you have to observe your host countries' amateur radio rules and regulations. There may be restrictions on operating (frequencies, radios, antennas etc.) and you'll have to be familiar with all relevant rules.

IOTA/DX On-line Sources:

Current information on DXpeditions to islands is critical. It's necessary to scan the various web sites regularly for literally up-to-the minute news of where operations are taking place. Here are three vital web site where you can find this information:

<http://www.rsgbiota.org/index>

IOTA main web site. Everything you need to know about IOTA is here, including which islands are currently active or will be in the near future.

<http://www.425dxn.org/>

Has a weekly newsletter which covers all current DXpeditions, where they're located, where to send QSLs and other pertinent information.

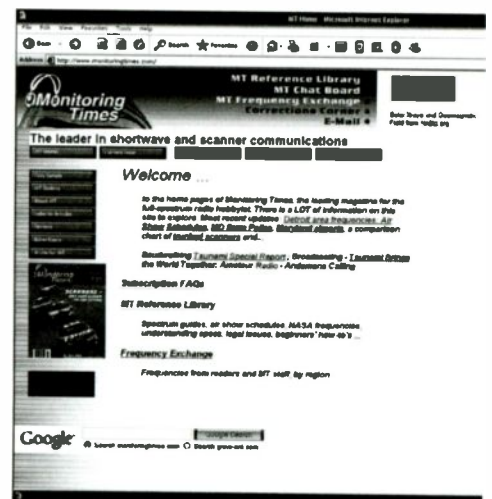
<http://oh2aq.kolumbus.com/dxs>

DX spotter's page. Lists DX stations, their frequencies and bands currently on-air. Page updates every three minutes.

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The Digital Ham Revolution

By Larry Van Horn, N5FPW

Who would have thought, when amateur radio operators first introduced the personal computer into their shacks several years ago, that computers would help create a revolution in ham radio? Back in the early days of computers, we used the PC to do code practice, perform electronic formula computations, and execute some basic amateur radio record-keeping functions. But, just as the PC evolved, so has our capability in the ham shack.

Most amateur radio operators are familiar with the voice modes (AM, FM, SSB) and the text or digital modes of CW (Morse code) and radio teletype (RTTY). For years these were the main modes we used in both the HF and VHF/UHF spectrums. However, thanks to increased computer power and capability, the PC equipped ham today has a whole host of modes to operate on. We can now use the computer for signal processing and its onboard sound card to decode 20 distinctly different modes of communications. And we have nearly 100 different sound card programs with which to work these various modes.

Digital Modes in Radio's Basement

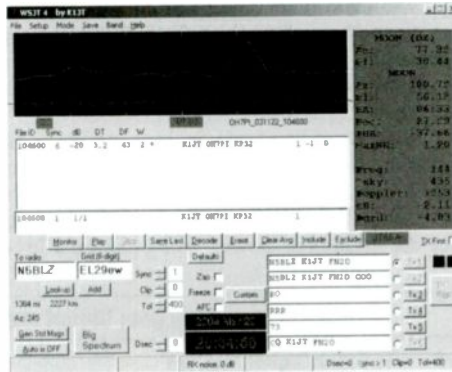
No matter in what part of the radio spectrum you hang out, we have a digital mode for you. First let's look down low in radio's basement – LF bands. U.S. hams currently do not have an amateur radio allocation below the broadcast bands, but other countries are now allowing hams in the 160-190 kHz range.

For the last few years, experimenters in the 1750 meter band have used a slow speed

Morse code mode known as QRSS to decode experimental beacons and two-way communications. While useful on extremely weak and low powered signals in the LF bands, it is very inefficient for two way contacts.

WOLF is the newest weak signal mode in the LF band and shows great promise. It may very well replace QRSS as the predominant mode in the 1750 meter band. The WOLF signal is very similar to BPSK. In fact, it is BPSK at MS100, but with a specially constructed bitstream. A fier each "data" bit, a "reference" bit is transmitted. You can think of the signal as having a data channel and a reference channel. You can find out more about WOLF at <http://www.highnoonfilm.com/xmgr/updates/wolf.htm>.

To learn more about QRSS and WOLF and communications in radio's basement, check out the website of the Longwave Club of America at <http://www.lwca.org/>



WSJT JT65 mode screen capture

HF Digital Modes

Of course, most hams are familiar with Morse code, radio teletype, and Slow Scan TV. These digital modes have been around for quite some time in the HF spectrum.

In 1983, AMTOR (an FSK mode) made its amateur radio debut, which coincided with the rising popularity of PCs. AMTOR was the first amateur digital communications mode to offer error free text transmission. Since its introduction it has been gradually fading into history, being replaced by more efficient and productive modes.

Although packet technology has been in

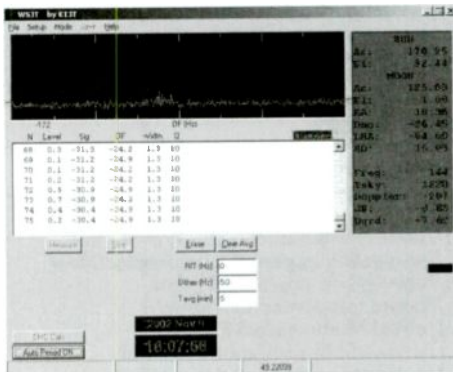


SkySweeper PSK mode screen capture

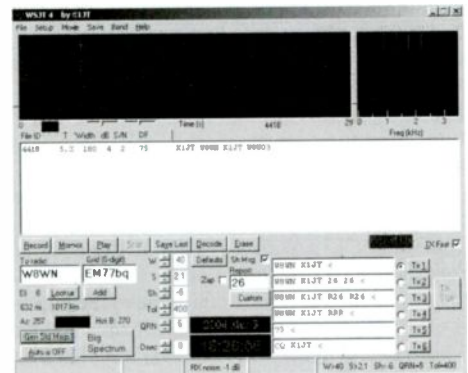
existence since the early '70s, hams embraced it with gusto in the middle '80s. Personal computers, again, were the driving force. Packet is an error-correcting mode, which means that it is capable of communicating error-free information, including binary data (for images, software applications, etc). Packet works quite well in the VHF/UHF spectrum, but encounters problems in HF as it requires strong, "quiet" signals at both ends of the path to function efficiently.

Another FSK mode, PACTOR, burst on the ham digital scene in 1991. It combined the best aspects of packet and the robust, error-free nature of AMTOR. Hams and manufacturers embraced the new mode and it quickly became the number one digital mode in short order. In the middle '90s PACTOR-II burst on the scene as a rival to the Clover mode (see below). These two modes have been the two dominant communications modes; both use DSP technology and complex data coding to achieve remarkable communication results in the HF spectrum.

PACTOR-III is a proprietary mode used for message and traffic handling over an HF



WSJT EME Echo mode screen capture



WSJT FSK441 mode screen capture



AOR ARD9800 Digital Voice/Image Modem radio circuit. Use of PACTOR-III protocol is limited for U.S. hams and some other countries, due to the very wide bandwidth of the transmit signal. Presently, digital signals that occupy the bandwidth of PACTOR-III are restricted to a few ham subbands. Only the embedded hardware (modem) from the German company that owns the rights to this mode is capable of operating Pactor-III.

Clover, introduced by the HAL Communications Corporation in 1993, was one of the first HF digital modes to use sophisticated data coding, coupled with a complex modulation scheme and DSP technology. The promise of Clover was great performance, but that came at a stiff price that few could afford. Because of this, hams have not embraced this mode as quickly as some others and it sees little use in the ham bands today.

G-TOR or Golay-TOR is an FSK mode that offers a fast transfer rate compared to PACTOR. It incorporates a data inter-leaving system that assists in minimizing the effects of atmospheric noise and has the ability to fix garbled data. G-TOR tries to perform all transmissions at 300 baud, but it drops to 200 baud if difficulties are encountered. If conditions are especially poor, the speed can drop to a low 100 baud. This protocol was devised by M. Golay. G-TOR is found in only one manufacturer's terminal node controller (TNC) and is rarely used today in the ham bands.

PSK31 Changes Everything

In 1999, this mode burst on the ham radio scene thanks to Peter Martinez, G3PLX, who invented it. (He is also responsible for AMTOR.) PSK31 is the high-octane cousin of radio teletype. Getting on the air using the PSK31 mode is pure simplicity. It uses the computer sound card as an interface to the transceiver. There is also an easily constructed interface used to key the transmit function. If your skills with the soldering iron are a bit rusty, there are several companies who offer inexpensive transceiver interfaces.

PSK31 combines the advantages of a simple variable length text code with a narrow bandwidth phase-shift keying (PSK) signal using DSP techniques. This mode is designed for "real time" keyboard operation, and the 31 baud rate is fast enough to keep up with the typical amateur typist. Most ASCII characters are supported.

A second version with four (quad) phase shifts (QPSK) is available that provides Forward Error Correction (FEC) at the cost of reduced Signal to Noise ratio.

What helped this mode achieve the popularity it enjoys on today's ham bands is that Martinez made the software available for free over the internet – equivalent to throwing a match on gasoline. Within a few short months

following articles in *QST* and other ham magazines, PSK31 became the number one HF digital mode for casual conversation, contesting, and DXing in the HF spectrum.

It has also led to other more significant advances in sound card software and new digital modes.

The Hell Modes

Hellschreiber is not a new mode (having been pioneered in the 1920s and '30s by Robert Hell). But now that we have DSP technology via computer sound cards, hams have been discovering this old mode all over again.

Unlike most of the other modes we have discussed in this article, Hellschreiber is a visual mode that paints text on your screen like television or facsimile, as opposed to being decoded and printed. It is also known by hams as the "fuzzy" mode.

The single-tone version (Feld-Hell) is the most popular Hell mode, and it is a favorite with low power (QRP) amateur operators. Feld-Hell is an on/off keyed system with 122.5 dots/second, or about a 35 wpm text rate, with a narrow bandwidth (about 75 Hz).

In addition to the Feld-Hell mode, there are two other "fuzzy" modes hams have found to be useful and are currently using. PSK Hell and FM Hell modes both come in a 105 baud and 245 baud rate. With these modes, the on/off keying needed to paint the Hell characters across the marquee are sent by shifting the phase of two tones (PSK Hell) or by shifting the frequency of one tone (FM Hell).

The faster baud rate for both modes does not increase text speed, but it does increase resolution, producing a sharper font. Both modes have a 100% duty cycle during transmit, but the additional power will produce a less



AOR USA donated two ARD9800 digital modem units to Maxim Memorial Station WIAW. AOR USA Executive Vice President Taka Nakayama, KW6I, visited WIAW and ARRL Headquarters to present the ARD9800 units. Accepting on behalf of ARRL was WIAW Station Manager Joe Carcia, NJ1Q. (Photo courtesy of AORUSA)

noisy background, making the text easier to read.

MT63

MT63 is a new DSP based mode for sending keyboard text over paths that experience fading and interference from other signals. It is accomplished by a complex scheme to encode text in a matrix of 64 tones over time and frequency. This overkill method provides a "cushion" of error correction at the receiving end while still providing a 100 wpm rate. The wide bandwidth (1 kHz for the standard method) makes this mode less desirable on crowded ham bands such as 20 meters. A fast PC (166 MHz or faster) is needed to use all functions of this mode.

THROB

Yet another new DSP sound card mode called THROB attempts to use Fast Fourier

Table One: Digital and Digital Voice Interfaces

| | |
|--|---|
| AOR ARD9800 Digital Modem | http://www.aorusa.com/main.html |
| Ham Radio Solution (Interfaces) | http://www.hamradiosolutions.com/site/ |
| MFJ Enterprises (Interfaces) | http://mfjenterprises.com |
| Saratoga Amateur Radio Products (Interfaces) | http://www.saratogaham.com/ |
| TigerTronics (Interfaces) | http://www.tigertronics.com |
| Timewave Technologies (Interfaces) | http://www.timewave.com |
| West Mountain Radio (Interfaces) | http://www.westmountainradio.com/ |

Table Two: Digital Modes Websites

| | |
|--|---|
| ARRL Digital Voice Webpage | http://www.arrl.org/tis/info/digivoice.html |
| Digital Modes Online Sounds | http://rover.wiesbaden.netsurf.de/~signals/DIG_intro.htm |
| Digital Voice on HF (Charles Brain, G4GUO) | http://www.chbrain.dircon.co.uk/dvhf.html |
| DRM and Ham Radio | http://www.owdjim.gen.nz/chris/radio/DRM/ |
| G3VFP Software and digital interfaces | http://www.g3vfp.org/index1.html |
| NB6Z Digital mode website | http://home.teleport.com/~nb6z/ |
| PSK31 Official Homepage | http://aintel.bi.ehu.es/psk31.html |
| Sound Card Interfacing by W5BBR | http://www.w5bbr.com/soundbd.html |
| WSJT Homepage | http://pulsar.princeton.edu/~joe/K1JT/ |
| WUN Club Digital Sounds Online | http://www.wunclub.com/sounds/ |

Transform technology (as used by waterfall displays) to decode a five tone signal. The THROB program is an attempt to push DSP into the area where other methods fail (because of sensitivity or propagation difficulties) and at the same time work at a reasonable speed. The text speed is slower than other modes, but the author, L.G. Sear, G3PPT, has been improving his MFSK (Multiple Frequency Shift Keying) program.

MFSK16 Appears in 1999

Another sound-card-related program, known as Stream, appeared on the heels of PSK31 in 1999 and was used to decode still another new ham digital mode – MFSK16. This mode is an advancement to the THROB mode (above) and encodes 16 tones. The software was developed by Nino Porcino, IZ8BLY, and uses its 16 multiple tones to overcome the many problems of HF propagation, such as fading. These signals are easily recognizable by their musical sounds. Utility digital enthusiasts will recognize MFSK16, as it was derived from the musical Piccolo mode.

VHF/UHF Digital Modes

The VHF/UHF crowd has not been sitting idly by watching the HF community have all the digital fun. One acronym that is very familiar to that community is WSJT – the name of a computer program which stands for Weak Signal communication, by K1JT.

The program currently supports four principal modes:

- **FSK441**, designed to support communication using very brief “pings” from meteor trails in the ionosphere.
- **JT6M**, also for meteor scatter, but especially optimized for the 6-meter band.
- **JT65**, ideal for extremely weak, but slowly varying signals such as those found on troposcatter and Earth-Moon-Earth (EME) paths.
- **EME Echo** mode is used for detecting and measuring your own echoes from the moon.

The WSJT uses state of the art digital techniques and the computer sound card for decoding and DSP functions. It can decode fraction-of-a-second signals reflected from meteor trails, as well as steady signals more than 10 dB weaker than those required for conventional CW.

Modems are the Key

In order to demodulate the incoming digital signals received by your transceiver, you will need a modem to decode the digital

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MFJ-1275 Soundcard Interface

stream into intelligence. You can do RTTY on the cheap with a handful of parts if you want to roll your own. Manufacturers have also jumped on the bandwagon for the construction-challenged. MFJ Enterprises in Starkville, Mississippi, makes several inexpensive RTTY modems.

If you want to run more than just RTTY and want to jump on the computer sound card bandwagon, companies such as MFJ, West Mountain Radio, TigerTronics and Saratoga Amateur Radio products have commercial computer-to-transceiver interfaces to help get you started. All you will need then is to select your software and you are ready to get on the air.



Saratoga EZPSKUSB

Table One of this article lists the contact information for the most popular computer-transceiver interface manufacturers and Table Two is a list of reference websites worth visiting to learn more about the digital modes of amateur radio.



Tigertronics Singalink sl1

I would also suggest you get a copy of an article written by Del Schier, K1UHF, published in the October 2003 issue of *QST* magazine, called *The Ins and Outs of a Sound Card*. Del's article will help start you on the road to using the computer sound card and the new host of digital sound card modes being used in amateur radio.

When it comes to researching software options for the sound card, there is one website that stands head and shoulders above the rest. Dr. Oliver Welp, DL9QJ, has a website with links to all the major amateur radio sound blaster software packages available for download on the internet. You can view this valuable reference site at <http://www.muenster.de/~welp/sb.htm>

The Future

One new area that is being extensively explored in the digital HF world of ham radio is digital voice communications. In fact, a major manufacturer, AOR, recently introduced the first digital voice/image modem for ham rigs. The ARD-9800 lets the ham send and decode digital voice signals and images in the HF ham bands. It uses a protocol developed by Charles Brain, G4GUO.

There is also experimentation being conducted on ham digital voice communications using the DRM protocol that is used by International Shortwave Broadcasters.

So, when we look back at what has happened over the last seven years in the ham bands, and then look ahead at further advancements in computer and DSP technology, the future of digital ham radio is a bright one. While analog communications will continue to reign supreme for some time to come, there is a quiet revolution taking place in the ham bands. Just like the move from AM to FM and Single Side Band, communications and ham radio are gradually shifting toward their future environment – the world of digital communications.

So are you ready to join the revolution, the digital ham revolution? It's never been easier to jump on the digital bandwagon and get in on some of the fun.

News from Winterfest

Kulpville, PA, March 10-11, 2005. approximately 200 of the faithful gathered from near and far to celebrate the 18th edition of the of Winter SWL Festival. Forums and displays cover the gamut from longwave to satellite. One afternoon session joined Bob Zanotti (formerly of Radio Switzerland International) and Ian McFarland (retired from Radio Canada International) in a look back and a look forward. Bob's new pages, "Switzerland in Sound" (<http://www.switzerlandinsound.com>), has almost become the defacto English-language site of the country.

Plan ahead now! The 19th 'fest is scheduled for March 3 and 4, 2006. And the big number 20 – two decades – will be on March 9 and 20, 2007! As always, the Web site <http://swlfest.com/> tells all.

- Tom Sundstrom W2XQ, Baudwalking



Ham Antennas for Small Budgets and Space

Here's nothing like leafing through the pages of amateur radio catalogs to dampen the enthusiasm beginning hams have for the hobby. Sure, who wouldn't like to have an 80 foot tower and a couple of stacked Log Periodic antennas? But, who can afford even the cable for such an enterprise, let alone the massive rotator, installation costs, etc.?

Most of the several hundred thousand hams in this country live on small suburban lots, in townhouse style apartments or other places with antenna restrictions. And most find the radio hobby way down the line in budget priorities. So, what are the options for the majority of us wanting to get the most out of our limited space and money?

❖ Use What You've Got

Most of us started our ham interests from years of shortwave listening (SWL). So, maybe you have a long wire antenna already in place which you used to tune in the HF bands. It might actually work as an all-band ham antenna with the aid of an antenna tuner. Most new transceivers have built-in tuners which can make virtually anything work as an antenna. True, it may not be the most efficient antenna and the auto-tuners usually drop the power down as the Standing Wave Ratio (SWR) goes up, but it might work and not cost an extra dime!

If you've just purchased an older rig without the built-in tuner, you'll need to buy a tuner. That's not a bad investment to start out in the hobby, because most tuners serve multiple duty as a dummy load, SWR/power meter and multi-antenna switch, allowing connections to two coax-fed antennas, a balanced line (ladder line feed) or long wire. A good example is the MFJ-949E (see photo) which, at \$149.95, is one of the best buys in ham radio gear.

Start out with very low power (1 to 5 watts) in a part of a band for which you're licensed, and make some on-air test transmissions (don't forget to ID). Now, tune to a place on the band where someone is calling CQ. Answer and see what happens. The signal report in reply will tell you all you need to know. If no one ever responds, you'll have to consider other options.

If you don't have HF privileges and want to get more boost from your handi-talkie (HT) on the local 2 meter repeater, consider using your scanner antenna for 2 meters. Most ground plane antennas used for scanners will work on



One stop rig helper: The MFJ-949E is an SWR/Power meter, dummy load, and antenna selector in one. Lets you choose from up to two coax feeds, a random wire or balanced line fed antenna for \$149.95. (Courtesy MFJ Enterprises)

2 meters. Don't forget to disconnect any other radios which might be attached to the antenna before you key up!

A small ground plane scanner antenna such as the Radio Shack model #20-176 can handle the output of an HT (usually .5 to 5 watts). And, using such an antenna may also make a big difference in trying to hit more distant repeaters or if you're in an area where the local repeater is hard to hit. This type of antenna is easily mounted in the attic if antenna restrictions are a problem where you live.

❖ The Multi-band Vertical

It's tough to put up a big wire antenna with limited room, so compromises have to be made. Why not put up a vertical antenna? New vertical antenna designs make it possible to have a decent antenna without an extensive radial wire counterpoise. That's a big plus for those of us with townhouse style living quarters. The Hy-gain HF vertical antenna model #DX-88 is an example of this popular design.

This Hy-Gain multi-band vertical takes up very little space and gives excellent performance on a variety of bands. At 25-ft tall it gives you 80 through 10 meters and can take up to 1,500 watts. (Courtesy Hy-Gain)

Covering 80 through 10 meters, the all-band vertical is a compromise and you shouldn't expect to compare its abilities with those of a Yagi beam antenna. But, there are some advantages for tight spaces: Self-supporting (no guy wires), able to handle high power (in excess of 1 kW) and installation is quick and uses only a few hand tools. The prices are fairly high for verticals (the DX-88 is \$370), but the performance is good, it takes up very little space and may be

the only antenna you'll ever need.

Too expensive for you? Why not roll your own vertical using wire construction? Many hams have made a mono-band (wire cut to the center frequency of a particular band) quarter wave vertical out of regular antenna wire. The antenna books have the specifics, but the basics are these: The length (l) is equal to 234 divided by the frequency in MHz. Using this formula, make the radiator (the vertical element that actually radiates the signal) the proper length for the band you want.

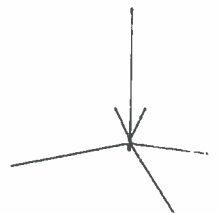
Now, cut radial wires the same length, and arrange them like spokes centering on the place where the radiator will be placed. Here's the rule of thumb on radials: the more in the ground the better the signal radiates. A hundred wouldn't be too many, but if all you can lay out is four, then go with that. Cut slits in the lawn about an inch or two deep with a hand trowel (I know, it's labor intensive) to lay the radials and cover them up. This ensures that they won't end up wrapped around your lawn mower!

Now take one end of your 50 ohm coax feed line and strip off the insulation. Cut a slit in the copper braid and pull the foam dielectric covered center conductor through. Strip off an inch or so of the foam and solder the center conductor to the vertical element and the braid to the place in the center of your ground radial "spokes." Of course, you'll have to support the radiator somehow with an insulated support, but I'll leave that to your imagination.

Run the coax into the shack, plug it into your tuner and give it the old "smoke" test. The tuner will help compensate for being slightly off and also allow you to try the antenna on other bands. Results may vary, but most will find that a home brew vertical cut for a lower frequency band such as 40 meters (7 MHz) may work very well on some of the higher frequency bands such as 10 meters (28 MHz). You'll just have to experiment!

One word of safety: Vertical antennas such as described here have a radiating element which

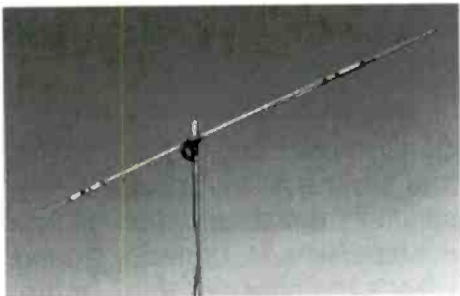
This \$25 scanner antenna from Radio Shack makes a good outdoor or attic mount 2 meter antenna for your HT. Put a better signal into your local repeater or reach more distant repeaters. (Courtesy: Radio Shack)



could come into contact with humans and other animals when you're transmitting, resulting in a nasty RF burn. So, be safe: mount the antenna in such a fashion as to prevent accidental contact. And, as with any antenna, you must pay attention to any power lines in the area. Before you start your installation make sure you know what's around you. You won't get any warning from a power line jolt.

❖ The Rotatable Dipole

A radiating element for a half-wave horizontal dipole at lower frequencies is huge. But, in the higher frequency bands, such as 12 and 10 meters, the element is quite manageable. What's more, it's small enough to mount on a mast turned by a common TV antenna rotator. You can make your own rotational dipole for 10 or 12 meters out of aluminum tubing you can find at your local hardware store. Look for various designs on this antenna in the antenna books and in *QST* magazine.



The rotatable dipole has the edge on the wire version: can be placed high above ground on a TV mast rotator and can be rotated for better signal. This CushCraft D3 covers 10, 15 and 20 meter bands. (Courtesy: CushCraft)

For an even cheaper and easier antenna, make the dipole out of wire and mount it on a 1" x 2" piece of wood fitted with an antenna mount. Solder one side of the dipole to the conductor of the coax feed and the other to the braided shield. Using the formula $l=468/f$, where l is the length which is equal to 468 divided by the frequency (f) in MHz, you can determine the exact measurement for your favorite band.

Want something a little more versatile and substantial? CushCraft makes a multiband rotational dipole for the 10, 15 and 20 meter bands. The model D3 is 25.8 feet long, weighs 9 pounds and will take up to 2 kilowatts. A similar antenna, the D3W, is available for the WARC bands (30, 17, and 12 meters). Price for either is \$259.99. There is also a 40 meter dipole, which is just over 42 feet long and retails at \$319.99. There are other professionally made rotatable dipoles on the market at various prices and performance ability, so it pays to look around.



Roll your own dipole with the help of a couple of HamStik antennas and this clever connector. The two HamStiks simply mount on the screw elements and the connector mounts on a mast. (Courtesy Antennawarehouse.com)

I've talked to several hams on-air who have made their own semi-commercial rotatable dipoles by taking two HamStik® antennas and deploying them in a horizontal fashion with the lower ends towards each other. Antennawarehouse.com sells an inexpensive special connector to make this job even easier. You can make your own rotatable dipole for any band you want by selecting two matching HamStiks and the center connector. Add your own 50 ohm coax and you're ready for some DX action. Assembly couldn't be easier and you can break it down for taking on Field Day or camping trips.

❖ Attic Addict

The ultimate stealth antenna is one mounted in the attic. But, the problem has always been getting a good signal out. The best answer may be the PAR HF End-fedz line of antennas. Each antenna is designed to operate on one band. The longest in the line is the EF-20 for 20 meters which is only 33 feet in length. The EF-10 for 10 meters is only 16 feet long. That's short enough to fit in just about anyone's attic. Because these antennas are end-fed with 50 ohm coax cable, they are fairly quiet. And, the price is right, as all sell for under \$50. Read Larry Van Horn's review of the SWL version of this antenna on-line here: <http://www.monitoringtimes.com/html/mt2003reviews.html>. Read reviews of various transmitting versions at <http://www.e-ham.net>.

❖ Last Say

None of the antennas listed here will out-perform a beam antenna on a tall tower. But, that's just the point. Most of us don't have the space or the money to be a "big gun." But, it doesn't mean we have to give up on the hobby, either. Try any of these cheap ways to get a signal out on the HF bands and have some fun. Note, too, that all of these antennas are made to order for PSK31 digital mode where low power is the order of the day, the bands are less crowded, and there's less competition from the guys with stacked arrays and kilowatt amps.

Resources:

QST review of the D3W (ARRL members only): <http://www.arrl.org/members-only/prodrev/pdf/pr9010.pdf>

Find the PAR End-fedz line of mono-band antennas at Par Electronics Inc, PO Box 645, Glenville, NC 28736, 828-743-1338; <http://www.parelectronics.com/>

Antennawarehouse.com sells HamStik antennas and the connector to build your own rotatable dipole. The HamStiks are priced according to band. The center connector unit is \$18.95 plus \$6.20 S/H. For orders call: 877-584-5055. For product and shipping questions call 772-419-8359. Visit their web site at <http://www.antennawarehouse.com>

E-ham.com has a number of reviews on the subject of rotatable dipoles. Check them out at <http://www.e-ham.net>.

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Q. I have an early-production scanner that can receive cellular frequencies. With the current laws forbidding the marketing of cellular-capable scanners, am I in danger of having this confiscated if I travel with it? (D.R., CA)

A. Any product which was FCC certified (and yours was), has not been unlawfully modified, and doesn't cause interference remains a lawful product in use and commerce. You should have no concerns about possessing it, using it (except for listening to phone calls!), traveling with it or advertising it for sale.

Q. I have an old scanner that has developed a hum through the speaker; what is the likely cause?

A. If the hum stays the same level with the volume turned down, it is either a bad filter capacitor in the power supply (most likely), or a shorted rectifier diode, also in the power supply (less likely). Filter caps contain an electrolytic chemical and are subject to drying out with time, thus losing their filtering ability. If the radio functions normally except for the hum, it's the capacitor, not the diode.

Q. I'd like to paint my antenna elements. Are some paints lossy to signals? (Steve Glover)

A. Yes, and this applies to plastics, rubber and other resins as well as radome covers. For example, some black pigments contain carbon, which is like a giant resistor, absorbing signals and dissipating them as heat; some white paints may contain metal particles which may interact with RF signal voltages. You can easily test these pigments, however, in a microwave oven.

Paint several test pigments as swatches on a piece of white paper, then let them dry thoroughly; you can coax them to dry with the microwave oven, but let them dry completely and cool down before actually testing them.

Once they are dry, microwave the paper test bed for about ten seconds; remove the paper and feel its temperature in comparison to the swatches. The highest heat will have the highest losses.

Sherwin Williams Polane® S Plus Polyurethane Enamel paint is recommended by some manufacturers.

Q. What makes the "whine" sound of a bullet ricochet? (Mark Burns, Terre Haute, IN)

A. The ricochet sound you hear in the movies is artificially produced; that's why so many of them sound the same. When a bullet leaves a muzzle, its symmetrical shape glides smoothly through the air molecules and you don't hear a whistle, but after it strikes a hard surface, it flattens on one side, making it irregular. The air passing by is destabilized by the irregularity, causing it to vibrate; the rate of vibration is the pitch of the sound. As the bullet slows down, its pitch lowers proportionately.

Q. I want to improve my pirate radio catches around 6.9 MHz with my Drake R8B receiver. I'm using a 150-ft longwire 20 feet above ground, made from common lamp cord including the lead-in. Will a "preselector/tuner" improve reception? How about cutting the antenna to a quarter-wavelength dipole? (John Morris, Whidbey Is., WA)

A. The R8B is one of the finest communications receivers ever made; it has excellent dynamic range, so it's unlikely – unless you have one or more local medium-wave broadcasters that are giving you an overload problem – that a preselector will give you much advantage. Concentrating on the antenna is a good idea.

Making the dipole a half wavelength (not quarter-wavelength) is theoretically an improvement since it's close to resonance and matches the receiver's design impedance; realistically, it probably won't make much difference, but it will be shorter and more pattern-predictable. This would be about 68 feet, fed at the center insulator with any kind of fresh coax, including inexpensive RG-58/U. The shielding on the coax will reduce electrical noise pickup from household appliances.

Elevating the dipole to 30 or more feet may help by lowering the main lobe of the antenna's pattern for more distant signal detection. Suspending it so that the broadside is toward Florida will give better nationwide coverage from Washington state.

Q. I have erected a longwave antenna consisting of two 250-ft

wires running out at an angle like a V. For best reception, should I connect their common feedpoint together, or isolate each leg and select them individually with a switch? (Herb Shatz)

A. I'd opt for the switch. Soldering them together will combine them into a single, broad element, while switching between them will permit you to choose the directivity which provides best signal with the lowest interference. At the lowest frequencies, the difference will be minimal; the higher you go in frequency, the more pronounced will be the difference.

Q. I live near an AM broadcaster, and several of my receivers hear splatter from that station all over the band when I connect a ground. What's the cause of this? (Jeffrey Muhr, Eugene, OR)

A. This almost certainly indicates that the combination of whip antenna plus ground is increasing the "aperture" – the signal gathering size – of your antenna system, overloading your receiver(s). Radios have a limited dynamic range (signal-strength-handling capacity) and when that is exceeded, the automatic gain control (AGC) circuitry fails along with the normally-linear amplification stages, developing spurious-signal products (intermodulation and images) throughout the tuning range.

This can be reduced or eliminated by:

- (1) Using a smaller antenna;
- (2) Disconnecting the ground;
- (3) Adding a notch filter tuned to the offending frequency to your antenna line;
- (4) Replacing your external antenna with a tuned loop like the Select-A-Tenna;
- (4) Sawing down the broadcaster's antenna;
- (5) Changing your hobby to bird watching;
- (5) Moving.

I'd suggest the first three!

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

<http://www.monitoringtimes.com>

Gary Webbenhurst

P. O. Box 344, Colbert, WA 99005-0344

garywebbenhurst@monitoringtimes.com

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If you live anywhere near Ohio, you should plan on attending the Dayton Hamvention© (<http://www.hamvention.org/>) Celebrating their 54th show, **May 20, 21, & 22, 2005**, the hamvention is the world's largest amateur radio gathering and trade show. You need NOT be a licensed amateur; anyone who enjoys radio will treated to a great experience. There are always a lot of new radios and other products to inspect. Prices are rock bottom, and often justify the expense of attending.

Don't live in the upper Midwest? Check this website for other upcoming ham radio events: <http://www.arrl.org/>.

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In the March 2005 column, I covered several ideas for maximizing your use of *Police Call* 2005. Readers Ward, Chris, and others emailed to say I overlooked the obvious: Why not copy the whole CD to a new folder on my hard drive and add a desktop shortcut? I did, and it is indeed faster, and more convenient. (Careful of the copyright license agreements.) I set up my *MT Anthology* series, the *Grove Military Frequency Directory*, and their *Federal Frequency Directory* as well. The good news is that this works very well: The bad news is that my hard drive is now pretty well filled. Time to optimize my hard drive!

Yeah, I know, many of you are running older PCs where your hard drive is measured in Megabytes, and not Gigabytes. As prices for new PCs (and hard drives) have plummeted, maybe the best bright idea is a new computer!

32

Wildland fire season approaches. The winter precipitation in the Spokane, Washington, area has been dismal. With only 0.04 inches for the month of February, it was the all-time driest February on record. We are expecting a very early and serious wildfire season. While I shudder to think of all the natural resources and private property that might be lost, I am prepared to spend several hours a day listening to the key fire frequencies.

Keep in mind that virtually all wildfire frequencies are VHF that any old scanner will receive. No fancy trunking or digital technology, with the exception that some new frequencies might be the new narrowband technology with 6.25 kHz spacing. Unfortunately, most scanners do not yet have this capability.

I use several different radios:

- One for the usual local fire frequencies, including the 153 and 154 MHz range, specifically 154.145-154.445.
- One for state forest conservation frequencies, usually in the 151 and 159 MHz allocations.
- One for Federal agencies
- One for aircraft frequencies

When using *Police Call* to search for state frequencies look for the "C" – Parks and Forests listings.

The US Government listings? Open Adobe Reader (the new free version 7.0). Select open file, and go to your folder for *Police Call*. Select PDF File, and then USGCD.pdf. You can then scroll, or use Edit-Find for the various federal agencies and individual US Forests. You can print the entire 37 page document if you wish.

Do your research: This is the fun part! Some great wildfire websites include the following: <http://www.wildfire.com/> <http://www.nifc.gov/> <http://www.fs.fed.us/fire/people/hotshots/> <http://www.californiahotshotcrews.org/> <http://www.fs.fed.us/fire/> <http://www.scancolorado.com/WILDFIRE.htm>

Caveat: As usual, some URLs might change and new sites appear. There are several Yahoo groups that might be worth your time. Do a search. I have several more ideas for preparing for the fire season.

33

Wildland Firefighter magazine is the best of the lot (\$29 for 12 issues) at 1-888-456-5367). Their website is <http://www.jems.com>. Note they also offer other magazines, and related programs.

34

Should the Red Cross, or ARES/RACES ask me to respond to the CP for liaison duties, I always carry my full complement of emergency radio equipment. Details about my list will be the main feature of next month's column. If you are a potential communications responder, you *might* need a yellow nomex shirt/jacket. Order one now, because they are hard to find once the season gets rolling. There are several vendors on the web.

35

Need to learn about Incident Command System (ICS)? FEMA offers many courses at <http://training.fema.gov/EMIWeb/IS/crslist.asp>. The specific class to look for is IS-195 ICS. These materials are downloadable from their website. The course is high quality, I highly recommend it.

36

I continue with my renewed general interest in railroads and monitoring their frequencies. On a recent trip to Pend Oreille County Washington, I captured a good photo of POVR 1745 engine, an EMD GP10. Note the new bright red paint job for the "Hotstart" of the Pend Oreille Valley railroad (POVR). A small fleet of GP10s is the stable of their working engines. I caught radio traffic on 160.305 and 161.010 MHz. Mmmm, does not does match up to their listed frequencies.



I also heard from reader Don Breitbath about <http://www.altamontpress.com>, and <http://www.djcooley.com>. These sites cater to the interests of West Coast/Northwest railfans, and have regional timetables, books, even free downloads. I am overwhelmed at the amount of web information and the level of intensity in the railfan hobby. I could easily fill every column with a long list of websites on any particular topic that reveal new frequencies, photos, and background trivia on the many facets of railroading. Thanks, Don.

37

Do it yourself repairs? Sometimes you can easily solve small problems, and save yourself some money. But, this only makes sense if you can fully diagnose the problems and have the tools and expertise to make the repair. In many cases, the mere act of "opening up the radio" causes damage that is irreparable. Technical repairs are not for the inexperienced nor the faint of heart. Two efforts by local hams proved disastrous. Superglue is not conductive and *does not* work on repair circuits or to replace soldered batteries. Many older ham transceivers have an internal, watch style battery to maintain memory information. These are a real pain to replace.

One colleague tried to mend a broken solder joint, but overheated and destroyed adjoining components. I could not undo the harm done by these well intentioned efforts of my ham friends. If you have any doubts, the brighter idea and safer decision is to let an expert do these repairs. If the dollar cost will exceed the value returned, you are probably wiser to spend the money on a new radio.

I hate to keep preaching, but I would remind all in the hobby that BNC connectors and power jacks are very "fragile." Constant, or rough handling will eventually break their internal solder connections. It may sound funny, but I feel the hurt every time I see someone's cherished radio bite the dust. Personally, I keep all these old radios on a display shelf as a reminder of the many hours of listening pleasure they provided me or others. Also, you can salvage the power supplies, batteries and antennas. Even in death, things have a value. If this is the only lesson you learn from my column, you have saved yourself the price of the magazine many times over.

The June 2005 column will focus on what you need to have to be prepared for an emergency at home, or as a communications first responder. Let's get ready!

Scanning Florida and Tennessee

This month we answer reader mail about public safety radio systems in Florida and Tennessee, provide some details about some personal communications services, and wrap up with a reminder about the world's largest radio hobbyist convention.

❖ Broward County, Florida

Dan,
I live in Broward County, Florida. What frequencies do you have on file for the Sheriff's Office and talk group IDs? I am having a great deal of trouble. I have a Bearcat BCT-8 scanner. I am also looking for information on District 11, which is Pompano Beach. Can you help me?

Thanks, Frank

Broward County is located in the southeast part of Florida, just north of Miami on the Atlantic Ocean coast. It covers nearly 1,200 square miles and 23 miles of beachfront. It's the second-most populous county in Florida with about 1.5 million residents.

The County operates a Motorola Type II trunked radio system that carries both analog and APCO Project 25 digital voice traffic. The system has six sites: three inside the city limits of Fort Lauderdale, and one each in the towns of Coconut Creek, Davie and Pembroke Park.

Frequencies on the system are 852.7125, 852.7375, 852.8125, 855.2375, 856.4875, 856.7375, 857.3625, 857.4875, 857.7375, 857.9875, 858.3625, 858.4875, 858.7375, 858.9875, 859.3625, 859.4375, 859.4875, 859.7125, 859.7375, 859.9875, 860.2375, 860.4875, 860.7375 and 860.9875 MHz.



| Decimal | Hex | Description |
|---------|-----|--|
| 16 | 001 | Airport Emergency |
| 4112 | 101 | Sheriff Dispatch (South) |
| 4144 | 103 | Sheriff Dispatch 2 |
| 4176 | 105 | Sheriff Dispatch (Dania) |
| 4208 | 107 | Dispatch (Pembroke Pines Police) |
| 4240 | 109 | Sheriff Dispatch (Cooper City, Weston, Davie Police) |

| | | |
|-------|-----|------------------------------------|
| 4272 | 10B | Court Services |
| 4304 | 10D | Dispatch (Lauderhill Police) |
| 4336 | 10F | County Detention |
| 4368 | 111 | Sheriff Dispatch (Tamarac) |
| 4400 | 113 | Sheriff Dispatch (Deerfield Beach) |
| 4432 | 115 | Sheriff Dispatch (West Area) |
| 4464 | 117 | Sheriff Dispatch 10 |
| 4496 | 119 | Technical Support |
| 4528 | 11B | Narcotics |
| 4560 | 11D | Internal Affairs |
| 4592 | 11F | Communications Services |
| 17616 | 44D | Broward Mutual Aid |
| 17648 | 44F | Fire Mutual Aid |
| 17680 | 451 | Police Mutual Aid |

Broward Fire/Rescue

Since October 2003, the Department of Fire Rescue and Emergency Services has been part of the Broward Sheriff's Office. Fifteen locations and 600 personnel around the county provide fire, medical and rescue services for most unincorporated areas as well as Cooper City, Lauderdale-By-The-Sea, Lauderdale Lakes and Sea Ranch Lakes, Pembroke Park, Southwest Ranches and Weston. The department also operates an Air Rescue helicopter unit at the Fort Lauderdale Executive Airport.



| Decimal | Hex | Description |
|---------|-----|----------------------------|
| 8208 | 201 | Dispatch (North) |
| 8240 | 203 | Dispatch (Central) |
| 8272 | 205 | Dispatch (South) |
| 8304 | 207 | Administrative/Supervision |
| 8336 | 209 | Headquarters |
| 8368 | 20B | Car-to-Car (North) |
| 8400 | 20D | Car-to-Car (Central) |
| 8432 | 20F | Car-to-Car (South) |
| 8464 | 211 | Car-to-Car |
| 8496 | 213 | Tactical (Alpha) |
| 8528 | 215 | Tactical (Bravo) |
| 8560 | 217 | Tactical (Charlie) |
| 8592 | 219 | Special Details |
| 8624 | 21B | Mutual Aid 1 (North) |
| 8656 | 21D | Administrative |
| 8688 | 21F | Administrative |
| 8720 | 221 | Medical Reserve |
| 8752 | 223 | Medcom 1 |
| 8784 | 225 | Medcom 2 |
| 8816 | 227 | Medcom 3 |
| 8848 | 229 | Medcom 4 |

| | | |
|------|-----|----------------------|
| 8880 | 22B | Medcom 5 |
| 8912 | 22D | Medcom 6 |
| 8944 | 22F | Medcom 7 |
| 8976 | 231 | Medcom 8 |
| 9008 | 233 | Medcom 9 |
| 9040 | 235 | Medcom 10 (Dispatch) |
| 9200 | 23F | Car-to-Car (West) |
| 9232 | 241 | Dispatch (West) |
| 9264 | 243 | Mutual Aid (West) |

Broward County Schools

The Broward County School system is the sixth largest in the country with more than 274,000 students in 250 schools. They have a number of talkgroups on the county system, but here are a few of the most common:

| Decimal | Hex | Description |
|---------|-----|------------------------|
| 14544 | 38D | School Buses (North) |
| 14608 | 391 | School Buses (Central) |
| 14672 | 395 | School Buses (South) |
| 14736 | 399 | School Buses (West) |

Broward Live Feed via the Internet

There is at least one live feed of the Broward Sheriff and Fire/Rescue on the Internet at <http://www.coral Springs.com/scanner/welcome.htm>

If you can get past the series of advertisements on that page, you can hear county activity as well as the city of Coral Springs Police and Fire/Rescue. The site uses a pair of Uniden Bearcat BC895XLT scanners feeding a 1 GHz Pentium computer that delivers a stereo signal - Coral Springs on the left channel and Broward County on the right.

❖ Fort Lauderdale, Florida

Within Broward County, the City of Fort Lauderdale operates their own Motorola Type II trunked radio system with analog voice traffic. The system transmits from three sites, two in Fort Lauderdale and one in Pompano Beach. All transmissions are broadcast from each site simultaneously (a process referred to as *simulcasting*).

The 26 frequencies in the system are 866.2125, 866.2375, 866.2625, 866.4125, 866.6625, 866.9125, 867.1875, 867.2125, 867.2625, 867.6125, 867.6375, 867.8375, 867.8625, 867.8875, 868.0375, 868.0875, 868.2875, 868.3125, 868.3375, 868.5375, 868.5625, 868.5875, 868.7875, 868.8125, 868.8375 and 868.9125 MHz.

| Decimal | Hex | Description |
|---------|-----|-----------------|
| 17648 | 44F | Fire (Dispatch) |

| | | |
|-------|-----|-------------------|
| 17680 | 451 | Police (Dispatch) |
| 17712 | 453 | Car-to-Car 1 |
| 17744 | 455 | Car-to-Car 2 |
| 17776 | 457 | Operations 1 |
| 17808 | 459 | Operations 2 |
| 17840 | 45B | Operations 3 |
| 18000 | 465 | Operations 4 |
| 18032 | 467 | Operations 5 |
| 18064 | 469 | Operations 6 |

Talkgroups for Pompano Beach include:

| Decimal | Hex | Description |
|---------|-----|--------------------------------|
| 61456 | F01 | Pompano Fire Battalion 1 |
| 61488 | F03 | Pompano Fire Battalion 2 |
| 61520 | F05 | Pompano Fire Division |
| 61552 | F07 | Pompano Fire Officers |
| 61712 | F11 | Pompano Fireground |
| 61744 | F13 | Pompano Fire Tactical 2 |
| 61776 | F15 | Pompano Fire Tactical 3 |
| 61808 | F17 | Pompano Fire Prevention |
| 61840 | F19 | Pompano Fire Tactical 5 |
| 61872 | F1B | Pompano Fire Car-to-Car |
| 61904 | F1D | Pompano Fire Tactical 7 |
| 61936 | F1F | Pompano Fire Tactical 8 |
| 61968 | F21 | Pompano Fire Dispatch |
| 62224 | F31 | Pompano Police Information |
| 62256 | F33 | Pompano Police Alternate |
| 62288 | F35 | Police Command |
| 62320 | F37 | Police Supervisors (Beach) |
| 62480 | F41 | Pompano Detectives (Main) |
| 62512 | F43 | Pompano Detectives (Tactical) |
| 62544 | F45 | Pompano Criminal Investigation |
| 62576 | F47 | Pompano Vice (Main) |
| 62608 | F49 | Pompano Vice (Tactical) |
| 63024 | F63 | Investigators |
| 63248 | F71 | Police Car-to-Car (Common) |
| 63280 | F73 | Police Car-to-Car (East) |
| 63312 | F75 | Police Car-to-Car (West) |
| 63344 | F77 | Dispatch (CDC) |
| 63376 | F79 | Dispatch (East) |
| 63408 | F7B | Dispatch (West) |
| 63440 | F7D | Tactical (Common) |
| 63472 | F7F | Tactical (East) |
| 63504 | F81 | Tactical (West) |
| 63760 | F91 | Public Safety |
| 65296 | FF1 | Beach Patrol (Unit-to-Unit) |
| 65328 | FF3 | Beach Patrol (Common) |
| 65360 | FF5 | Beach Patrol (Supervisor) |

❖ Brevity Codes

Like most forms of communication, radio users have developed ways to communicate information more quickly. One way to do that over the radio is through the use of brevity codes, which are a kind of shorthand for common messages. Nearly everyone has heard the code "10-4", meaning that a message has been acknowledged. Many police and fire departments use a number of these "ten codes," some of which have been in use for more than 60 years. Below is a list of some of the most common ten codes in use. Note that many departments have customized the list for their own use, so some codes may mean different things depending on the agency that is using them.

| Code | Description |
|------|------------------|
| 10-1 | Receiving Poorly |
| 10-2 | Receiving Well |
| 10-4 | Acknowledged |
| 10-6 | Busy |
| 10-7 | Out Of Service |
| 10-8 | In Service |

| | |
|-------|------------------------------|
| 10-9 | Repeat Previous Transmission |
| 10-10 | Out of Service |
| 10-19 | Return to Station |
| 10-20 | Your Location |
| 10-22 | Disregard |
| 10-23 | Standby |
| 10-24 | Assignment Complete |
| 10-26 | Message Received |
| 10-27 | Complete Records Check |
| 10-28 | Vehicle Registration Check |
| 10-29 | Stolen and/or Wanted |
| 10-31 | In Pursuit |
| 10-42 | Out of Service at Home |
| 10-46 | Urgent |
| 10-50 | Stopping Vehicle |
| 10-51 | Send a Tow Truck |
| 10-52 | Send an Ambulance |
| 10-54 | Negative |
| 10-52 | Estimated Time of Arrival |
| 10-55 | Car to Car |
| 10-56 | Meet At |
| 10-60 | Assist Motorist |
| 10-66 | Cancel |
| 10-76 | Enroute |
| 10-78 | Need Assistance |

Many departments also use "Code" numbers to indicate the urgency of the message. Broward County uses the following three priority levels:

| | |
|--------|-----------|
| Code 1 | Routine |
| Code 2 | Expedite |
| Code 3 | Emergency |

❖ Bearcat BCT-8

The Uniden Bearcat BCT-8 is a base/mobile scanner with 250 memory locations that covers most of the public safety bands, including all of the 800 MHz frequencies we've discussed for Broward County. It is capable of trunk tracking the "big three" in public safety: Motorola, EDACS and LTR systems. Its only drawback is that it does not decode digital voice transmissions, so the APCO Project 25 digital voice traffic on the Broward County system will be out of reach.

❖ Memphis, Tennessee

Dan,

I live in Memphis and Radio Shack told me that the new digital scanner they carry would pick up Memphis, so I bought it. I haven't had any luck hearing them, though. Do you know if it will pick them up? I love listening to the action.

The Radio Shack clerk was correct, just a little premature. The City of Memphis has operated a Motorola trunked radio system for many years with a type of digital voice transmission called VSELP (Vector Sum Excited Linear Prediction).



VSELP is different than the IMBE (Improved Multi-Band Excitation) standard specified in the APCO Project 25 (P-25) standards and is not compatible with any consumer scanner, including the newest models from Uniden and Radio Shack.

However, the public safety radio system in Memphis is being upgraded to APCO Project 25 standards. The upgrade is scheduled to be complete by May 2005, so by the time you read this the upgrade should nearly complete. If all goes according to plan, the new Radio Shack PRO-96 scanner will be able to follow the action by the end of the month.

There are five repeater sites licensed for the Memphis system. The first is downtown on Jefferson Avenue, across from the Veterans Administration Medical Center. The second is north of the city, across Route 51 from Firestone Park. Two repeaters are south of the city, one along Highway 61 near the Mississippi border and the other more easterly, off Winchester Road close to Riverdale Road. The fifth site is east of downtown, near Interstate 40.

Each of these sites is licensed for the following rather large list of frequencies: 855.4625, 856.2375, 856.4375, 856.4625, 856.7125, 856.9375, 856.9625, 857.2375, 857.4375, 857.4625, 857.7125, 857.9375, 857.9625, 858.2375, 858.4375, 858.4625, 858.7125, 858.9375, 858.9625, 859.2375, 859.4375, 859.4625, 859.7125, 859.9375, 859.9625, 860.2375, 860.4375, 860.4625, 860.7125, 860.9375 and 860.9625 MHz.

| Decimal | Hex | Description |
|---------|-----|---------------------------------|
| 48 | 003 | Police Dispatch (North) |
| 80 | 005 | Police Car-to-Car (North) |
| 112 | 007 | Police Computer Database Checks |
| 144 | 009 | Police All City |
| 176 | 00B | SWAT Tactical |
| 208 | 00D | Police Dispatch (South) |
| 240 | 00F | Police Car-to-Car (South) |

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| | | |
|-------|-----|---------------------------------|
| 272 | 011 | Police Dispatch (East) |
| 304 | 013 | Police Car-to-Car (East) |
| 336 | 015 | Police Dispatch (West) |
| 368 | 017 | Police Car-to-Car (West) |
| 400 | 019 | Police Dispatch (Central) |
| 432 | 01B | Police Car-to-Car (Central) |
| 464 | 01D | Police Dispatch (Downtown) |
| 496 | 01F | Police Car-to-Car (Downtown) |
| 528 | 021 | Police Dispatch (Southeast) |
| 560 | 023 | Police Car-to-Car (Vice) |
| 592 | 025 | Internal Affairs |
| 624 | 027 | Internal Affairs Car-to-Car |
| 656 | 029 | Police Special Operations |
| 688 | 02B | Organized Crime Unit Car-to-Car |
| 1008 | 03F | Fire Dispatch (Main) |
| 1040 | 041 | Fire Dispatch (Alternate) |
| 1072 | 043 | Medical Dispatch (Main) |
| 1104 | 045 | Medical Dispatch (Alternate) |
| 1136 | 047 | Fire Operations 1 |
| 1168 | 049 | Fire Operations 2 |
| 1200 | 04B | Fire Operations 3 |
| 1232 | 04D | Fire Operations 4 |
| 1264 | 04F | Fireground 1 |
| 1296 | 051 | Fireground 2 |
| 1328 | 053 | Fireground 3 |
| 1360 | 055 | Fireground 4 |
| 1392 | 057 | Fireground 5 |
| 1424 | 059 | Fire Car-to-Car |
| 1456 | 05B | Fireground 6 |
| 1488 | 05D | Fireground 7 |
| 1520 | 05F | Fireground 8 |
| 1552 | 061 | Fireground 9 |
| 1584 | 063 | Fireground 10 |
| 2256 | 08D | Fireground (Mutual Aid) |
| 2768 | 0AD | Arson Investigators |
| 2800 | 0AF | Fire Inspectors |
| 3984 | 0F9 | Emergency Operations 1 |
| 4016 | 0FB | Emergency Operations 2 |
| 4048 | 0FD | Emergency Operations 3 |
| 4080 | 0FF | Emergency Operations 4 |
| 4112 | 101 | Emergency Operations 5 |
| 4752 | 129 | Police Tactical Ch 1 |
| 4784 | 12B | Police Tactical Ch 2 |
| 4816 | 12D | Police Tactical Ch 3 |
| 4848 | 12F | Police Tactical Ch 4 |
| 5040 | 13B | Direct Channel 1 |
| 5072 | 13D | Direct Channel 2 |
| 5104 | 13F | Direct Channel 3 |
| 39952 | 9C1 | Motorcycle Patrol 1 |
| 41008 | A03 | Airport Security 1 |
| 41040 | A05 | Airport Security 2 |
| 44944 | AF9 | Motorcycle Patrol 2 |

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

Use of FRS radios does not require a license and has become a popular replacement for CB radios, since they use Frequency Modulation (FM) rather than Amplitude Modulation (AM) and provide the clarity and quiet you'd expect from FM. In many cases they have also replaced the use of cellular telephones, since FRS radios do not require a monthly subscription or incur a per-minute charge. The Motorola Talkabout pictured here is an example of the handheld radios available today that can provide clear, reliable communication over short distances up to a mile.



Although the unlicensed FRS radios are limited to half a watt of output power, a GMRS radio can operate at up to 5 watts and provide a range of anywhere from five to 25 miles. GMRS requires a license, but an individual can obtain one "to facilitate the activities of immediate family members."

GMRS has 16 UHF frequencies and operates in one of two modes. The first mode is simplex, like FRS. The second mode is through a repeater, where the repeater receives transmissions on one frequency (*input*) and retransmits them on a second frequency (*output*).

Eight of the frequencies are designated for simplex operation. Those same eight may also be used as repeater output frequencies. The other eight are only for repeater input. Usually input and output frequencies are paired, separated by 5 MHz, but any pairing is allowed.

| GMRS Frequency | Description |
|----------------|------------------|
| 462.550 | Output/Simplex 1 |
| 462.575 | Output/Simplex 2 |
| 462.600 | Output/Simplex 3 |
| 462.625 | Output/Simplex 4 |
| 462.650 | Output/Simplex 5 |
| 462.675 | Output/Simplex 6 |
| 462.700 | Output/Simplex 7 |
| 462.725 | Output/Simplex 8 |
| 467.550 | Input 1 |
| 467.575 | Input 2 |
| 467.600 | Input 3 |
| 467.625 | Input 4 |
| 467.650 | Input 5 |
| 467.675 | Input 6 |
| 467.700 | Input 7 |
| 467.725 | Input 8 |

❖ Personal Two-Way Communications

We've come a long way since the Citizen's Band (CB) craze of the 1970s. Although CB radios continue to be used, much of the personal radio communication activity has moved on to the General Mobile Radio Service (GMRS) and Family Radio Service (FRS).

The Federal Communications Commission (FCC) defines FRS in Part 95 Subpart B of their rules. There are 14 UHF frequencies assigned to FRS, all defined for *simplex* operation. Also called *talk-around*, simplex means all voice activity occurs on the same frequency, so a scanner set to monitor that frequency will hear all parts of the conversation.

| FRS Frequency | Description |
|---------------|-------------|
| 462.5625 | Channel 1 |

❖ Dayton Hamvention

The 54th annual Dayton Hamvention will take place on May 20, 21 and 22 in the city of Dayton in southwest Ohio. It is the largest amateur radio convention in the world. Major equipment manufacturers like Icom, AOR and Optoelectronics often introduce new products at the Hamvention from the 500-space indoor exhibit area. The outdoor flea market has more than 2,500 spaces, and as long as the weather is reasonable you can find bargains galore.



In addition to the gadgets, the Hamvention runs a number of forums, covering everything from antenna technology and design, low power operation, kit building, using satellites, disaster relief operations to "fox hunting" (finding hidden transmitters).

The Hamvention is held at the Hara Arena located at 1001 Shiloh Springs Road in the town of Trotwood, Ohio. You can read more about the convention and view photographs from previous years at <http://www.hamvention.org>. If at all possible, take the time to come and spend a weekend with fellow radio enthusiasts.

Dayton operates their own analog Motorola trunked radio system on the following frequencies: 856.2125, 856.4625, 856.7125, 856.9625, 857.2125, 857.4625, 857.7125, 857.9625, 858.2125, 858.4625, 858.7125, 858.9625, 859.2125, 859.4625, 859.7125, 859.9625, 860.2125, 860.4625, 860.7125 and 860.9625 MHz.

| Decimal | Hex | Description |
|---------|-----|----------------------------|
| 36848 | 8FF | Dispatch |
| 36880 | 901 | Fireground 2 |
| 37424 | 923 | Fire Car-to-Car |
| 37456 | 925 | Fire Support Services |
| 37488 | 927 | Fire Prevention |
| 37520 | 929 | Emergency Medical Services |
| 37872 | 93F | Police Dispatch |
| 45424 | B17 | Parking Patrol (Dispatch) |
| 45456 | B19 | Parking Patrol (Towing) |
| 45488 | B1B | Parking Patrol (Citations) |
| 46448 | B57 | Police Dispatch (West) |
| 46480 | B59 | Police Records |
| 46512 | B5B | Police Dispatch (East) |
| 46544 | B5D | Police Car-to-Car 1 |
| 46576 | B5F | Police Car-to-Car 2 |
| 46768 | B6B | Special Events |
| 46800 | B6D | Traffic |
| 46832 | B6F | SWAT |

Before heading for the Hamvention, plug in these frequencies and talkgroups into your scanner and stay informed throughout the convention weekend.

That's all for this month. More frequencies and scanner information is available on my web site at <http://www.signalharbor.com>. If I don't see you at the Dayton Hamvention you can always send me electronic mail at danveeneman@monitoringtimes.com. Until next month, happy scanning!

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**CALL
TODAY!**

Hear the Space Shuttle Return to Flight

As we go to press, the launch window for the first space shuttle flight since the loss of *Columbia* is right when this column comes out. It seems like a good time to review where this exciting program turns up on shortwave radio.

As we've certainly seen, there are no routine manned space missions. Listening in is more than a casual diversion for many concerned individuals. A result of all this interest is the great volume of information that is found on the Internet. As usual, though, much of the online information is dated, or just plain wrong.

The shuttle never actually transmits on high frequency (HF). Most communication comes from air and ground operations supporting the launches at the Kennedy Space Center's historic pads 39A and B. This complex is located at the north end of the famous Cape Canaveral launch area in east central Florida.

While KSC is an activity of the National Aeronautics and Space Administration (NASA), it uses the US Air Force Space Command's Eastern Test Range (ETR). This 5000-mile range begins at a number of sites on and around the Cape. It has additional tracking assets at Antigua in the Caribbean, and on Ascension Island, far out in the Atlantic Ocean.

Obviously, such a far-flung operation has hundreds of possible HF frequencies. We'll try to hit a few that you're most likely to hear something on.

Cape Radio

The ETR's big gun on HF is "Cape Radio," which sometimes uses the static callsign of FISHER. This flame-thrower is across the Banana River from KSC, at the Cape Canaveral Air Force Station. Like most technical activities at the range, it's contracted out to Computer Sciences Rockwell.

Cape Radio's primary frequency is 10780 kilohertz (kHz) upper sideband (USB). Secondary is 20390 USB. These two frequencies also serve as a backup to the Air Force's separate High-Frequency Global Communications System (HF-GCS).

Cape Radio is also a heavy user of the primary range frequency of 5180 kHz USB. 10780 and 5180 are definitely the places to listen, starting 24-36 hours before a launch, as ships and aircraft begin to deploy.

Launch Day Activities

As launch approaches, you'll hear two major nets. First is booster recovery. As we know, the spent Solid Rocket Boosters fall away a few

minutes into flight. They parachute into the ocean downrange, to be brought home by two NASA Booster Recovery Vessels (BRV), the *Freedom Star* and *Liberty Star*.

This net is something of a catch. It can start out on 5180, but it usually goes to a number of low frequencies with limited coverage, especially in daytime.

The other, larger net is for range safety. Barring some kind of worst-case scenario involving the "destruct" command, range safety ships and/or aircraft are basically the traffic cops. Their mission is to keep everyone else away while a hazard exists. The whole, vast range has to be "go" before the shuttle can launch. You might also hear the occasional radio check with Antigua and Ascension.

Another callsign that's sometimes heard on the range safety net is the military activity identifying as "DoD Cape." This stands for the US Department of Defense. There might also be an occasional Air Force rescue planes identifying as "KING" plus a number.

If you're lucky, you might even run across some instrumentation traffic. The range uses a lot of telemetry, lightning sensors, chase aircraft, and every other imaginable data-gathering activity. Time was when the bottle-nosed ARIA (Advanced Range Instrumentation Aircraft) would come east from their California home base to receive spacecraft telemetry downrange. However, this interesting but costly mission was terminated in 2001.

Real-Time Audio

Since the first flight, many amateur radio stations have retransmitted the NASA mission communications between space shuttle astronauts and the ground. The FCC has made an ongoing exception to its amateur broadcasting prohibition for shuttle audio, wake-up music and all.

Most people listen to local amateur repeaters on higher frequencies, but HF feeds do exist. The biggest one is from WA3NAN at NASA's Goddard Space Flight Center in Maryland. It simulcasts on several bands, using lower sideband on 75 and 40 meters, others USB. Frequencies can vary slightly, to avoid interference.

In the past, shuttle audio has sometimes been heard from Houston's Johnson Space Center, and even the Jet Propulsion Laboratory (JPL) near Los Angeles, CA. It has also been known to turn up outside amateur bands, presumably from government or MARS (Military Affiliate Radio System) stations.

Space Shuttle Frequencies

(All in kHz and USB unless noted)

| | |
|---------|---------------------------------|
| 2356.0 | BRV ship/ship |
| 2622.0 | All nets |
| 2622.0 | BRV ship/ship |
| 2638.0 | ETR Clearance |
| 2639.0 | BRV ship/ship |
| 2716.0 | Harbor |
| 2764.0 | Range Safety/Booster Recovery |
| 2800.0 | BRV ship/shore |
| 2820.0 | BRV ship/shore |
| 2836.0 | Range Safety |
| 2837.0 | BRV ship/shore |
| 3041.0 | All nets |
| 3089.5 | HF air/ground |
| 3120.0 | Range Safety |
| 3187.0 | Range Safety/Booster Recovery |
| 3365.0 | Range Safety/Booster Recovery |
| 3385.0 | ETR Emergency Net |
| 3395.0 | ETR Emergency Net |
| 3840.0 | Houston/JPL Mission Audio (LSB) |
| 3860.0 | Goddard Mission Audio (LSB) |
| 4520.0 | Range Safety |
| 4604.5 | ETR Emergency Net |
| 4704.0 | Range Safety |
| 4856.5 | Range Safety |
| 4992.0 | Range Safety |
| 5011.0 | Range Safety |
| 5180.0 | Cape Radio/Range Ops Primary |
| 5187.0 | "DoD Cape" Range Safety |
| 5190.0 | Range Safety/Booster Recovery |
| 5211.0 | Booster Recovery |
| 5246.0 | Range Safety/Booster Recovery |
| 5711.0 | Range Safety/Booster Recovery |
| 5717.0 | Range Safety/Booster Recovery |
| 5810.0 | All nets |
| 6724.0 | "DoD Cape" Range Safety |
| 6751.0 | Cape Radio working ships |
| 6897.0 | Range Safety |
| 6937.0 | Cape Radio/ETR Control |
| 6982.5 | ETR Emergency Net |
| 7185.0 | Goddard Mission Audio (LSB) |
| 7461.0 | Range Safety |
| 7672.0 | Cape Radio/ ETR Control |
| 7676.0 | Booster Recovery |
| 7765.0 | All nets |
| 9023.0 | Range Safety |
| 9043.0 | Range Safety |
| 10780.0 | Cape Radio Primary |
| 11104.0 | Cape Radio & DoD Cape |
| 11217.0 | Range Safety |
| 11407.0 | All nets |
| 11440.0 | Antigua Search & Rescue |
| 11615.5 | Cape Radio/ ETR Control |
| 13237.0 | Cape Radio |
| 13878.0 | Cape Radio |
| 14280.0 | Houston Mission Audio |
| 14295.0 | Goddard Mission Audio |
| 14967.0 | Cape Radio |
| 15062.5 | HF air/ground |
| 20195.0 | Cape Radio |
| 20390.0 | Cape Radio Secondary |
| 21280.0 | JPL Mission Audio |
| 21350.0 | Houston Mission Audio |
| 21395.0 | Goddard Mission Audio |
| 28495.0 | Houston Mission Audio |
| 28650.0 | Goddard Mission Audio |

Hugh Stegman

hughstegman@monitoringtimes.com

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ABBREVIATIONS USED IN THIS COLUMN

| | |
|----------|---|
| ALE | Automatic Link Establishment |
| AM | Amplitude Modulation |
| ARQ | Automatic Repeat Request teleprinting system |
| CAMSLANT | Communication Area Master Station, Atlantic |
| CW | Morse code telegraphy ("Continuous Wave") |
| DEA | US Drug Enforcement Administration |
| DSC | Digital Selective Calling |
| E10a | Abnormal Israeli female phonetic "numbers" |
| FAX | Radiofacsimile |
| FEC | Forward Error Correction teleprinting system |
| HFDL | High-Frequency Data Link |
| HF-GCS | High-Frequency Global Communications System |
| JSTARS | Joint Surveillance Target Attack Radar System |
| LSB | Lower Sideband |
| M21 | Russian CW air tracking, ?=missing character |
| M22 | Israeli CW "numbers," weather, and messages |
| MARS | Military Affiliate Radio System |
| Meteo | Metereological |
| MFA | Ministry of Foreign Affairs |
| Navtex | Navigational Telex |
| Piccolo | High-pitched British multi-tone teleprinting |
| PR | Puerto Rico |
| RSA | Republic of South Africa |
| RTTY | Radio Teletype |
| SAM | Special Air Mission |
| SHARES | Shared Resources |
| SITOR-A | Simplex Teleprinting Over Radio, ARQ mode |
| SITOR-B | Simplex Teleprinting Over Radio, FEC mode |
| UK | United Kingdom |
| Unid | Unidentified |
| US | United States |
| VFT | Voice Frequency Telegraphy |

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

- 518.0 "P"-Haifa Radio, Israel, gale warning for Middle East at 2020. "L"-Rogaland Radio, Norway, SITOR-B Navtex distress relay for a fire aboard vessel *Fjord Champion*, at 2050. "R"-Monsanto Radio, Lisbon, Portugal, SITOR-B Navtex warning of man overboard near Madeira Islands, at 2130. (Patrice Privat-France)
- 1641.0 OXJ-Thorshavn Radio, Faroe Islands, listening on 20663, at 0635. (Privat-France)
- 1680.0 LGL-Floroe Radio, Norway, marine bulletins at 0645. (Privat-France)
- 1743.0 Unid-Probably Stornoway Coast Guard Radio, UK, weather at 0112. (Privat-France)
- 2187.5 GDNP-Ship *Grampian Pioneer*, calling MWQB7, vessel *Grampian Frontier*, in DSC at 2021. (Day Watson-UK)
- 2219.5 Unid-Russian Air Defense, probably Moscow area (M21), CW time-stamped data markers every minute, at 2023. (Watson-UK)
- 3700.0 "Yosemite Sam" - Weird pirate beacon, Laguna Pueblo Reservation, NM, repeating databurst with "varmint" cartoon voice loop, in rotation with 4500, 6500, and 10500 kHz, apparently 24/7. (Tom Severt-KS) ["Sam" has been definitively traced to a US Army contract facility! TOO strange! -Hugh]
- 4041.0 NNN0ZWR-US Navy/Marine Corps MARS, closing a net at 0059. (Mark Cleary-SC)
- 4232.0 RFLIE-French Navy, RTTY testing at 0243. (Severt-KS)
- 4271.0 CFH-Canadian Forces, Halifax, NS, RTTY weather at 0436. (Bob Hall-RSA)
- 4369.0 WLO-Mobile Radio, AL, voice-synthesized 'female' weather voice at 0258. (Severt-KS)
- 4372.0 Franchise-US Navy, working "Z-6-D" at 2040. (Cleary-SC)
- 4583.0 DDK2-Hamburg Meteo, Germany, RTTY marker and information for North and Baltic Seas, also on 7646 and 10100.8, at 1446. (Watson-UK)
- 4721.0 IKF-US Air Force, Keflavik, Iceland, working CRO, Croughton, UK, at 0104. (Watson-UK)
- 4724.0 Jayhawk-US Air Force, surveillance exercise with Royal and Night-

- 4739.0 star (E-8C JSTARS), at 1622. (Cleary-SC)
- 4751.0 Rescue 320-Unknown unit patching Rescue Coordination Centre via Halifax Military on a search, at 0239. (Cleary-SC)
- 4951.5 TWLV-Spanish Guardia Civil, Vizcaya, calling TXXX, Valdemoro, ALE at 0200. (Watson-UK)
- 5320.0 Unid-Russian Air Defense, probably Moscow area (M21), CW time-stamped data markers every minute, at 2112. (Watson-UK)
- 5422.5 Cutter Cochito-US Coast Guard, reporting whales to Group Cape Hatteras, at 1359. (Cleary-SC)
- 5547.0 North Raleigh Radio-US Coast Guard Auxiliary, net with Choptank Radio and Mooresville Radio, at 0003. (Cleary-SC)
- 5616.0 Evergreen 6307-Evergreen International Airlines, position for San Francisco at 0404. (Severt-KS)
- 5684.0 NWA52-Northwest Airlines #N806NW, working Gander Radio, Canada, at 0104. Gander, company patch from Atlas dispatch to GTI 8629, at 0135 Reach 833Y-US Air Force charter transport, position and fuel for relay to North American Airlines via Gander, at 0147. Air Force One-US Air Force Presidential aircraft, working Shanwick Radio, Ireland, at 2025. (Cliff-UK)
- 5696.0 Hunter 16-Canadian Forces, working Halifax Military, at 2143. (Cleary-SC)
- 5720.0 Coast Guard 2128-US Coast Guard helicopter enroute from Guantanamo to Haiti, working CAMSLANT at 1253. (Cleary-SC)
- 5732.0 N312UP-United Parcel Service flight 6703, HFDL position at 0837. (Watson-UK)
- 5792.0 Ping Pong-US Customs, TX, working Omaha 4CS at 0100. 17C-DEA, investigating a vessel with Panther at 2326. (Cleary-SC)
- 5875.0 RABAT-French Embassy, Morocco, calling CER11, French MFA, Paris, at 1707 and 1840. (Watson-UK)
- 6379.0 EAATS-Eastern Army Aviation Training Site, PA, ALE sound at 1250. (Ron Perron-MD)
- 6501.0 4XZ-Isreali Navy, Haifa (M22), CW markers and traffic at 2015. (Watson-UK)
- 6507.1 NMN-US Coast Guard CAMSLANT Chesapeake, VA, with weather being read by a live male (not "Perfect Paul"), with interference from "Yosemite Sam" on 6500, at 1735. (Severt-KS)
- 6535.0 SVO-Olympia Radio, Greece, voice loop announcing calling channels on numbers 806, 1232, 1640, and 2217, in English and Greek from 0030 to 0330. (Alvin Mirabal, PR)
- 6694.0 LH0502-Lufthansa flight working "Atlantico" (Recife, Brazil), in Portuguese at 0600. (Privat-France)
- 6721.0 Pathfinder 20-Canadian Forces, working Halifax Military at 2342. (Cleary-SC)
- 6761.0 500322-US Air Force Reserve tanker, working ADW (Andrews Air Force Base, MD) in ALE, then no joy in voice as Mash 84, at 2316. (Perron-MD)
- 6911.5 Ethyl 58-US Air Force tanker, working transport UHAUL 99, at 2347. (Cleary-SC)
- 6930.0 KYAASF-KY National Guard Aviation Support Facility, ALE sound at 1240. (Perron-MD)
- 7310.0 SYN2Z58-Abnormal Israeli Intelligence callup (E10a), at 0453. (Severt-KS) SYN2 callup only (E10a) at 2230. (Mark Morgan-OH)
- 7313.5 705-Probably Canadian Forces, calling 705A, in ALE at 1254. (Perron-MD)
- 7617.0 AFF2FL-US Air Force MARS, working AFF2TFL in Florida Training Net, at 1401. (Cleary-SC)
- 7632.0 RM4-Mexican Army 4th Region, Monterrey, calling CAMALEON3 in ALE, at 0157. (Perron-MD)
- 7635.0 NNNOKAG-Control in SHARES Southeast Region Net, checking in stations at 1615. (Cleary-SC)
- 7771.5 Hill CAP 49-Civil Air Patrol, national net with Headcap 45 and Kitty Hawk 30, at 1725. (Cleary-SC)
- 8103.0 L2C-Argentine Navy, Buenos Aires, SITOR-B weather in Spanish, at 0450. (Hall-RSA)
- 8146.5 4XZ-Isreali Navy, Haifa (M22), CW traffic possibly in Hebrew at 2045 and 2101. (Watson-UK)
- 8151.5 IMB55-Rome Meteo, FAX weather chart and volcanic ash warning, at 2254. (Watson-UK)
- 8171.5 9MR-Malaysian Navy, RTTY administrative traffic at 2139. (Hall-RSA)
- 8192.3 R23566-US Army National Guard, VT, calling 86OPS (86th Medical), also 6911.5 and 9295, ALE at 2023. (Perron-MD)
- 9MR-Malaysian Navy, RTTY administrative traffic in Malay, at 1606. (Hall-RSA)

- 8280.0 PNRN5-Venezuelan Navy Post, Rio Negro, calling BRIFR15 in LSB ALE, at 0358. (Perron-MD)
- 8293.0 VTP13/14-Indian Navy, RTTY test loop at 1547. (Hall-RSA)
- 8297.7 VTP13/14-Indian Navy, RTTY weather "to all concerned" in English, at 2127. (Hall-RSA)
- 8301.6 Sri Lanka Navy P 621-Former US Coast Guard Cutter Courageous, working Sector San Juan at 1946. (Cleary-SC)
- 8452.7 RFFMEA-French Navy, RTTY test loop to all ships at 2116. (Hall-RSA)
- 8971.0 Wafer 20-US Navy P-3C with Spare Group report for Goldenhawk, ME, at 2128. (Cleary-SC)
- 8992.0 Reach G3-US Air Force tanker relaying message to Qatar via Andrews HF-GCS, at 2224. (Cleary-SC)
- 9007.0 Canforce 4495-Canadian Forces, working Trenton Military at 0005. (Cleary-SC)
- 9025.0 Coast Guard 1504-US Coast Guard, ALE-initiated patch via US Air Force net to Lantarea Command, at 1906. (Cleary-SC)
- 9106.7 Unid-Egyptian MFA, Cairo, working Bonn embassy in Arabic SITOR-A, at 1728. (Watson-UK)
- 9129.7 Unid-Egyptian Embassy, Vienna, Austria, SITOR-A traffic at 1722. (Watson-UK)
- 9145.0 RIW-Russian Navy, Moscow, calling RKW95, CW at 1630. (Watson-UK)
- 9145.0 832410-US Army, GA, calling CLH, possibly Hunter Air Field, also on 8056.0, ALE at 1556. (Perron-MD)
- 9198.0 4PO-Chilean Navy, calling CA2 in LSB ALE, at 0057. (Perron-MD)
- 9200.0 Leskoviku-Albanian Army, calling Shebeniku, ALE at 1904. (Watson-UK)
- 9316.7 Unid-Egyptian MFA, Cairo, working Asmera, Eritrea, in Arabic SITOR-A, also listening on 9226.7 and 14566.7, at 1655. (Watson-UK)
- 10045.0 4XZ-Israeli Navy, Haifa (M22), CW marker at 1852. (Watson-UK)
- 10066.0 SU0106-Aeroflot flight working Hat Yai ground station, Thailand, in HF DL at 1526. (Watson-UK)
- 10075.0 SU0106-Aeroflot flight working Bahrain ground station in HF DL, at 1616. (Watson-UK)
- 10081.0 ZS-SFI-South African Airways flight 527, HF DL position (west of South Africa), at 0412. SAA400-South African Airways, HF DL position (similar) at 0544. G-VSHY-Virgin Atlantic flight 200, HF DL position (South Pacific) at 1450. (Glenn Blum-TX) [Good DX. -Hugh]
- 10100.8 DDK9-Hamburg Meteo, RTTY weather, parallel on 8581.5 and 16449.2, at 2123. (Hall-RSA)
- 10183.0 "Sierra-3-Delta"-US military, 3 EAMs at 2340. Same station came back as "7-Oscar-Bravo," next UTC day's call, with 3 EAMs at 0016. (Jeff Haverlah-TX)
- 10242.0 25C-DEA aircraft, working Panther at 2047. (Cleary-SC)
- 10626.0 RFFXL-French Forces in United Nations Interim Force in Lebanon, Naqoura, with ARQ traffic to RFFAB, Paris, at 1609. (Watson-UK)
- 10691.5 814388-US Army, KY, calling HTR, probably Hooter Ops, Ft. Campbell, KY, also 8056 and 9145, ALE at 1941. (Perron-MD)
- 10818.0 "I-7-W"-Joint US Coast Guard and Colombian Navy Patrol, sending "I-3-D" to frequency "Blue/Azul-6," at 2318. (Cleary-SC)
- 10993.6 Shark 14-Probable US Coast Guard, working Sector Key West at 2342. (Cleary-SC)
- 11175.0 SAM 8570-US Air Force Distinguished Visitor flight, phone patch via Offutt HF-GCS, stepped on by Offutt with a scheduled EAM, at 1531. Pelican 712-US Navy P-3, patch via Offutt to Fiddle, FL, at 1543. Offutt, working Andersen Training at 1546. (Haverlah-TX) McClellan, CA, EAM with interference from unid male making rude noises, at 1807 (Sevart-KS) Elmendorf-US Air Force HF-GCS, working Reach 1009, who required assistance, at 2256. (Perron-MD)
- 11205.0 Hunter 16-Canadian Forces, working Halifax Military at 2133. (Cleary-SC)
- 11205.0 Smasher-US Joint Task Force, FL, working Shark 84 (a C-130), at 1621. (Cleary-SC)
- 11205.0 Smasher-US Joint Task Force, FL, taking position of aircraft R24181, at 1425. (Perron-MD)
- 11229.0 Appetizer-US military, working Brown Recluse and calling Optional, at 1953. (Cleary-SC)
- 11232.0 Trenton Military-Canadian Forces, taking formatted report from Razor 33 (US Air Force E-8 JSTARS), at 1550. Trenton, working Atlas 41 at 1849, Canforce 2699 at 1905, and Canforce 2705 (a C-130) at 2150. (Perron-MD)
- 11427.5 MAE-Algerian MFA, Algiers, with ALE-initiated skyfax to TRP, Tripoli, Libya, also on 11472, at 1151. (Watson-UK)
- 11475.0 TNS-Algerian Embassy, Tunis, Tunisia, working MAE, Algiers, in ALE at 1044. (Watson-UK)
- 12710.5 PWZ33-Brazil Navy, RTTY warnings in English, at 2131. (Hall-RSA)
- 12745.5 JJC-Tokyo Radio, slow FAX Kyodo newspaper in Japanese, at 1556. (Hall-RSA)
- 13200.0 Titan 20-US Marine KC-130, patching Titan Ops via Andrews HF-GCS, at 1941. (Cleary-SC)
- 13321.0 ZS-SFF-South African Airways flight 144, HF DL position for Johannesburg at 1208. (Hall-RSA)
- 13510.0 CFH-Canadian Forces, Halifax, FAX weather chart at 1625. (Privat-France)
- 13538.8 ZSJ-South African Navy/ Air Force Meteo, Silvermine, FAX weather chart at 1551. (Hall-RSA)
- 13886.5 Unid-Moscow Meteo, FAX weather chart at 1632. (Hall-RSA)
- 13927.0 Pack 11-NH Air National Guard tanker, MARS patch to Pack Control at 2050. (Sevart-KS)
- 13993.0 AFA4C-US Air Force MARS, calling Ramstein at 1833. (Sevart-KS)
- 14467.3 DDH8-Hamburg Meteo, RTTY weather at 1451. (Watson-UK)
- 14629.7 Unid-Egyptian MFA, Cairo, calling Bonn, Germany in SITOR-A, at 0954. (Watson-UK)
- 14757.0 P16CAV-Unknown US Army, ALE sound at 2116. (Perron-MD)
- 14761.5 HONDO1-US Army, calling SKYWAT (Skywatch, Honduras), ALE at 1901. (Perron-MD)
- 15016.0 Offutt-US Air Force HF-GCS, several EAMs at 0002. (Sevart-KS)
- 15025.0 LH8419-Lufthansa flight, with HF DL position at 1614. (Watson-UK)
- 15025.0 Shark 66-US Joint Task Force, relaying to Smasher for Shark 80, at 2255. (Cleary-SC)
- 15920.0 CFH-Canadian Forces, Halifax, all-warships RTTY loop at 2129. (Sevart-KS)
- 15988.0 DDK7-Hamburg Meteo, RTTY weather at 0735. (Hall-RSA)
- 16144.5 WAROPS-US Army, Soto Cano, Honduras, ALE sound at 1723. (Perron-MD)
- 16155.0 GYA-UK Royal Navy, Northwood, FAX weather chart on additional North Atlantic frequency, at 1355. (Watson-UK)
- 16813.0 UAT-Moscow Radio, CW identifier in ARQ marker at 1609. (Hall-RSA)
- 16840.5 4XZ-Israeli Navy, Haifa (M22), CW marker at 1516. (Watson-UK)
- 16879.0 LZW-Varna Radio, Bulgaria, SITOR-B traffic list at 1453. (Watson-UK)
- 16951.5 6WW-French Navy, Dakar, Senegal, RTTY test loop at 1202. (Hall-RSA)
- 17458.5 A090ZN-Army National Guard, AZ, calling A092ZNEMERGEN, an emergency unit, ALE at 1655. (Perron-MD)
- 17982.0 India Victor-Brazilian Air Force flight inspection group, ALE sound at 2154. (Perron-MD)
- 17988.0 PTH-US Coast Guard, Port Huron, MI, ALE sound at 2138. NOJ-US Coast Guard, Kodiak, AK, ALE sound at 2151. (Perron-MD)
- 17994.0 Trenton Military-Canadian Forces, working Canforce 4407 regarding bad weather, at 1844. (Perron-MD)
- 18237.9 ZSJ-South African Navy, Capetown, FAX weather chart at 1547. (Watson-UK)
- 18757.0 RFGW-French MFA, Paris, FEC idler at 1650. (Hall-RSA)
- 19103.5 SKYWAT-US Army, Honduras, calling RUH981, ALE at 2031. (Perron-MD)
- 19615.9 Unid-UK military, Piccolo in multi-channel VFT, encrypted traffic at 1037. (Watson-UK)
- 20056.7 Unid-Possible Egyptian MFA, Arabic SITOR-A traffic at 1015. (Watson-UK)
- 20810.6 KWK95-US State Department embassy net, calling KWK96, ALE at 2113. (Perron-MD)
- 22403.0 UIW-Kaliningrad Radio, CW identifier in ARQ marker, parallel 16833.5, at 1600. (Hall-RSA)
- 22446.7 FUV-French Navy, Djibouti, RTTY test loop at 1145. (Hall-RSA)
- 22744.0 "Radio Olivier"-Unknown station with voice loop in English and Spanish, "...call us on 806 [8210 -Hugh], 12320, 16400, 22744" at 1550. (Hall-RSA)

The Versatile Frequency Manager

We can all do with a little help from the computer to improve our digital listening experience from time to time. It's been about four years since I last took a look at Ingenieurbüro feur Satellitentechnik's (IFS) PC Frequency Manager suite, but owner Roland Proesch has been hard at work over the years improving the program and expanding its capabilities.

Delivered on CD-ROM, the program will work on any PC running Windows 98, NT, 2000 or XP. The company recommends a Pentium III processor speed of at least 1GHz and 50Mb of free disk space; however, I installed and successfully ran the latest version on a 350MHz Pentium II system. Even though it was understandably a little sluggish, it was still perfectly usable on this somewhat outdated equipment.

Up and Running

Installation of the program is straightforward and requires an email to be sent to IFS for a registration key. I received my key within a few minutes of sending the email early on a Saturday morning (you can also fax or phone for your key).

Configuration of PCFM is similarly easy and requires a choice of language (English or German), your location (latitude and longitude), the hard drive paths to your digital decoder and DRM (Digital Radio Mondiale) decoder programs if you have them, and your favorite propagation prediction program.

If you've not used a program like PCFM before, there is a very extensive, 300 page manual in PDF included on the CDROM, which provides a very solid background to utility listening and digital systems, in addition to the operation of the program itself.

Integrated Databases

PCFM7.0 packs a lot of very useful functions into a highly integrated suite:

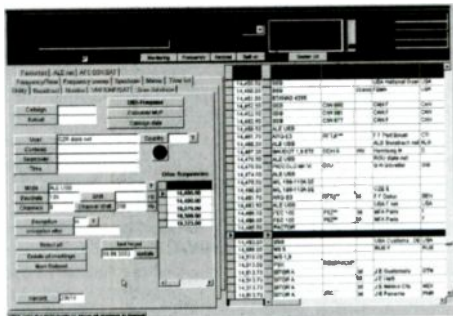
- Databases for callsigns, HF utility and broadcast stations, weather stations, previously active utility stations, VHF/UHF and satellite stations
- Various propagation analysis, prediction and antenna pointing tools
- Descriptions and audio clips of many data signals
- Radio control functions (supporting many popular receivers)
- Digital decoder control functions (most useful with the Hoka Code300-32 system)
- ATU-80 Arabic translations (very useful for listening to the Egyptian diplomatic service)
- ITU and ISO three letter country codes (essential for good logkeeping)
- The DJ0SX satellite prediction program

PCFM provides detailed databases covering utility, broadcast and spy "number" stations. These are all accessed by clicking the appropriate database

button on the program's home screen. Figure 1 below shows the screen after selecting the utility database, where frequency, callsign, time, location, and system information (such as whether or not the signal is encrypted) are all included.

There are some nice touches here, too. For example, clicking on any of the database entries shows other frequencies on which the same station or network appears. You can immediately jump to these frequencies by double clicking on them. You can also see that switching between any of the databases is a simple matter of selecting the appropriate "tab".

You can also tune one of several radios directly from a database entry or have the database follow you along as you tune. The program can plot a path from your location to the signal transmitter or check the likely propagation and field strength for the time of day and frequency (more on these features later).



The utility database contains about 3,000 entries. There is also a database of over 10,000 historical utility frequencies, which are sometimes useful in providing clues to an unknown or new signal.

You can also check information on over 12,000 ICAO weather stations, 10,000 irregular callsigns, 125,000 ITU-registered callsigns and other station identification information.

If your favorites are the spy "numbers" stations used by various intelligence agencies to send coded messages to agents in the field, IFS provides a database of many thousands of frequencies identified by the ENIGMA numbers station monitoring group's classifications.

Most importantly, PCFM's databases are not just read-only. You can add your own entries or edit and delete existing information as you wish. Import from simple database formats is also possible, although we didn't try this feature.

PCFM also includes a built-in bandplan, so regardless of where you live, you can see precisely what kind of stations you can expect to hear in a given portion of radio spectrum.

Propagation Tools

A good knowledge of radio propagation is vital to getting the best out of any kind of HF listening, and utility stations are no different. PCFM helps out on this front, too. If you are lucky enough to have a directional "beam" antenna, or if you are interested in bearing and distance (via the long path or short path) to any station from your location, this is easily calculated and displayed in various user-selectable formats, including a world map.

For newly discovered and unlocated stations, an analysis of prevailing conditions for the frequency and time of day can provide very useful clues as to the possible location of the station.

In Figure 2 you can see the expected field strength contours from Maine to Beirut on 8100kHz at 0200UTC, which tells us that a 1kW transmitter should be audible at that time and frequency.

PCFM also provides a number of different plots of estimated signal strength from any location to yours (or another location). This analysis can also be done for any location in order to estimate the likelihood of hearing the station over a 24 hour period given a user-specified fixed frequency or across a range of frequencies. The results can be plotted in a 3D or 2D graph or as field strength contours on a world map. These are some incredibly powerful and useful tools.

There are a number of preset locations to choose from, although these can be deleted, added to or edited to your own preference. We found the default list of locations to need some work as they appear to be derived from weather station locations and airfields rather than, for example, major cities of the world, which would probably be more useful. However, as a simple and convenient workaround, you can also choose start and/or end locations by pointing to its position on a world map.

❖ More Next Month

Next month we'll conclude our review with a look at additional databases and radio control using PCFM. If you can't wait until then for the bottom line, PCFM is \$99 plus \$15 for worldwide shipping from IFS, Muehlenweg 11, 24217 Stakendorf, Germany; telephone +49 4344 6758, fax +49 4344 5154; <http://www.frequencymanager.de>

That's it for this month. Happy digital DXing



Glenn Hauser

P.O. Box 1684-MT, Enid, OK 73702

glennhauser@monitoringtimes.com

www.worldofradio.com

Dr. Eugene Scott, R.I.P.

The seemingly limitless lung capacity of Dr. Gene Scott and his nonstop University Network broadcasts on several SW stations was interrupted UT February 22 at 0132 for an announcement by his wife Melissa that he had died an hour before, first reported to us by Jim Moats, OH. A funeral, or rather "send-off ceremony" was to follow the next Sunday, and then Pete Fountain's version of *Just a Closer Walk with Thee* was repeated over and over for hours, as noted by Fred Waterer, ON. She said that his final day was quite painful; it was known that he had been suffering from cancer, but subsequent obituaries said it was prostate cancer, not lung cancer as expected from all his cigar-puffing on camera. Actual cause of death: a stroke. He was 75.

By the following day it was business as usual. Few of his broadcasts had been live anyway, but drew on an immense tape library of previous sermons, which could continue indefinitely for years, should his heirs choose to spend his fortune that way. His sermons included profanity, denunciations of his incompetent staff, and stare-downs demanding money: "Get on the telephone!"

He lived lavishly and did not hide it, but was also a philanthropist

for causes in the Los Angeles area. Mark Travis, his chief of staff, said the ministry was taking in more than \$1 million a month.

Rev. John Cereghin, DE, told *DX Listening Digest*, "I really can't see Scott's broadcasting empire continuing much longer. Scott dominated his University Network and left no clear successor at his Los Angeles church. The best candidate to take over would be his "disciple", E. C. Fulcher of Abingdon, Maryland, who has built his own media network. Will the King's Houses and Scott's other supporters keep sending in money for whoever will follow Scott? Unlikely, as Scott never really prepared the way for anyone to follow him. He was a charismatic radio personality who is not easily duplicated, most of all in the minds of his followers. This makes for an interesting scenario of what happens to all that transmitter time that would be freed up if the University Network does fold up."

Three weeks later, his tapes were still going strong on WWCN 13845/5935, Caribbean Beacon, Anguilla 11775/6090, KAIJ Dallas 13815/5755, and his own Costa Rican outlets on 5030, 6150, 7375, 9725, 11870, 13750.

ANTIGUA A-05 schedule of Deutsche Welle revealed that they would abandon the Antigua transmitters as of March 27 and replace them by Montsinéry [see GUIANA FRENCH] (Kai Ludwig, Germany, *DX LISTENING DIGEST*) DW has been co-owner of the Caribbean Relay Co. there along with BBC from the outset. Presaging this were the DW DRM tests via GUF in Feb (gh)

Not only DW, but BBC is also moving most of their Antigua transmitter-hours to Montsinéry. A few hours move to Bonaire. Appears there will be a net loss of transmitter hours to the region in English (Richard Cuff, PA, *DXLD*) So what is the root problem at Antigua? Is it being phased out? Transmitters conking out? Temporarily down for refurbishing? (gh)

Money-saving activity. For the BBC it appears there's a net gain - yes, they'll pay rental fees to TDF but will save over what it would have cost to run Antigua. I don't know if DW's economics are similar. Bonaire and Antigua are run off diesel generators. Crude oil at \$53+ per barrel probably doesn't help. Long-term plans aren't certain, but the facility could potentially be sold. Where will the savings go? Probably to Middle East radio & TV services. It would seem that TDF, Merlin, and the broadcasters realized there was excess capacity among Montsinéry, Antigua, and Bonaire - and that it made collective economic sense to operate two facilities each at, say, 80% of capacity vs. three facilities each at 55% capacity (Rich Cuff, *ibid.*) Decided at short notice? I saw an A05 schedule for VT, still with the usual Antigua transmissions and nothing at Montsinéry (Kai Ludwig, Germany, *ibid.*) Appeared BBC would also no longer be on WYFR transmitter; see U S A (gh)

BELGIUM [non] Partial reprieve? RVI announced that although programs in English would end, there would still be news in English several times a day (Ed Stone, *DXLD*) Seven times a day (Larry Nebron, CA, *ibid.*) According to the French redaction, English news will be transmitted via Astra satellite only (JM Aubier, France, *ibid.*)

Wim Janssen, director of RVI, appeared on VOA Talk to America March 4. The cuts are not primarily for financial reasons, but for the survival of RVI in the next 5-10 years. There will be English news and features in text on the website, and in audio, headline news in English. RVI is in the same building as RTBF, but they barely talk to each other (gh)

RTBF via Germany, 17570 at 1804, slow-tempo tango-jazz with Arabian influence, and Breton reels (accordion or concertina), excellent signal, great music program (Eric Bryan, WA, *DXLD*) This relay of RTBF's domestic La Première radio service has been coming in well on 17570 from 1530 to 1830 (sometimes later) on weekdays. There's music in the half-hour beginning at 1530. After 1600, an hour-long "Dictionary Game" panel show. The 1700 hour is mostly news (including

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

all-important Brussels traffic reports), while more music creeps in during the 1800 hour. I enjoy this broadcast largely because it's a rare direct SW relay of a domestic European broadcaster (Mike Cooper, GA, *ibid.*) Perhaps all one hour earlier during DST (gh)

BRAZIL Due to ute interference on 3235, R. Guarujá Paulista has been assigned a new frequency, 3385, but first experimented with 3400; reports wanted (Sarmiento F. Campos, Rio de Janeiro, *condiglist*) radioguaraajaam@radioguaraajaam.com.br (Rudolf Grimm, SP, *bcnews.it*) 3400 heard at 2233-2314, international songs, TCs, slogan "Guarujá Paulista - A Rádio da Família!" (Carlos Gonçalves, Portugal, *Conexión Digital*) Since 3400 is on the boundary with the aero band, they might get some complaints (gh) From March 8 at 0230 heard on 3385 ex-3400, (Francisco Jackson dos Santos, *radioescutas*)

CANADA RCI Ukrainian service has been reduced much more than most people realize: no longer on SW, and only on cable around Kiev! And CBC president Robert Rabinovitch says the decision is "final." Staff at the service is in shock and doesn't know where to turn for support. Senator Raynell Andreychuk brought the issue up a number of times, as has the Ukrainian Canadian Congress. But everyone is trapped in a Kafkaesque bureaucratic nightmare [everyone passing the buck]. A popular daily radio program from Canada has been reduced to two half-hours: one on Saturday, one on Sunday. Weekend programs do not have newscasts, since they're pre-recorded on Fridays (Wojtek Gwiazda, RCI Action Committee)

CHILE For two weeks in February, the Portuguese service of Christian Voice at 0400-1100 was way off nominal frequency, 11890, instead monitored varying around 11801 and on some days around 11849. Finally returned to 11890 after I notified them in Miami (Wolfgang Büschel, Germany, *DXLD*) Why didn't they notice before that?? Or any of their target listeners? (gh)

CHINA Voice of the Straits, Fuzhou, 4940, heard with a program in English, Focus on China, Sat and Sun at 1430-1500; seemed to be mostly business related (Ron Howard, Monterey, CA, Walt Salmaniw, Victoria, BC, *DXLD*) see <http://www.vos.com.cn/enroot/> (Jari Savolainen, Finland, *ibid.*)

[non] CRI A-05 relays via Cërrik, Albania to ENAm: 0000-0157 English and 0200-0357 Chinese, all at 305 degrees with 2 x 150 kW transmitters in parallel (Observer, Bulgaria)

CONGO Maintenance and Renovation of Broadcast Station in Djoué. Overall Contract: A SW transmitting station including civil construction and equipment supply, installation and adjustment of 2 sets of 50 kW SW transmitters, 3 sets of antennas and feeders with transformer-switch, corollary equipment, electric generating set, distribution apparatus, air-conditioning, etc.: Under construction (China Radio & TV Corporation for International Techno-Economic Cooperation (CRTV) <http://www.crtv.com.cn/en/index.htm> via *DXLD*)

CONGO DR [non]. R. Okapi heard in French 0400-0600 on 11690, too strong to be their 10 kW transmitter; now relayed? (Walt

Salmaniw, Victoria, BC, HCDX) Sounds too strong, too good an audio and too good a delivery (Don VE6JY Moman, Lamont, Alberta, *ibid.*) Good signal on 11690 with interviews, listeners questions about elections, music. Website <http://www.radiookapi.net> indicates they have a new 2-hour program at 0400 on 11690 covering the whole country (JM Aubier, France, DXLD) Informed source says it's via Meyerton, South Africa (Bernd Trutenau)

CZECH REPUBLIC Czech Radio has organized a unique reconstruction of the battle for the station against the Nazis in 1945, part of 60th Anniversary of the end of WW II. The re-enactment will last around 40 minutes, 7th May 2005 at 13 UT in front of the Czech Radio building on Vinohradská Street. No doubt the English service of R. Prague will also cover this (Jonathan Marks, Media Network blog) If live, at that hour on 21745, 13580 (via Michael Bethge via Wolfgang Bueschel via Andreas Volk via Alokesh Gupta)

ECUADOR HCJB has been recording and will soon be broadcasting programs in the Cofán language, for an indigenous tribe in the Amazon rain forest of Ecuador and Colombia, M-F as soon as radios fix-tuned to 6050 are distributed to the people (HCJB press) Time? Fixed-tuned radios are a common tactic of missionaries and North Koreans (gh)

EGYPT The head of the Egyptian Government, Dr. Ahmed Nazeef, decided to replace the Media Minister, Mr. Mamdoh El Beltaagy, with the Youth Minister, Mr. Anaas El Feqy. Hope the new media minister will reconsider ceasing some of Radio Cairo's overseas broadcasts (Tarek Zeidan, Cairo, DXLD)

FINLAND The YLE Radio Finland situation as of mid-Feb: Since June 2004 there has been public discussion about the future of international free-to-air radio in Finland. The major organization representing Finnish nationals abroad (Suomi-Seura, Finland Society) has underlined the view that reception of free-to-air radio from Finland is a "subjective" right of the expats. The organization, headed by former foreign minister and Labour Party chairman, Mr Pertti Paasio, has worked intensely on the matter. For example, they had some 30-thousand copies of a leaflet printed focusing on the cost to the consumer of (a) SW (b) mobile phone internet and (c) satellite services.

Then the Finland Society handed in a petition representing some 15,000 Finnish expatriates, to the chairman of the Parliamentary controllers of YLE, MP Mika Lintila. The issue became the high cost to the consumer of the use of mobile internet. Mr Lintila said that mobile phone internet probably cannot replace radio via shortwave.

YLE has made no decisions about the future of its SW. Current agreement concerning distribution with Digita/TDF runs out at the end of 2006. The popularity of Radio Finland amongst expats may be attributed to the fact that in the early '90s, R. Finland broke away from traditional international broadcasting formats and introduced continuous all-day flows of programming. Live domestic and international sports is a key attraction.

Within YLE, the future of SW and MW is an issue at the corporate level, not handled within the external broadcasting branch only. No decisions have so far been taken. In 2002 YLE closed all foreign language external services, except Russian and some small languages spoken in Russia. The closures did not arouse much protest, except to some extent from the German area. The reaction to the possibility of closing now Finnish and Swedish has been surprisingly vast and intense, and may be unique in recent expatriate media discussions, internationally. Radio Finland has not, repeat not been involved in these campaigns (Juhani Niinistö, YLE R. Finland, Media Network blog)

FRANCE DRM from Issoudun on 6175 heard from early March, scheduled 0700-1100, 1200-1900 and 2200-0600 (Kai Ludwig, Germany, DXLD) Now no chance to hear anything +/- 20 kHz from 6175 here in Europe (Wolfgang Büschel, *ibid.*) Another racket to contend with on 49 mb, S9+15dB with lots of hash each side, and even audible on 6190 (Noel R. Green, UK, BC-DX)

GEORGIA R. Georgia, from late February on 11805.00 exactly, for the first time in years; formerly 70 to 140 Hertz above; and well-performing audio, minimally distorted, but tolerable. Maybe the technicians at Dusheti overhauled the equipment recently. Same for 11910.00 English at 1030, also scheduled at 0930 (Wolfgang Büschel, Germany, BCDX, DXLD)

GERMANY [and non] DW A-05 English, nothing to NAM, of course, but selected frequencies for elsewhere that we may hear: 0000-0100 9825; 0400-0500 7170, 11945; 0500-0600 9630, 9700, 15410; 0600-0700 7170, 15275, 17860; 1600-1700 17595; 1900-2000 13780, 15520; 2000-2100 11865, 13780, 15205; 2100-2200 9440, 11865, 15205; 2200-2300 9720; 2300-2400 9890 (gh, from sked via Alokesh Gupta, India, DXLD)

[and non] Jewish leaders expressed relief after a federal court judge ruled that Ottawa was free to deport infamous holocaust denier Ernst Zündel back to his native Germany. He had been in solitary confinement in a Toronto jail for the past two years on a national security certificate signed by Canada's solicitor general and the federal minister of citizenship and immigration (CTV News via Fred Waterer, DXLD) At 2100 UT March 2, Ernst Zündel arrived at Frankfurt. He was arrested and brought to Mannheim for further proceedings (Kai Ludwig, Germany, *ibid.*) Zündel had a program, Voice of Freedom via WRNO, New Orleans, heard Feb 28, 1994 at 2200-2230 on 15420 and QSLed with a raft of Neo-Nazi propaganda (Edward Kusalik, AB, ODXA)

GREECE [non] V. of Greece A-05 via US relays: Delano: 15190 0600-0800

296° (Sat & Sun 0600-0700); 9775 1200-1500 075° (Sat and Sun 1200-1600); 17705 1600-2200 075°. Greenville: 17565 2000-2200 164° (Ch. Charalampopoulos, ERT, via John Babbis, DXLD)

GREENLAND KNR, 3815-USB, heard on our DXpedition between Venice and Trieste with a 450 m beverage aimed 330 degrees, at 2137-2214, talk in Danish recorded and confirmed by Anker Petersen (Alessandro Gropozzi, *et al.*, DXLD) Also recognized the voice of the newsreader relayed from Denmark at 2200 (Petersen, DX Window) KNR Tasiilaq presumed the one or 3815.00 USB from 2103 to 2215°, also heard by Noel Green (Mike Barraclough, UK, DXLD) Also heard from 2100 well past 2200 on two occasions (Jan Edh, Sweden, SW Bulletin)

GUIANA FRENCH DW and BBC relays were supposed to move here for A-05; but in February, the Montsinéry site was reported with numerous problems relaying the stations it already had - audio dropouts, totally missing broadcasts of RFI and R. Japan (Thierry Fricot, México, Roman Mora, Costa Rica, and Adan González, Venezuela, DXLD; Celio Romais, Brasil, *condiglist*) See ANTIGUA

IRAN IRIB A-05 English, all 500 kW, from K=Kamalabad or S=Sirjan sites, with azimuths: 1030-1130 15600-K-100, 17660-K 109; 1530-1630 9635-S-105, 11650-K-100; 1930-2030 7205-K-304, 9800-S-211, 9925-K-205, 11660-S-313, 11670-K-304, 11860-S-313; 0130-0230 9495-K-336, 11875-S-328 (via Swopan Chakraborty, DXLD)

[non] R. Seda-ye Mellat-e Iran (V. of the Iranian Nation)'s move to 11620 at 1430-1500 did not last long; in late Feb heard on 11625 getting it away from India 11620 and out from under WYFR 11615 skirts (gh) In early March had moved again up to 11630.16 to avoid Iranian jammers but had been followed with generator engine type jammers on 11630 and 11632.68, but a lonely 'forgotten' bubble jammer on 11624.00; jammers may start a few minutes late (Wolfgang Büschel, BC-DX)

KUWAIT Ministry of Info, excellent reception on 11675 in DRM, but unfortunately bit rate so low, 11 kbps, with 5 kHz audio no better than an analog MW station; at least there no fading or variation in S/N ratio (Marcus, PY3CRX/PY2PLL, São Paulo, @*tiividade* DX) B-04 schedule was 2200-0200 in Arabic, 350 degrees, 500 kW. IBB plans to install a fourth SW transmitter here, this one on the tropical band for Afghanistan (gh)

LAOS [non] The Hmong Lao Radio broadcast to NAM via UK Wed & Fri 0100-0200 on 6040 was replaced by Sat 1300-1400 & Sun 1400-1500 via WHRI South Carolina on 15105, hmuch better reception here and no doubt in Hminnesota where the station is based. Included some very rustic hmusic, like a badly tuned wooden horn, toward the end of the hours (gh, OK) !! *Ceeb toom !! Xov tooj cua Hmoob Lostsuas ncuav kev nthuav tawm huab cua nyob rau sab tebchaws America tau hloov mus rau SW2 15.105 kHz raws cov sijhawm nram qab no lawm* (HLR website, mentioning MI, FL, NC, SC, AR, MN, WI, CA, Hmong strongholds)

LITHUANIA R. Vilnius English on 7325 to NAM heard at 0130-0200 (Eric Bryan, WA, and Brian Alexander, PA, DXLD) Had been at 2330, but leapfrogged the repeat at 0030 on 9875, for late B-04 anyway (gh)

MADAGASCAR Pres. Mark Ravalomanana, who attends the Presbyterian Church, was to visit the US in Feb, accompanied by leaders of World Christian Broadcasting, whom he had invited to set up a SW station at Mahajonga on the NW coast. Plans are developing for antennas to blanket Africa, South America, the Middle East, India, Indonesia, southern and western China and European Russia with the gospel. Some confusion arose over the exact location of the land, but the issue was quickly resolved, with World Christian getting the land best suited for construction of radio towers. "The Malagasy people have great respect for written documentation," said Kevin Chambers, Director of Engineering. Even during the years of communist rule, the property rights of Radio Netherlands, which has a SW facility near Antananarivo, were respected by the regime. The Madagascar facility will be similar to the one in Anchor Point, Alaska, in that it will be a transmitting site. Production of programming will continue in Franklin, TN. Program CDs will be shipped to Mahajonga via international courier. The next order of business is to hire a security staff, dig wells for water, install a fence, and obtain electrical power (WCBC)

MEXICO R. Huayacocotla, created in 1965, has finally been granted an FM license after 25 years of waiting (Notimex, mid-Feb via Héctor García Bojorge, DF, *condiglist*) This could be the beginning of the end for 2390 kHz, an assignment considered to be only slightly better than nothing. Let's hope they keep it once the FM is going (gh) 2390 is either off the air or running a very erratic schedule. I did not hear them one time while I was in Central America in February (Harold Frodge, MARE *Tipsheet*)

The Riz DRM transmitter is still at R. Educación, since the DRM Consortium reached an agreement with the Ministry of Communications to do more detailed 26 MHz tests both with Radio Educación and with the CIRT (the association of commercial R&TV stations). They have permission to leave the transmitter in México till July 31 (Jeff White, FL, DXLD) Monitor 25620

R. Educación (analog), 6185, is sometimes in the clear around 0600-0700, after China/Sackville 6190 closes, when Brazil relents, and when propagation from Vatican is not so good, but why not for its entire 12-hour overnight broadcast? Part of the problem is the official Mexican view of SW, which is just like AM and FM: each station has one specific assigned frequency, in use forever, with no possibility of moving as needed to avoid interference. This is totally out of touch with the actual situation on the SW bands. Quite possibly even the Mexican SW stations don't realize they should insist on frequency flexibility (gh)

Shortwave Broadcasting

Glenn, you're right that the problem lies with the government authorities who don't understand that SW stations need to change frequencies. And you're right that the stations themselves don't even understand this need, nor do they ask the authorities for the right to do so. A large part of the problem is that most of these stations' transmitters have fixed frequencies. They are assigned a shortwave frequency by the government, then they go and buy a fixed-frequency SW transmitter tuned to that frequency. R. Educación and R. Mil are now at least in the HFCC master lists, and they do show up as "collisions" with the larger frequency-agile stations (Jeff White, FL, DXLD)

NEW ZEALAND RNZI A-05 until 1 May, when further changes are expected, azimuth 0 u.o.s.: From 0459 11820; 0706 9885; 1100 9885 325; 1300 6095; 1651 6095 35; 1851 9845; 1951 11725; 2051 15720 (via Alokesh Gupta, DXLD)

PAPUA NEW GUINEA I asked Joe Emert for another update on the planned Wantok Radio Light project, 7120; they were behind schedule. Target date now in from late May to early June, with Celebration of the commencement of shortwave planned for June 11 (Guy Atkins, WA, DXLD)

PORTUGAL RDPI plans: second 300 kW Thalès transmitter delivered this year and to be put into service very soon; third 300 kW Thalès transmitter commissioned, possibly in operation by Oct '05; two new Thalès antennas ordered, one intended for NAM coverage (Carlos Gonçalves, Portugal, DXLD)

SAUDI ARABIA A big buzz of slightly oscillating pitch is way otop BSKSA Holy Qur'an Service on 21460, at 1510 past 1530, a malfunctioning transmitter, not jamming or some external interference. No such problem on the French service, 21600. 21460, again another day with huge buzz over audio making it unlistenable, at 1445 and still at 1510 (gh) Same transmitter with same buzz earlier at 0900-1155 on 21495 and before that with first program at 0600-0855 at 17740 (Wolfgang Büschel, harmonics yg)

SOMALIA R. Galkayo, 6980, uses a ham transceiver, into an aging amp at 100 watts, all in a small room, like a pirate. I found no evidence of the reported relay on 9615 in Bassaso. There are only three SW stations being heard in Somalia, the others being R. Mogadishu 6960, and R. Hargeisa 7530. The 40/41 mb is full of rogue radiotelephone setups, and I have heard several RT operations on 20/31/49 mb, a terrible trend (Joe Talbot, Somalia, DSWCI DX Window)

SUDAN [non] Sudan Radio Service (Nairobi studios, VT Merlin transmitters) announced this A-05 schedule, M-F: 0300-0500 on 11665, 0500-0600 on 15325, 1500-1800 on 17660 (Chris Greenway, Kenya, DXLD) Via UK?

TAIWAN Fu Hsing, 3rd program, 15250 heard from 1100, jammed by a siren sound. On 15250 before 1100 is CRI in Chinese via Kunming, but the siren jammer is already on (Mauna Ritola, Finland, HCDX) Nothing but the jammer heard here at 1100, 1235 (Zocharias Liangas, Greece, DXLD) QSL card in Chinese and English after 31 days for my report in Chinese, signed by Mr. Xieyi Zhao, Station Manager. Memory card box, paper knife, and key holder enclosed as souvenirs. He says SW broadcast on 15250 has continued since August 23, 1993, with 10 kW for communication between Taiwan and mainland; welcomes reception reports in English or in Chinese; no reply postage is required. Address: 5, Lane 280, Sec. 5, Chungshan North Road, Taipei 111. URL: <http://www.fhbs.com.tw> E-mail: fushinge@ms63.hinet.net Fu Hsing means "rehabilitation" or "reconstruction" in Chinese (Takahito Akabayashi, Japan, DXLD)

TURKEY VOT A-05 English: 0300-0350 6140 7270; 1230-1320 15225 15535; 1830-1920 9785; 2030-2120 7170; 2200-2250 9830 (Observer, Bulgaria)

UGANDA R. Uganda, 4976, 5026, 7110 and 7195 all active, but irregular. I suspect that neither transmitter has been running at full listed 10 kW for several years. The one on 4976/7195 is noticeably weaker than that on 5026/7110 and is poorly modulated (Chris Greenway, Kenya, DXLD)

[non] from March 1, R. Rhino International Africa temporarily suspended transmission. However, RRIA maintains news updates on our website <http://www.radiorhino.org> (via Alokesh Gupta, DXLD)

UKRAINE On 7440 at 0442 UT Sun, Radio Ukraine International, wonderful S9 + 10 reception, mailbag with lovely music of the Orange Revolution. For Ukrainian speakers, these lyrics never fail to bring a lump in my throat, and tears to my eyes. Beautiful music and very frank, almost apologetic talk in English about not telling the real story in Ukraine before the revolution (Walt Salmani, BC, DXLD) English now at 0000 & 0300 on a higher frequency? (gh)

UK At presstime, there was contradictory information about A-05 BBC relays audible in NAM; see ANTIGUA, GERMANY, GUIANA FRENCH. WYFR originally planned to have BBCWS at 0000-0300 on 11835, but this was replaced with their own programming. However, one VT A-05 schedule still showed 11835 for BBC, followed by another two hours from a secret site, presumably Delano as before (gh)

A government Green Paper suggests BBC World Service undertake a "radical and creative reprioritisation of its vernacular output" which is 42 languages. The 8 languages it currently has online websites for - Arabic, Chinese, Hindi, Persian, Portuguese, Russian, Spanish and Urdu - should be the starting point for the discussion. BBCWS in 16 languages spoken in the former Soviet bloc is beginning to look anachronistic (Mike Barraclough, UK, DXLD) For example, BBC is hogging FM frequencies in the Czech Republic, but the Czechs will never get such an opportunity

in the UK! Time for the BBC to celebrate 60 years of broadcasting to Eastern Europe and retire. There are other areas where it could have far more of an impact (Jonathan Marks, Critical Distance blog)

UNITED NATIONS [non] UN Radio, A-05 in English: M-F 1730-1745 on 7150 via Meyerton, 100 kW, 5 degrees to EAF; 15495 via Skelton UK, 300 kW, 110 degrees to ME; 17810 via Ascension, 250 kW, 65 degrees to W/CAF (VT schedule via Michael Bethge via Wolfgang Bueschel via Andreas Volk via Alokesh Gupta)

USA WRNO New Orleans planned to start testing a new 100 kW transmitter by March 1, 15420 daytime, 7355 nighttime; now owned by a church (George Thurman, TX, WORLD OF RADIO) Had been silent for years, but hardly eagerly anticipated; still no sign of it by mid-March (gh) FCC shows: Good News World Outreach, WRNO, 5601 Bridge Street, 3rd Floor, Fort Worth, TX 76112. Outdated station website <http://www.wrnoworldwide.org/index.html> had nothing about this, but a different address: WRNO Worldwide, c/o Good News World Outreach, P. O. Box 895, Fort Worth, Texas 76101, 817.850.9990 Office, 817.850.9994 Fax, hope@goodnewsworld.org but e-mail bounced; plus imaginary program schedule on 7395 at 2300-0300, even the 7395 is not authorized until after 0300 when WYFR comes on 7355. B-04 schedule, likely similar to A-05: 2200-0300 7355, 0300-1600 7395, 1600-2300 15420. That gives them option of using either 15420 or 7355 during the 2200-2300 hour (gh)

We're having trouble operating on 15725, and FAA Atlanta complained about our use of 6870, saying it is a 24-hour emergency channel for them, and they want us to abandon it completely. Of course the FCC had checked the frequency out for us and approved it. But since it's out of band, utility stations have preference, so we have to move, back to 7385 and expanded to 1300-1000, the other three hours still on 9955 (Jeff White, WRMI, early March)

Progress on our own recently acquired transmitter has been slow due to transit delays and poor weather conditions; however, we hope to have some good news by mid-April. Meanwhile, Europa Radio International begins broadcasting via WRMI Miami March 20, Sundays 1800-2000 on 7385, and Wednesdays 1000-1200 on 9955 to Caribbean [as DST shifted] (Alan Day, Europa Radio International, <http://www.europaradiointernational.co.uk/>)

Glenn: We are testing 15190 at 1730 March 4 with a new rhombic antenna, making RF human exposure measurements, and testing for any signs of meltdowns (Dave Frantz, WWRB) Inaudible here; no doubt hoping to glom onto BBCWS audience after it closes, and despite Equatorial Guinea also on 15190 (gh)

URUGUAY [non] Checking for R. Cimarrona, on a Sunday in mid-Feb at 2245, no trace of it on 9480 via Germany, not even a carrier; so the station appears to be gone. Was Sun & Mon only, 2200-2300 (gh)

VANUATU R. Vanuatu, 7260.17, stayed on after dark, heard between 0950-1120, and during the 1000-1100 hour, a ten-minute tape loop with a Polynesian song followed by male speakers played over and over. Stronger another night at 0842-0950, peaked around S8 using 7.2 MHz delta loop, though it was a more quiet copy on the big inverted L. Female announcer played pop and light Polynesian music with "Radio Vanuatu" mentioned multiple times in local dialect. Terrible QRM from DRM transmission just up frequency [DW Wertachtal, Germany, 7265, 200 kW non-directional], so best heard in LSB or by switching to narrow filter and tuning down slightly. Spectrum pollution from the digital transmission took a full 10 kHz bandwidth, faded almost completely out by 1000. Also a very weak carrier on 3945, but nothing audible (David Hodgson, TN, DXLD) Very strong signal on 7260 at 0630; also audible on 3945 by 0940 (Craig Edwards, Queensland, *ibid.*) WRTH 2005 says they have nominal 10 and 2.5 kW SW transmitters, so which is which? Hope they leave 7260 on at night, even with 3945 going (gh)

ZANZIBAR Neither 6015 nor 11734 heard. Not active on SW at present, I suspect (Chris Greenway, Jan-Feb, Nairobi, Kenya, DXLD)

ZIMBABWE [non] As the March 31 elections approached, opposition station SW Radio Africa was hit by more and more jamming. Added a MW frequency, 1197, presumably Lesotho, at 0300-0500 (gh) But in Zimbabwe that faded out before the first hour. That transmission also via South Africa on 3230; 1600-1900 on 6145, jamming became extreme, so moved to 4880, but also jammed. Jamming appeared to be coming from the ZBC site at Gweru, in Central Zimbabwe (David Pringle-Wood, Zimbabwe, DXLD) 3230 weak but audible from 0301 (Scott R. Barbour, Jr., NH, *ibid.*) 3230, 0315-0345+ poor in noise and slight co-channel QRM from numbers station on high side (Brian Alexander, PA, *ibid.*) SWRA announced it would use both 3230 and 6145 at 1600-1700, 3230 1700-1900 (via Mike Terry, DXLD)

Two jammers could switch among the three frequencies in minutes. Then SWRA added a third frequency at 1600-1700, 11845 via Ascension. Check <http://www.swradioafrica.com> for latest (David Pringle-Wood, Harare, DXLD) Zimbabwe also stepped up jamming before elections three years before (Wolfgang Büschel, Germany, DXLD) 11845 with nice signal at 1622 (Jari Savolainen, Finland, *ibid.*) Would be interesting to know if ZBC is on SW when SWRA is jammed. If not, while two frequencies jammed, we should know how many transmitters are there in working condition at Gweru and how many // frequencies SWRA will need (Thorsten Hallmann, Germany, *ibid.*)

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

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com

0000 UTC on 3249.8

HONDURAS: Radio Luz y Vida. Christian songs to promo and ID to local time check. Greetings and special thanks to **Radio Sonagera** 1250 AM for relaying their programming. Honduran HRMI 3340 at 0100. (Fernando Garcia, Baltimore, MD)

0041 UTC on 5019.91

PERU: Radio Horizonte. Spanish music to regional time check and ID, "por las ondas de Radio Horizonte...para todo el Peru." (Arnaldo Slaen, Buenos Aires, Argentina) Peruvians monitored: **Radio Huancabamba** 6536.15, 0055-0111; **Reina de la Selva** 5486.7, 1028-1043; (Scott Barbour, Intervale, NH) **Radio Tarma** 4775, 0125-0148 with Spanish ads and IDs. (Gayle Van Horn, NC)

0200 UTC on 7180

RUSSIA: Voice of. News on Ukrainian political scene to segment on Czar Peter the Great. Folk music to interval signal. Station ID to news service. Reception easier than previous night's propagation. (Dan Malloy, Everett, MA; Roger Nash, Heber Springs, AR)

0338 UTC on 4775

SWAZILAND: Trans World Radio. Sign-on IDs and announcements in listed Lomwe programming. Audible 3240, 0340-0347* (Rich D'Angelo, Wyomissing, PA/NASWA Flash Sheet) Audible 9500, 0500-0510 with religious format with moderate signal amid utility interference, // 6120. (Jim Evans, Germantown, TN/NASWA)

0356 UTC on 4915

BRAZIL: Radio Anhanguera. Lite vocal music to full identification and Portuguese station promo at 0402 with mentions of Macapa. SIO 433. Brazil's **Radio Nacional** 4915, 2250-2333+; **Radio Record** 6149.8, 0750. ID and mentions of Sao Paulo to religious format. (Garcia, MD) **Radio Nova Visao** 5965, 0900 with **Radio Transmundial** relay; **Radio Cult-Ondas Tropicais** 4845 at 1001. (Garcia, MD); **Radio Guaraja** 3235, 0925; **Radio Alvorada** 2460 at 0910. (Alvin Mirabal, Puerto Rico) **Radio Inconfidencia** 6010.2, 2232-2240. (Arnaldo Slaen, Buenos Aires, Argentina).

0450 UTC on 7290

SAO TOME: VOA relay. *Music Time in Africa* focusing on pop music's African musicians. ID/freq at close of transmission //6080 weaker //4960 poor. (Evans, TN)

0830 UTC on 6080.6

BOLIVIA: Radio San Gabriel. Spanish/Aymara. Sign-on into taped religious crusade. Andes flutes to Spanish sermon. **Radio San Miguel** 4902.22, 935-1030 (Robert Wilkner, Pompano Beach, FL/DSWCI); **Radio Pio Doce Lallagua** 5952.5, 1000 with news and promos. (Garcia, MD) **Radio Mosoj Chaski** 3310, 0935 (Mirabal, PR) 3310, 2323-2336. (D'Angelo, PA)

1126 UTC on 4925

INDONESIA: RRI-Jambi. Indonesian. Talk to traditional station interval signal at 1130. Half-hour updates to resumed Indo music program. **RRI-Pontianak** 3976, 1115-1137 (Frank Hillton, Charleston, SC) **RRI Jambi** 4925, 1113-1137 Poor/fair for Indo and Koran recitations. **RRI-Fak Fak** 4789.98, 1111-1130. (Barbour, NH)

1135 UTC on 3260

PAPUA NEW GUINEA (New Guinea Territory) Radio Madang. Program of vocals music to English/Pidgin script. Poor to fair signal quality. PNG's monitored; Papua Territory-**Radio Southern Highlands** 3275, 1155-1218; Admiralty Islands-**Radio Manus** 3315, 1142-1153; Bougainville Islands-**Radio Bougainville** (tentative) 3325, 1200-1201*; New Ireland-**Radio New Ireland** 3905, 1143-1215; New Guinea Territory-**Radio Simbu** 3355, 1200-1205*; New Britain Island-**Radio East New Britain** 3385, 1210-1235; Papua Territory-**Catholic Radio Network** 4960, 1228-1256. (D'Angelo, PA)

1228 UTC on 7185

BANGLADESH: Bangladesh Betar. English service sign-on interval signal. Station ID and "tinny" fanfare tune into news. Rough copy but able to detect Asian news briefs. National cultural program at

1244 to regional news. Poor signal although better than it was earlier this season. (Barbour, NH)

1246 UTC on 9525

POLAND: Radio Polonia. German service to 1255, followed by interval signal intro for English service at 1259. Poor signal for identification and national news at 1300. (Barbour, NH)

1615 UTC on 13675

CANADA: Radio Austria Int'l relay. Great signal for *Report From Austria* program (Bob Fraser, Belfast, ME; Nash, AR)

1942 UTC on 11585

ISRAEL: Kol Israel. News and interviews on the Holocaust. Monitored on 6280, 2016 with news update on aid to Sri Lanka tsunami victims. (Fraser, ME) **Galei Zahal** 6973, 2140+ in Hebrew. (Harold Frodge, Midland, MI)

2149 UTC on 5030

BURKINA FASO: Radio Burkina. French talks to African high-life and pop vocals. ID to news and sports update. Fair signal with only minimal fading. (Tom Banks, Dallas, TX; Frodge, MI)

2216 UTC on 4915

GHANA: Radio Ghana. Male DJ format with English phone calls to rap music. Male/females news and remotes to "the news comes to you from Radio Ghana." (Frodge, MI)

2230 UTC on 6165

CHAD: Rdiffusion Nationale. Vernacular text into African light music and few talks. Interference from Croatia, which is perhaps not such a problem to European DXers in skip zone. Fair signal quality. (Carlos Goncalves, Portugal/DWSCI) Additional African's logged as; **Benin-Radio Parakou** 5025, *0457 with anthem, "ici Parakou, station ..." with mention of freqs and time for weak signal. **Botswana-VOA** relay 4930, 0435-0445 //4960, 6080, 7290, 9575. (Anker Petersen, Skovlunde, Denmark/DSWCI) **Morocco-RTV Marocaine** 15345, 1754 Arabic; **Morocco-VOA** 14240, 1743 English; **Gabon-Afrique Numero Un** 15475, 1802 French. (Mirabal, PR) **Angola-Radio Nacional** 4950, 2119-2139. (Barbour, NH)

2253 UTC on 7295

MALAYSIA: Radio 4/Radio Malaysia. Easy listening and lite pops to "Radio 4" spot. Tentative Radio Malaysia ID before news at 2300. (Frodge, MI)

2300 UTC on 4845

MAURITANIA: Radio Mauritanie. Presumed news service in Arabic to traditional music at 2315. Good signal bothered by fading, SINPO 34333. (Evan, TN; Frodge, MI)

2326 UTC on 9800

CANADA: CBC. Deutsche Welle DRM English broadcast via CBC, language lesson and ID. Radio Sweden DRM English via CBC with *Studio 49* program. Reception excellent (digital reception is either excellent or non existent, there is no in between). Using NRD-545 receiver set to -5 kHz of desired frequency, USB, BWC 9.99 kHz and +2.30 PBS. Using phone out from receiver to PC sound card line-in. Running DRM version 1.17 (precompiled sharware) on PC. (Kraig Krist KG4LAC, Annandale, VA) Kraig, thanks for the DRM log -GVH

2333 UTC on 7125

GUINEA: Radio Nationale du Guinee. French promo for "Histoire de la Guinee," plus ID as "Radio Nationale du Guinee" to national anthem and sign-off. SIO 343+. (Frodge, MI)

2342 UTC on 6856

PIRATE: The Crystal Ship. Nice mix of music by the Poet. Music included several tunes by the Romones, Warren Zevon and the Stones (*Paint it Black* and *Under Your Thumb*) from 23456-0000. Station identification "you are on board the Crystal Ship, plundering the airwaves." First log on this frequency. (Joe Wood, Greenback, TN)

Thanks to our contributors - Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times (or e-mail gaylevanhorn@monitoringtimes.com)
English broadcast unless otherwise noted.

The Spring-Summer Catalog (A05) - Part 2

As stated last month, this is most definitely a work in progress. Whether it continues to progress is entirely up to you, the reader. If you think this effort has value and would like to see it updated monthly on the *MT* web site, as well as published seasonally in the magazine, write in and tell us...us being me the author *and* the editor, "my boss." Addresses (e-mail and otherwise) are on the index page.

Next month, we'll key on the U.S. international broadcasters.

Formatting:

Since international broadcasting encompasses other media beyond shortwave, references and information for them have been included - **sw** is shortwave; **i-net** is internet audio; **wrn-na** is World Radio Network, North America stream (also available on Sirius stream 115). Day of week abbreviations correspond to those used in *MT's Shortwave Guide*, which is where you will find the sw frequencies for these programs. All times are UTC/GMT. * is minutes, e.g., 60'.

The List

ALBANIA

R. Tirana rtsh.sil.at/foreign.htm
sw: T-A 0145 (15'), 0230 (30') - News, a few reports and folk music.

ARGENTINA

RAE <http://www.radionacional.gov.ar>
sw: 0200 (60', T-A only)
Fixed programs - :00 News & current affairs reports; :40 H DXers' Special, A DXers' Supplement; :50 Sport Review. Also, considerable local music interspersed, including tangos.
Optional features at indeterminate days & times - Science & Technology, Argentina Exports, Cultural Agenda, Knowing Argentina, Ephemerides (personalities).

AUSTRALIA

R. Australia <http://www.abc.net.au/ra>
sw: 24/7 service targeting Pacific and Asia. Some portions audible in NA. Reception is better in wNA.
News - on the hour and Asia Pacific (regional current affairs): S-H 2305, M-F 0130, 1005, 1305, 1505. Asia Pacific Review (weekend roundup) F 1905, 2305, A 0805, 1105. AM (morning report): S-H 2110, 2210. The World Today (midday report): M-F 0210. PM (evening report): M-F 0810, 1410. Correspondents Report A 1805, 2305, S 0805. Dateline Pacific (from RNZI): S-H 2130; M-F 0630. Perspective A 1655, 2005, S 0005; S-H 2255, M-F 0855. Correspondent's Notebook A 1205, 2055, S 1355. On the Mat (Pacific issues): M-F 0535, 0735. Asia Pacific Business: F 0615; A 0030, 1005.
Magazines - Pacific Beat: morning ed. S-H

1810, evening ed. M-F 0510. Pacific Review: F 1805, A 0005, 1035. In the Loop S-H 2330. w/excerpts repeated S 1705; M-F 1730. Australian Express F 1830, 2330, T 1330. Australia All Over A 1830.

Music - Keys to Music (enjoying the classics): F 0405. Margaret Throsby (w/interview): I A 1005, 1605; II S 1605. Saturday Night Country: A 1210. The Music Show: S 0905. Hit Mix: A 0730. Jazz Notes: A 0830.

Info - AWAYE! (Aboriginal) T 1105. Science Show A 1405, T 0410. National Interest: (politics) S 1505, M 1105. Background Briefing (documentary) S 0005, H 0410. Hindsight (history) F 0010. Health Report M 0331, 1030, 1530. Law Report T 0331, 1030, 1530. Religion Report: T 0331, 1030, 1530. Rural Reporter: W 1710, F 1930. Saturday Breakfast: F 2230. Late Night Live (perspective/interviews): M-H 1205; "Best of" F 1205, A 1705. The Europeans: H 1105. Books & Writing: H 1130. All in the Mind: W/A 1130. Education Series: W 0405, 1105; H 1330, 1705; S 0830. Encounter (religion): S 1305. Spirit of Things (spirituality): A 2205; S 1205. Innovations: A 2330; S 0730; M 1330, 1705; W 0430. Australia Talks Back (national phone-in): M-F 0910, 1605. Sunday Profile (interview): S 1105. Speaking Out (Aboriginal affairs): S 1130. Talking Point (interviews): S-H 2240; M-H 0615; A 1020. Perspective (comment): S-H 2255; M-F 0855, 1655. In Conversation (science): M 0315. Big Ideas: M 0405, F 1705. Ockham's Razor (science): T 0315. Lingua Franca (language): W 0315. The Ark (religious tradition): H 0315. The Arts: H 1130, F 1330. Movie Time: H 1105. Sport - Grandstand (live action) A/S 0105-0730. Sports Factor: F 0331, 1030, 1530; S 1730. Reports: M-F 0305, 0610, 0730, 1405; S-H 1830, 1930, 2030. Media/DX - Media Report: T 0331, 1030, 1530.

i-net: 24/7 live stream; as sw sked w/alternative programs b/c during Grandstand. Most programs available as audio on-demand w/archive, many with transcript.

wrn-na: 0000 A AM, S Books & Writing; 0700 S Education Series, M-F PM, A Asia Pacific Review. 0730 S Innovations, A Verbatim. 1100 S Correspondents Report, M-F Asia Pacific, A Pacific Review; 1130 S Sunday Profile, M Health Report, T Rural Reporter, W Religion Report, H Media Report, F Sports Factor, A Australian Express; 1930 S Pacific Review, M-F Pacific Beat (25'), A All in the Mind.

cbco: local times - M-F 0230, 0505; A/S 0505. (all 30').

BULGARIA

R. Bulgaria <http://www.bnr.bg>
sw: (60') 2300, 0200
:00 D News; :10 S/M* Views Behind the News, T-A* Events and Developments; :20 S* Keyword Bulgaria, M* Folk Studio (music), T* Sports, W* Magazine Economy, H* The Way We Live, F* History Club; :30 S* Answering Your Letters, M-F* Keyword Bulgaria, A* DX Program; :40 M* Walks and Talks (places), T-F* Timeout for Music; :45 S/A* Timeout for Music. *UTC one day earlier in 2300 broadcast.

i-net: available as audio on-demand and as program transcript, both archived.

CANADA

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

CROATIA

V. of Croatia <http://www.hrt.hr/hr/glashrvatske>
sw: the international program of Croatian Radio, primarily for Croations abroad. Broadcasts mainly in Croatian 2300-0600 to NAM on 7285 kHz. News in English:
inet: 24/7 mainly in Croatian.

DENMARK

Banns R. Int. <http://www.euroaudio.dk>
inet: weekly Copenhagen Calling available on-demand; also, other content.
wrn: (30') S 0530, 1730 - Copenhagen Calling (magazine)

ECUADOR

HCJB <http://www.hcjb.org.ec>
sw: D 1100-1300: Christian evangelical and religious programming.
Media/DX: DX Partyline A 1230.
inet: HCJB World Radio Audio News (archived weekly) and Beyond the Call, available on-demand.

FRANCE

RFI <http://www.rfi.fr>
sw: English to Africa and Asia only. Best reported reception in NAM are for the 1600 (90') and 0600 (30') broadcasts to Africa.
inet: All English transmissions available in streaming audio, live and on-demand.

GERMANY

DW <http://www.dw-world.de>
sw: English to Africa and Asia only. Best reported reception in NAM is for the 2100 (60') broadcast.
inet: 24/7 in English. All newscasts and feature programs available on-demand.
wrn: 1400 M-F News and Newslink (news mag).

IRAN

V. of Justice <http://www.irib.ir/worldservice>
sw: D (60') 0130 - News and political commentary on Mideast current events.
inet: transmissions available in live streaming and on-demand audio.

IRELAND

RTE <http://www.rte.ie>
inet: 4 networks (3 in English) 24/7.
wrn: 1300 (60') S This Week w/Gerald Barry, M-F Marian Finucane (interviews), A Playback (best of RTE); 1800 & 2100 (30' ea.) M-F 5-7 Live (news mag), A/S Sports Results.

ISRAEL

Kol Israel <http://www.israelradio.org>
sw: D (15') 0530, 1130, 1930; (25'): 2100. (All newscasts)

inet: Most recent English newscast available on demand. Live audio stream of all international broadcasts, including domestic relays. News in text.

wrn: D (25') 0030 & 0530: (Rebroadcast of previous day's 2100 newscast.)

ITALY

RAI <http://www.raiinternational.rai.it>

sw: D 0055 (20'): News.

inet: 24/7 two audio channels in Italian only.

JORDAN

R. Jordan <http://www.jrtv.com>

sw: (210') D 1400. English broadcast, a relay of Amman's English mw service, consists mainly of news, pop music and some feature programming targeted at western listeners. (The sw broadcast is almost entirely blocked by RTTY interference on-frequency and the inet site was inaccessible at press time.)

KOREA, DPR

V. of Korea (no internet)

sw: D (30') 1300, 1500. (Reception better in wNA.)

Program consists of political tracts and local martial and patriotic music of a nature reminiscent of Cold War-era broadcasts from hardline regimes in closed societies.

LITHUANIA

R. Vilnius <http://www.lrt.lt>

sw: (30') D 2330 and 0030. Program consists of news, comment and analysis, politics, the arts and cultural events, accounts of everyday life, and Lithuanian music.

inet: News in text format.

NEW ZEALAND

R. New Zealand Int. <http://www.rnzi.com>

sw: 24/7 service targeting the Pacific. Portions audible in NAm (as below). Reception is better in wNA.

News: on the hour; with Pacific Regional News M-F 0000, 0300, 1300, 1500; The Week in Parliament S 0012, 0730; Spectrum S 0034; Midday Report M-F 0000; Checkpoint M-F 0500, 0700; Pacific Correspondent H 0830, 1330, 1530, F 0330; Worldwatch M-F 0607; Pacific Report M-F 0620; The Letter M 0630; Insight M 0906; Late Edition M-F 1005.

Magazines: Dateline Pacific M-F 0308, 0808, 1308, 1508; In Touch with NZ (variety) M-F 0106; Tagata o te Moana (the Pacific) A 0510, S 1308, 1810; NZ Forces Radio A/S 1504; Mana Korero (Maori affairs) S 0606, 1605; Country Life F 0906; Mana Tangata M-F 1605.

Info: Focus on Politics A 0012; Your Money A 0106; Eureka! (science) A 0204; Environment [or] Health Matters A 0230; Spiritual Outlook A 1405, S 0512; Bookmarks S 0130; Global Perspective (documentaries) S 0206; One in Five (disability) S 0704; Sounds Historical S 0806; Tradewinds T 0830, 1330, 1530, W 0330; What's Going On (arts/cultural events) M-F 0430;

Entertainment & Music: The Sampler A 0033; Comedy Zone A 0130; Home Grown A 0306; Music Mix A 0607; Saturday Night A 0706; Deep Purple (relaxing music) A 1012; New Music Releases A 1308, S 1708, M 0330; Hymns A 1430; At the Movies S 0106; Drama S 0304, W 0906; Music series S 0406; Jazz Spotlight S 0540; In a Mellow Tone S 1405; Storytime M-F 0645; Documentary series T 0906; Waiaata (Maori music) H 0906; Wayne's Music M-F 0106, 1406.

Sport: Sportsworld S 1610; World in Sport W 0830, 1330, 1530, H 0330; Sports Story F 0830, 1330, 1530. Live coverage of rugby and cricket matches in season and as avail-

able, often between 0100-0700, preempting other programming.

Media/DX: Mailbox/RNZI Talk M 0830, 1330, 1530, T 0330; Mediawatch S 1012.

inet: Selected programs available on-demand; others on demand from rnz.co.nz

wrn: (15') M-F 1600 - *Korero Pacifica* (Pacific current affairs).

POLAND

R. Polonia <http://www.radio.com.pl/polonia/>

inet: live streaming and on-demand audio, with some archives.

wrn: (30') 1700 S Insight Central Europe, M-F News from Poland, A Europe East; 0300 S Europe East, M Insight Central Europe, T-A News from Poland.

ROMANIA

R. Romania Int. <http://www.rrri.ro>

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

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

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

inet: all transmissions available via live audio stream and on-demand.

wrn: (30')—first ½ hr. of sw b/c above) D 1000, 1500, 2230.

SERBIA & MONTENEGRO

Int. R. of <http://www.radioyu.org>

sw: (30') T-S 0100. Program mainly consists of news and comment about the situation in Serbia, Montenegro and the Balkans, especially the states that formerly were part of Yugoslavia.

inet: News in audio and text formats available on demand.

SOUTH AFRICA

Channel Africa <http://www.channelafrica.org>

sw: No direct transmissions to NAm, but these broadcasts to wAf are often well heard in eNA. (55') D 0500, 0700, 1700. Programs include news of Africa, the programs broadcast on wrn listed below and other features. (No definitive schedule available at press time.)

inet: Broadcasts and individual programs available via live stream and on-demand audio. (The web site is difficult to navigate and does not always operate well.)

wrn: M-F 0530, 1030, 1730 (30'): Africa Rise and Shine (news mag).

A 0530 (30'): Tam Tam Express (African gov't.)

SPAIN

R. Exterior de Espana <http://www.rtve.es/rne/ree>

sw: (55') D 0000 - :00 S American Chronicles, M Window on Spain (culture), T-A News (international, Spain, Latin America); :14 S Wines of Spain, M Spanish history or culture series; :17 T-A Spain Day-by-Day (feature magazine); :24 S Lab Notes and Field Notes

(science); :34 S Musical Interlude, M Radio Club (letters), W Entremeses (food & tourism), F American Chronicles, A Food in Spain; :38 S/F Cultural Roundup, W History Notes, A Africa Today; :48 S Radio Waves, T-A A Language Without Bounds (Spanish lesson).

inet: mp3 downloads of selected programs available.

THAILAND

R. Thailand <http://www.prd.go.th>

sw: (30') D 0030, 0300 - News.

inet: News available on demand.

TURKEY

V. of Turkey <http://www.trt.net.tr>

sw: (50') D 2200, 0300.

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

(Programs during 2200 transmission are one day earlier.)

inet: applicable to the Turkish service only.

UKRAINE

R. Ukraine Int. <http://www.nrcu.gov.ua>

sw: (55') D 0000, 0300.

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

inet: live audio stream of all broadcasts; news in text form with archive.

VATICAN

Vatican R. <http://www.vaticanradio.org>

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

inet: live audio streams; also—news, features, inspirational messages, liturgies and prayer services available on demand.

wrn: (15') M-F 1615. News.

VIETNAM

V. of Vietnam <http://www.vov.org.vn>

sw: (30') D 0100, 0230.

:00 D News; :05 D Current Affairs; :10 S Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; :15 T Vietnam in Close Up, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; :20 S Music, A Literature and Arts.

inet: selected programs available on-demand with archive.

WALES

Wales R. Int. <http://wri.cymru.net/>

sw: (30') A 0200 Celtic Notes (magazine).

inet: Weekly program Celtic Notes available on demand, with archive.

wrn: A 1400, S 0030 (same as sw above).

Daniel Sampson's PRIME TIME SHORTWAVE

<http://www.primetimeshortwave.com>

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

A closer look at prepared QSL cards

Ask a seasoned DXer about prepared QSL cards, and some may likely wince. There was a time when such QSLing solutions were considered too easy. As the hobby changes, so do tactics for verifying, and this one has become a popular and successful technique.

As the name implies, a prepared card is one that you prepare and enclose with your reception report for the station to return to you. Blanks can be left on the card for the station to fill in times, frequency and date, or you can add that data so the station only has to sign or rubber stamp it. Your name and return address should be on the card with an "Airmail" notation.

So what's the use of preparing a card, when the station likely has its own, you ask? Most international broadcasters do indeed, but not so in many third world countries. You're likely to find stations in South America or Asia who either can't afford QSL cards or don't know what they are. With a brief explanation, most will return the card as verified.

Prepared cards may take many forms, such as ordinary postcard type stock, commercially printed cards or individually created cards. Picture postcards of the country to which you are writing can sometimes be obtained from the country's embassy or tourist bureau.

My method is to design a card using my PC's graphics pro-

gram and decorative fonts and colors. Try some web surfing to find the country's flag, map, national symbol or landmark to insert on the card. Save each image as a jpeg file to your hard drive, and you're on your way to designing a card that will be a station attention getter...just what you want!

Designing multilingual cards is just as easy. Cut and paste your text and use an on-line translation service such as <http://world.altavista.com/> or <http://www.freetranslation.com/>

Of course, return postage is a "must" in the use of mint stamps of the country. Postage may be purchased from: Bill Plum's Airmail Postage Service, 12 Glenn Road, Flemington, NJ 08822 USA. Include a self-addressed envelope for a current price list.

Now comes the question of affixing the stamps. Do you affix them on the card or do you enclose them within the letter? My preference is to enclose them. By doing so, the station has on occasion under separate cover, sent me pennants, letters or station souvenirs. Either method has been successful and I would recommend you experiment with both alternatives.

Still think it's *too easy*? The prepared card technique might be your solution ... so get creative!

ALBANIA

China Radio relay 5960 kHz. Full data *Happy New Year Rooster* card initialed and noted as Albanian relay, plus souvenir cut outs. Received in 46 days for an English report. Station address: 16A Shijingshan Street, Beijing 100040 China (or) P.O. Box 4216, CRI-2, Beijing 100040 China. Website: <http://www.cri.com.cn> English service <http://www.cirenglish.com> (Duane Hadley, Bristol, TN)

BRAZIL

Radio Record 6150 kHz. No data verification letter signed by Ivone Souza-Diretora Geral. Received in two months for CD report. Station address: Radio Record AM, Rua da Varzea 240, Barra Funda, Sao Paulo (SP), CEP 01140-080 Brazil. Website: <http://www.radiorecord.com.br> Email: radio@rederecord.com.br (Jerry Berg, Lexington, MA/DSWC)

BULGARIA

Radio Bulgaria 5800 kHz. Partial data beach front view card, plus a nice piece of folk art. Received in 60 days for an English report. Station address: P.O. Box 900, BG-1000, Sofia, Bulgaria (or) 4



Dragan Tsankov Blvd., 1040 Sofia, Bulgaria. Website: <http://www.bnr.bg> (Joe Wood, Greenback, TN)

CLANDESTINE

Radio Minivan 11810 kHz. Full data verification signed by Monica Michie,

plus station info sheet. Received in 66 days for an English report. Station maildrop: 15, Fowler's Road, Salisbury, SPI 2QP England. Website (with Real Audio): <http://radiominivannews.com> Email: minivanradio@gmail.com (John Wilkins, Wheat Ridge, CO/Cumbre DX)

ECUADOR

HCJB 17640 kHz. Special QSL of *HCJB Choir and Orchestra*. Signed by Curt Cole-Vice President of International Ministries and Kazuo Ozaki-Director of Japanese Service. Schedule and station souvenirs enclosed with card. Received in 45 days for an English report of the December 24, 2004 special programming by the Japanese language service. Station address: Casilla 17-17-691, Quito, Ecuador. (Arnaldo Slaen, Buenos Aires, Argentina)

ERITREA

Voice of the Broad Masses 7100 kHz. Full data card and verification letter signed by Gerhane Gerezigihier-Technical Director of Radio Engineering. Received in 67 days for an English report and two IRCs. Station address: Ministry of Information, Radio Department, Radio Engineering Division, P.O. Box 243, Asmara, Eritrea. (Bruce W. Churchill, Falibrook, CA/Cumbre DX)

MEDIUM WAVE

KZNX 1530 kHz AM. Verification letter and "goodie" pack of bumper stickers, business card, key chain, ESPN mug grabber plus a DVD Play Station 2 NCAA March Madness demo. My cassette returned with the SASE. The

tech noted the operation was on 15 watts the morning I heard them, and they dubbed my cassette tape to their hard drive! This is my 70th Texas station and medium wave QSL # 2,894. Station address: 4314 West Braker Lane # 1260, Austin, TX 78759. (Patrick Martin, Seaside, OR)

THAILAND

Bangkok Radio 6765.1 kHz USB. Full data card and verification letter signed by Ms. Jantima Niyomchok. Received in 45 days. Station address: Telecommunication Division, Meteorological Department, 4353 Sukhumvit Road 10260, Thailand. (Arnaldo Slaen, Buenos Aires, Argentina)

UNITED KINGDOM

VT Merlin Communications Limited 9800 kHz. Partial data *Leading the Way* verification card with site. Received in 30 days for a SASE (not used). QSL address: LTW, P.O. Box 20100, Atlanta, GA 30325. (Scott Barbour, Intervale, NH)

USA

AWR Full data QSL card signed by Adrian M. Peterson, for rebroadcast of Radio Monitors International Edition # 485 from September 1984 via Voice of the NASB via WRMI. Received in 285 days for email report to: letters@awr.org. Received 1996 AWR *Wavescan DX Contest* certificate, five blank QSL cards, plus an assortment of vintage AWR souvenirs. (Kraig Krist KG4LAC, Annandale, VA) Goodie package received for special broadcast on 7385 kHz in 287 days. (Barbour, NH)

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 Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

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

Find the station you want to hear.

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

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

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

In the same column ⑥, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

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

The frequencies ⑦ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

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

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

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

Target Areas

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

MT MONITORING TEAM

Gayle Van Horn
Frequency Manager

gaylevanhorn@monitoringtimes.com

Daniel Sampson

danielsampson@monitoringtimes.com

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo, *NASWA Flash Sheet*; BCL News; Cumbre DX; Dave Yetman HCJB Australia; Alokesh Gupta, *New Delhi, India*; Glenn Hauser, *Enid, OK/DX Listening Digest*; Michael Murray, *UK*; MD Azizul Alam Al-Amin, *Bangladesh*; Marty McLaughlin, *BVB*; Anker Petersen, *Denmark*; George Ross, *KTWR*; Adrian Sainsbury, *R. NZ Intl*; Daniel Sampson/*Prime Time-SW*; Bernard Schraunt, *Freq Manager, TWR Europe*; DX Window; Observer, *Bulgaria*; ODXA/DX Ontario; Roberto Scaglione, *Italy*; Larry Van Horn *N5FPW, MT Asst. Editor*; Loyd Van Horn *W4LIH/WWNC, Asheville, NC*; Hard Core DX; *NASWA Journal*; *WWDX*.

Shortwave Broadcast Bands

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

Notes

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

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

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



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

| | | | | | |
|------|------|----------|-----------------------------------|----------------|------------------|
| 0000 | 0015 | vl | Cambodia, National Radio | 11940as | |
| 0000 | 0015 | vl | Croatia, Croatian Radio | 7285sa | |
| 0000 | 0015 | | Japan, Radio | 13650as | 17810as |
| | | | 17825na | | |
| 0000 | 0027 | | Czech Rep, Radio Prague Intl | 9440na | |
| 0000 | 0030 | | Egypt, Radio Cairo | 7115na | |
| 0000 | 0030 | | Thailand, Radio | 9680va | 13695va |
| 0000 | 0030 | | UK, BBC World Service | 3915as | 5970as |
| | | | 6195as 9410as | 9740as | 11945as 11955as |
| | | | 15280as | 15310as | 15360as 17615as |
| | | | 17790as | | |
| 0000 | 0030 | | USA, Voice of America | 7215va | 9890va |
| | | | 11760va | 11995as | 15185va |
| | | | 17740va | | |
| 0000 | 0045 | | India, All India Radio | 9705as | 9950as 11620as |
| | | | 11645as | 13605as | |
| 0000 | 0057 | | Canada, Radio Canada Intl | 9755am | 11990am |
| | | | 13710am | | |
| 0000 | 0059 | | Spain, Radio Exterior Espana | 6055na | |
| 0000 | 0100 | | Anguilla, Caribbean Beacon | 6090am | |
| 0000 | 0100 | | Australia, ABC NT Alice Springs | 2310irr | 4835do |
| 0000 | 0100 | | Australia, ABC NT Katherine | 5025do | |
| 0000 | 0100 | | Australia, ABC NT Tennant Creek | 4910do | |
| 0000 | 0100 | | Australia, Radio | 9660as | 12080as 13630pa |
| | | | 15240pa | 17715as | 17750pa 17775pa |
| | | | 17795as | | |
| 0000 | 0100 | | Australia, Voice Intl | 7355as | |
| 0000 | 0100 | | Bulgaria, Radio | 7400na | 9700na |
| 0000 | 0100 | | Canada, CBC Northern Service | 9625do | |
| 0000 | 0100 | | Canada, CFRX Toronto ON | 6070do | |
| 0000 | 0100 | | Canada, CFVP Calgary AB | 6030do | |
| 0000 | 0100 | | Canada, CKZN St John's NF | 6160do | |
| 0000 | 0100 | | Canada, CKZU Vancouver BC | 6160do | |
| 0000 | 0100 | | China, China Radio Intl | 6020al | 6075os |
| | | | 7170as 7180as | 7345eu | 11770as |
| | | | 5030va | 6150va | |
| 0000 | 0100 | | Costa Rica, University Network | 7375va 9725va | |
| 0000 | 0100 | | Germany, Deutsche Welle | 7130as | 9505as |
| | | | 9825as | | |
| 0000 | 0100 | | Guyana, Voice of | 3290do | |
| 0000 | 0100 | | Malaysia, Radio | 7295as | |
| 0000 | 0100 | vl | Namibia, Namibian BC Corp | 6060do | 3270do 3290do |
| | | | 6175do | | |
| 0000 | 0100 | | Netherlands, Radio | 9845na | |
| 0000 | 0100 | | New Zealand, Radio NZ Intl | | 15720pa |
| 0000 | 0100 | | Oman, Radio | 5970as | |
| 0000 | 0100 | | Sierra Leone, Radio UNAMSIL | 6137do | |
| 0000 | 0100 | | Singapore, Mediacorp Radio | 6150do | |
| 0000 | 0100 | DRM | UK, BBC World Service | 6010na | |
| | | | UK, BBC World Service | 9825ca 12095ca | 5975ca 9525ca |
| 0000 | 0100 | | Ukraine, Radio Ukraine Intl | 7440na | |
| 0000 | 0100 | | USA, AFRTS | 4319usb | 5446usb 5765usb |
| | | | 6350usb | 7590usb | 7812usb 10320usb |
| | | | 12133usb | 12579usb | 13855usb |
| 0000 | 0100 | | USA, KAIJ Dallas TX | 5755na | |
| 0000 | 0100 | | USA, KATN Salt Lake City UT | | 7505na |
| 0000 | 0100 | | USA, KWHR Naalehu HI | | 17510as |
| 0000 | 0100 | | USA, WBCQ Kennebunk ME | 9330na | 5105na 7415na |
| 0000 | 0100 | | USA, WBOH Newport NC | 5920am | |
| 0000 | 0100 | | USA, WEWN Birmingham AL | 5810va | 7425va |
| | | | 11530va | | |
| 0000 | 0100 | | USA, WHRA Greenbush ME | 7580na | |
| 0000 | 0100 | | USA, WHRI Noblesville IN | 7315am | 7535am |
| 0000 | 0100 | | USA, WINB Red Lion PA | 9320am | |
| 0000 | 0100 | | USA, WJIE Louisville KY | 13595am | |
| 0000 | 0100 | | USA, WRMI Miami FL 7385am | 9955am | |
| 0000 | 0100 | | USA, WRMI Miami FL 7385am | 9955am | |
| 0000 | 0100 | | USA, WTJC Newport NC | 9370na | |
| 0000 | 0100 | | USA, WWCR Nashville TN | 3210na | 5070na |
| | | | 7465na 13845na | | |
| 0000 | 0100 | | USA, WWWR Manchester TN | 5050na | 5085na |
| | | | 5745na 6890na | | |
| 0000 | 0100 | | USA, WYFR Okeechobee FL | 6065na | 9505na |
| | | | 11720sa | | |
| 0000 | 0100 | | Zambia, Radio Christian Voice | 4965af | |
| 0005 | 0030 | sm | Austria, Radio Austria Intl | 7325sa | |
| 0015 | 0030 | sm twhfa | Austria, Radio Austria Intl | 7325sa | |
| 0030 | 0045 | s | Germany, Pan American BC | 9740as | |
| 0030 | 0100 | | Australia, Radio | 9660as | 13630pa |
| | | | 15240pa | 15415pa | 17715as 17750pa |
| | | | 17775as | 17795as | |
| 0030 | 0100 | sm | Austria, Radio Austria Intl | 7325am | |
| 0030 | 0100 | | Germany, Bible Voice Broadcasting | 6015as | |
| 0030 | 0100 | | Lithuania, Radio Vilnius | 9875na | |
| 0030 | 0100 | | Lithuania, Radio Vilnius | 9875na | |
| 0030 | 0100 | | Sri Lanka, SLBC | 6005as | 15745as |
| 0030 | 0100 | | Thailand, Radio | 5890na | 13595na |
| 0030 | 0100 | | UK, BBC World Service | 5970as | 6195as |
| | | | 9410as 9740as | 11955as | 15280as 15310as |

| | | | | | |
|------|------|-------|-----------------------------|---------|---------------|
| 0030 | 0100 | | 15360as | 17790as | |
| | | | USA, Voice of America | | 7215va 9890va |
| | | | 15185va | 15290va | 17740va |
| 0045 | 0100 | twhfa | Austria, Radio Austria Intl | | 7325am |
| 0045 | 0100 | | Pakistan, Radio | 9340as | 11565as |
| 0055 | 0100 | | Italy, RAI Intl | 11800na | |

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

| | | | | | |
|------|------|--------|---------------------------------|---------------|-------------------------|
| 0100 | 0115 | | Italy, RAI Intl | 11800na | |
| 0100 | 0115 | | Pakistan, Radio | 9340as | 11565as |
| 0100 | 0127 | | Czech Rep, Radio Prague Intl | | 6200na 7345na |
| 0100 | 0128 | | Hungary, Radio Budapest | | 9590na |
| 0100 | 0128 | | Vietnam, Voice of | 6175am | |
| 0100 | 0129 | s | Germany, Universal Life | | 9485as |
| 0100 | 0130 | | Australia, Radio | 9660as | 12080as 13630pa |
| | | | 15240pa | 15415pa | 17715as 17750pa |
| | | | 17775as | 17795as | |
| 0100 | 0130 | twhfas | Serbia & Montenegro, Intl Radio | | 7115va |
| 0100 | 0130 | vl | Slovakia, Slovak Radio | | 7230am 9440am |
| 0100 | 0130 | | Uzbekistan, Radio Tashkent | | 5975as 6165as |
| | | | 7160as | | |
| 0100 | 0156 | | Romania, Radio Romania Intl | | 6140na 9510na |
| | | | 9615na 11740na | | |
| 0100 | 0157 | | China, China Radio Intl | | 9580na 6005na 7345na |
| | | | 9580na | | |
| 0100 | 0157 | DRM | Netherlands, Radio | 15525na | |
| 0100 | 0159 | | Canada, Radio Canada Intl | 13710am | 9755am 11990am |
| 0100 | 0200 | | Anguilla, Caribbean Beacon | | 6090am |
| 0100 | 0200 | | Australia, ABC NT Katherine | | 5025do |
| 0100 | 0200 | | Australia, ABC NT Tennant Creek | | 4910do |
| 0100 | 0200 | | Australia, HCJB | 15560as | |
| 0100 | 0200 | | Australia, Voice Intl | 7355as | |
| 0100 | 0200 | | Canada, CBC Northern Service | | 9625do |
| 0100 | 0200 | | Canada, CFRX Toronto ON | | 6070do |
| 0100 | 0200 | | Canada, CFVP Calgary AB | | 6030do |
| 0100 | 0200 | | Canada, CKZN St John's NF | | 6160do |
| 0100 | 0200 | | Canada, CKZU Vancouver BC | | 6160do |
| 0100 | 0200 | | Costa Rica, University Network | | 5030va 6150va |
| | | | 7375va 9725va | | |
| 0100 | 0200 | | Cuba, Radio Havana | 6000na | 9820na |
| 0100 | 0200 | | Guyana, Voice of | 3291do | |
| 0100 | 0200 | | Indonesia, Voice of | 9525as | 11785pa 15150al |
| 0100 | 0200 | | Japan, Radio | 5960va | 11860as 11935sa |
| | | | 15325as | 17560va | 17685pa 17810as |
| | | | 17825ca | 17845as | |
| 0100 | 0200 | | Malaysia, Radio | 7295as | |
| 0100 | 0200 | vl | Namibia, Namibian BC Corp | 6060do | 3270do 3290do |
| | | | 6175do | | |
| 0100 | 0200 | | Netherlands, Radio | 9845na | |
| 0100 | 0200 | | New Zealand, Radio NZ Intl | | 15720pa |
| 0100 | 0200 | | North Korea, Voice of | | 7140as 9345as |
| | | | 9730am | 11735am | 13760as 15180as |
| 0100 | 0200 | | Oman, Radio | 11955as | |
| 0100 | 0200 | | Sierra Leone, Radio UNAMSIL | | 6137do |
| 0100 | 0200 | | Singapore, Mediacorp Radio | | 6150do |
| 0100 | 0200 | | Sri Lanka, SLBC | 6005as | 11905as 15745as |
| 0100 | 0200 | | UK, BBC World Service | 9410as 9825ca | 11955as 12095ca 15280as |
| | | | 15310as | 15360as | 17790as |
| 0100 | 0200 | | USA, AFRTS | 4319usb | 5446usb 5765usb |
| | | | 6350usb | 7590usb | 7812usb 10320usb |
| | | | 12133usb | 12579usb | 13855usb |
| 0100 | 0200 | | USA, KAIJ Dallas TX | 5755na | |
| 0100 | 0200 | | USA, KATN Salt Lake City UT | | 7505na |
| 0100 | 0200 | | USA, KWHR Naalehu HI | | 17510as |
| 0100 | 0200 | | USA, Voice of America | 11820va | 7200va 11705va |
| | | | 17740va | | |
| 0100 | 0200 | | USA, WBCQ Kennebunk ME | 9330na | 5105na 7415na |
| 0100 | 0200 | | USA, WBOH Newport NC | 5920am | |
| 0100 | 0200 | | USA, WEWN Birmingham AL | 5810va | 7425va |
| 0100 | 0200 | | USA, WHRA Greenbush ME | 7580na | |
| 0100 | 0200 | | USA, WHRI Noblesville IN | 5835am | |
| 0100 | 0200 | mtwhf | USA, WHRI Noblesville IN | 7535am | |
| | | as | USA, WINB Red Lion PA | 9320am | |
| 0100 | 0200 | | USA, WJIE Louisville KY | 13595am | |
| 0100 | 0200 | | USA, WRMI Miami FL 7385am | 9955am | |
| 0100 | 0200 | | USA, WTJC Newport NC | 9370na | |
| 0100 | 0200 | | USA, WWCR Nashville TN | 3210na | 5070na |
| | | | 5935na 7465na | | |
| 0100 | 0200 | | USA, WWWR Manchester TN | 5050na | 5085na |
| | | | 5745na 6890na | | |
| 0100 | 0200 | | USA, WYFR Okeechobee FL | 6065na | 9505na |
| 0100 | 0200 | | Zambia, Radio Christian Voice | 4965af | |
| 0105 | 0115 | vl | Croatia, Croatian Radio | 7285na | |
| 0130 | 0200 | | Australia, Radio | 9660as | 12080as 13630pa |
| | | | 15240pa | 15415pa | 17715as 17750pa |
| | | | 17795as | | |
| 0130 | 0200 | | Iran, Voice of the Islamic Rep | | 9495am 11875am |
| 0130 | 0200 | | Sweden, Radio | 6010na | 9435va |

Shortwave Guide

| | | | | | |
|------|------|--------|----------------------------------|--------|--------|
| 0130 | 0200 | twfwa | USA, Voice of America 13740va | 7405va | 9775va |
| 0145 | 0158 | twfhas | Albania, Radio Tirana 6115eu | 7160eu | |

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

| | | | | | |
|------|------|--------|---|----------|----------|
| 0200 | 0230 | | Austria, AWR Europe 9895as | | |
| 0200 | 0230 | m-wfa | Belarus, Radio 5970eu | 7210eu | |
| 0200 | 0230 | | Iran, Voice of the Islamic Rep 9495am | 11875am | |
| 0200 | 0230 | | Serbia & Montenegro, Intl Radio 7130va | | |
| 0200 | 0257 | | China, China Radio Intl 13640as | 11770as | |
| 0200 | 0300 | | Anguilla, Caribbean Beacon 6090am | | |
| 0200 | 0300 | twfha | Argentina, RAE 11710na | | |
| 0200 | 0300 | | Australia, ABC NT Alice Springs 2310irr | 4835do | |
| 0200 | 0300 | | Australia, ABC NT Katherine 5025do | | |
| 0200 | 0300 | | Australia, ABC NT Tennant Creek 4910do | | |
| 0200 | 0300 | | Australia, HCJB 15560as | | |
| 0200 | 0300 | | Australia, Radio 9660as | 12080as | 13630pa |
| 0200 | 0300 | | 15240pa 15415pa 15515as | 17750pa | |
| 0200 | 0300 | | Australia, Voice Intl 7355as | | |
| 0200 | 0300 | | Canada, CBC Northern Service 9625do | | |
| 0200 | 0300 | | Canada, CFRX Toronto ON 6070do | | |
| 0200 | 0300 | | Canada, CFVP Calgary AB 6030do | | |
| 0200 | 0300 | | Canada, CKZN St John's NF 6160do | | |
| 0200 | 0300 | | Canada, CKZU Vancouver BC 6160do | | |
| 0200 | 0300 | | Costa Rica, University Network 5030va | 6150va | |
| 0200 | 0300 | | 7375va 9725va | | |
| 0200 | 0300 | | Cuba, Radio Havana 6000na | 9820na | |
| 0200 | 0300 | | Egypt, Radio Cairo 7260na | | |
| 0200 | 0300 | | Guyana, Voice of 3291do | | |
| 0200 | 0300 | | Malaysia, Radio 7295as | | |
| 0200 | 0300 | vl | Namibia, Namibian BC Corp 6060do | 3270do | 3290do |
| 0200 | 0300 | | 6175do | | |
| 0200 | 0300 | | New Zealand, Radio NZ Intl 15720pa | | |
| 0200 | 0300 | | North Korea, Voice of 4405as | 13650as | |
| 0200 | 0300 | | 15100as | | |
| 0200 | 0300 | | Oman, Radio 11955as | | |
| 0200 | 0300 | | Philippines, Radio Pilipinas 12015as | 15120pa | |
| 0200 | 0300 | | 15270as | | |
| 0200 | 0300 | | Russia, Voice of 7180na | 7350na | 15425na |
| 0200 | 0300 | | 15475na 15595na | 17695as | |
| 0200 | 0300 | | Sierra Leone, Radio UNAMSIL 6137do | | |
| 0200 | 0300 | | Singapore, MediCorp Radio 6150do | | |
| 0200 | 0300 | | South Korea, Radio Korea Intl 9560na | 11810na | |
| 0200 | 0300 | | 15575na | | |
| 0200 | 0300 | | Sri Lanka, SLBC 6005as | 11905as | 15745as |
| 0200 | 0300 | | Taiwan, Radio Taiwan Intl 5950na | 9680na | |
| 0200 | 0300 | | 11875as 15465va | | |
| 0200 | 0300 | | UK, BBC World Service 5975ca | 6195eu | |
| 0200 | 0300 | | 9410va 9825ca 9525ca | 9750af | 11760me |
| 0200 | 0300 | | 11955as 12095ca 15280as | 15310as | |
| 0200 | 0300 | | 15360as 17790as | | |
| 0200 | 0300 | | USA, AFRTS 4319usb | 5446usb | 5765usb |
| 0200 | 0300 | | 6350usb 7590usb | 7812usb | 10320usb |
| 0200 | 0300 | | 12133usb 12579usb | 13362usb | 13855usb |
| 0200 | 0300 | | USA, KAIJ Dallas TX 5755na | | |
| 0200 | 0300 | | USA, KJES Vado NM 7555na | | |
| 0200 | 0300 | | USA, KTBN Salt Lake City UT 7505na | | |
| 0200 | 0300 | | USA, KWHR Naalehu HI 17510as | | |
| 0200 | 0300 | mtwhf | USA, Voice of America 7200va | 11705va | |
| 0200 | 0300 | | 11820va 17740va | | |
| 0200 | 0300 | | USA, WBCQ Kennebunk ME 9330na | 5105na | 7415na |
| 0200 | 0300 | | USA, WBOH Newport NC 5920am | | |
| 0200 | 0300 | | USA, WEWN Birmingham AL 5810va | 7425va | |
| 0200 | 0300 | | USA, WHRA Greenbush ME 5850na | | |
| 0200 | 0300 | mtwhf | USA, WHRI Noblesville IN 5835am | | |
| 0200 | 0300 | as | USA, WHRI Noblesville IN 7535am | 17510am | |
| 0200 | 0300 | | USA, WINB Red Lion PA 9320am | | |
| 0200 | 0300 | | USA, WJIE Louisville KY 13595am | | |
| 0200 | 0300 | | USA, WRMI Miami FL 7385am | 9955am | |
| 0200 | 0300 | | USA, WTJC Newport NC 9370na | | |
| 0200 | 0300 | | USA, WWCR Nashville TN 3210na | 5070na | |
| 0200 | 0300 | | 5935na 7465na | | |
| 0200 | 0300 | | USA, WWRB Manchester TN 5050na | 5085na | |
| 0200 | 0300 | | 5745na 6890na | | |
| 0200 | 0300 | | USA, WYFR Okaloosa FL 5985na | 6065na | |
| 0200 | 0300 | | 9505na 11855ca | | |
| 0200 | 0300 | | Zambia, Radio Christian Voice 4965af | | |
| 0205 | 0215 | vl | Croatia, Croatian Radio 7285na | | |
| 0215 | 0230 | | Nepal, Radio 3230as | 6100as | |
| 0200 | 025E | twfhas | Albania, Radio Tirana 6115eu | 7160eu | |
| 0230 | 025E | | Hungary, Radio Budapest 9795na | | |
| 0230 | 025E | | Vietnam, Voice of 6175am | | |
| 0230 | 0300 | s | Belarus, Radio 5970eu | 7210eu | |
| 0230 | 0300 | | Sweden, Radio 6010na | | |
| 0245 | 0300 | | Myanmar, Radio 9730do | | |
| 0250 | 0300 | | Vatican City, Vatican Radio 7305am | 9605am | |

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

| | | | | | |
|------|------|-----------|---|----------|----------|
| 0300 | 0327 | | Czech Rep, Radio Prague Intl 7345na | 9870na | |
| 0300 | 0330 | vl | Croatia, Croatian Radio 7285na | | |
| 0300 | 0330 | | Egypt, Radio Cairo 7260na | | |
| 0300 | 0330 | | Myanmar, Radio 9730do | | |
| 0300 | 0330 | | Philippines, Radio Pilipinas 15120as | 15270pa | |
| 0300 | 0330 | s | Swaziland, TWR 3200af | | |
| 0300 | 0330 | | Thailand, Radio 5890na | 15460na | |
| 0300 | 0330 | | UK, BBC World Service 6190af | 7160af | 6005af |
| 0300 | 0330 | | 9750af | 12035af | 11765af |
| 0300 | 0330 | a | UK, Wales Radio Intl 6005na | | |
| 0300 | 0330 | | USA, KJES Vado NM 7555na | | |
| 0300 | 0330 | | USA, Voice of America 6035af | 6080af | |
| 0300 | 0330 | | 7290af 7340af 9885af | | |
| 0300 | 0330 | | Vatican City, Vatican Radio 7360af | | |
| 0300 | 0350 | | Turkey, Voice of 6140va | 7270me | |
| 0300 | 0355 | | South Africa, Channel Africa 3345af | 7390af | |
| 0300 | 0357 | | China, China Radio Intl 7190na | 9690na | |
| 0300 | 0400 | | 9790na 11770as 15110as | | |
| 0300 | 0400 | | Anguilla, Caribbean Beacon 6090am | | |
| 0300 | 0400 | | Australia, ABC NT Alice Springs 2310irr | 4835do | |
| 0300 | 0400 | | Australia, ABC NT Katherine 5025do | | |
| 0300 | 0400 | | Australia, ABC NT Tennant Creek 4910do | | |
| 0300 | 0400 | | Australia, Radio 9660as | 13630pa | |
| 0300 | 0400 | | 15240pa 15415pa 15515as | 17750pa | |
| 0300 | 0400 | | Bulgaria, Radio 9400na | 9700eu | |
| 0300 | 0400 | | Canada, CBC Northern Service 9625do | | |
| 0300 | 0400 | | Canada, CFRX Toronto ON 6070do | | |
| 0300 | 0400 | | Canada, CFVP Calgary AB 6030do | | |
| 0300 | 0400 | | Canada, CKZN St John's NF 6160do | | |
| 0300 | 0400 | | Canada, CKZU Vancouver BC 6160do | | |
| 0300 | 0400 | | Costa Rica, University Network 5030va | 6150va | |
| 0300 | 0400 | | 7375va 9725va | | |
| 0300 | 0400 | | Cuba, Radio Havana 6000na | 9820na | |
| 0300 | 0400 | vl | Guatemala, Radio Cultural 3300sa | | |
| 0300 | 0400 | | Guyana, Voice of 3291do | | |
| 0300 | 0400 | | Japan, Radio 21610pa | | |
| 0300 | 0400 | | Malaysia, Radio 7295as | | |
| 0300 | 0400 | | Malaysia, Voice of 6175as | 9750as | 15295as |
| 0300 | 0400 | vl | Namibia, Namibian BC Corp 6060do | 3270do | 3290do |
| 0300 | 0400 | | 6175do | | |
| 0300 | 0400 | | New Zealand, Radio NZ Intl 15720pa | | |
| 0300 | 0400 | | North Korea, Voice of 3560as | 7140as | |
| 0300 | 0400 | | 9345as 9730as | | |
| 0300 | 0400 | | Oman, Radio 15575as | | |
| 0300 | 0400 | | Russia, Voice of 7150na | 7180nc | 7350na |
| 0300 | 0400 | | 12010na 15425na | 15475na | 15595na |
| 0300 | 0400 | | 17695as | | |
| 0300 | 0400 | vl | Rwanda, Radio 6055do | | |
| 0300 | 0400 | | Sierra Leone, Radio UNAMSIL 6137do | | |
| 0300 | 0400 | | Singapore, MediCorp Radio 6150do | | |
| 0300 | 0400 | | Sri Lanka, SLBC 6005as | 11905as | 15745as |
| 0300 | 0400 | | Taiwan, Radio Taiwan Intl 5950va | 15125va | |
| 0300 | 0400 | | 15320va | | |
| 0300 | 0400 | vl | Uganda, Radio 4976do | 5026do | 7196do |
| 0300 | 0400 | | UK, BBC World Service 5975ca | 9410va | |
| 0300 | 0400 | | 9525ca 11760me 12095eu | 15310as | 15280as |
| 0300 | 0400 | | 15360as 15575me | 17760as | 17790as |
| 0300 | 0400 | | 21660as | | |
| 0300 | 0400 | vl/ mtwhf | UK, Sudan Radio Service 9625va | | |
| 0300 | 0400 | | Ukraine, Radio Ukraine Intl 7440na | | |
| 0300 | 0400 | | USA, AFRTS 4319usb | 5446usb | 5765usb |
| 0300 | 0400 | | 6350usb 7590usb | 7812usb | 10320usb |
| 0300 | 0400 | | 12133usb 12579usb | 13362usb | 13855usb |
| 0300 | 0400 | | USA, KAIJ Dallas TX 5755na | | |
| 0300 | 0400 | | USA, KTBN Salt Lake City UT 7505na | | |
| 0300 | 0400 | | USA, KWHR Naalehu HI 17510as | | |
| 0300 | 0400 | | USA, Voice of America 4930af | 4960af | |
| 0300 | 0400 | | USA, WBCQ Kennebunk ME 5105na | 7415na | |
| 0300 | 0400 | | 9330na | | |
| 0300 | 0400 | | USA, WBOH Newport NC 5920am | | |
| 0300 | 0400 | | USA, WEWN Birmingham AL 5810va | 7425va | |
| 0300 | 0400 | | USA, WHRA Greenbush ME 5850na | | |
| 0300 | 0400 | mtwhf | USA, WHRI Noblesville IN 5835am | | |
| 0300 | 0400 | as | USA, WHRI Noblesville IN 7535am | 17510am | |
| 0300 | 0400 | | USA, WINB Red Lion PA 9320am | | |
| 0300 | 0400 | | USA, WJIE Louisville KY 13595am | | |
| 0300 | 0400 | | USA, WRMI Miami FL 7385am | 9955am | |
| 0300 | 0400 | | USA, WTJC Newport NC 9370na | | |
| 0300 | 0400 | | USA, WWCR Nashville TN 3210na | 5070na | |
| 0300 | 0400 | | 5935na 7465na | | |
| 0300 | 0400 | | USA, WWRB Manchester TN 5050na | 5085na | |
| 0300 | 0400 | | 5745na 6890na | | |
| 0300 | 0400 | | USA, WYFR Okaloosa FL 5985na | 6065na | 9505na |
| 0300 | 0400 | | 9985na 11740na | | |
| 0300 | 0400 | | Zambia, Radio Christian Voice 4965af | | |
| 0300 | 0400 | vl | Zimbabwe, ZBC Corp 5975do | | |
| 0330 | 0345 | | Hungary, Radio Budapest 6025eu | 9655eu | |
| 0330 | 0357 | | Czech Rep, Radio Prague Intl 9445va | 11600va | |
| 0330 | 0358 | | Vietnam, Voice of 6175am | | |
| 0330 | 0400 | | UAE, Emirates Radio 12005na | 13675na | 15400na |

Shortwave Guide



| | | | | | |
|------|------|-----------------------|---------|---------|--|
| 0330 | 0400 | UK, BBC World Service | 3255af | 6005af | |
| | | 6190af 7160af 9750af | 12035af | 11765af | |
| | | 15420af | | | |
| 0330 | 0400 | USA, Voice of America | 6035af | 6080af | |
| | | 7290af 9885af | | | |

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

| | | | | | |
|------|------|-----------------------------------|----------|----------|----------|
| 0400 | 0430 | Australia, Radio | 9660as | 12080as | 13630pa |
| | | New Zealand, Radio | 15515pa | 21725pa | |
| 0400 | 0430 | France, Radio France Intl | 9555af | 9805af | |
| 0400 | 0430 | Sri Lanka, SLBC | 6005as | 11905as | 15745as |
| 0400 | 0430 | USA, Voice of America | | 6080af | 7290af |
| | | 9575af 9775af | 9885af | | |
| 0400 | 0456 | Romania, Radio Romania Intl | | 6125va | 9515va |
| | | 11870va | 15250va | | |
| 0400 | 0457 | China, China Radio Intl | | 6190na | 9560na |
| | | 9755na | | | |
| 0400 | 0457 | DRM Netherlands, Radio | 15400au | | |
| 0400 | 0458 | New Zealand, Radio NZ Intl | | 15720po | |
| 0400 | 0500 | Anguilla, Caribbean Beacon | | 6090am | |
| 0400 | 0500 | Australia, ABC NT Alice Springs | | 2310irr | 4835do |
| 0400 | 0500 | Australia, ABC NT Katherine | | 5025do | |
| 0400 | 0500 | Australia, ABC NT Tennant Creek | | 4910do | |
| 0400 | 0500 | Canada, CBC Northern Service | | 9625do | |
| 0400 | 0500 | Canada, CFRX Toronto ON | | 6070do | |
| 0400 | 0500 | Canada, CKZN St John's NF | | 6160do | |
| 0400 | 0500 | Canada, CKZU Vancouver BC | | 6160do | |
| 0400 | 0500 | Costa Rica, University Network | | 5030va | 6150va |
| | | 7375va 9725va | | | |
| 0400 | 0500 | Cuba, Radio Havana | 6000na | 9820na | |
| 0400 | 0500 | Germany, Deutsche Welle | | 7170af | 11945as |
| | | 15445as | | | |
| 0400 | 0500 | Guyana, Voice of | 3291do | | |
| 0400 | 0500 | Malaysia, Radio | 7295as | | |
| 0400 | 0500 | Malaysia, Voice of | 6175as | 9750as | 15295as |
| 0400 | 0500 | Namibia, Namibian BC Corp | 6060do | 3270do | 3290do |
| | | 6175do | | | |
| 0400 | 0500 | Netherlands, Radio | 6165na | 9590na | |
| 0400 | 0500 | Nigeria, Radio/Kaduna | | 6090do | |
| 0400 | 0500 | Oman, Radio | 15575as | | |
| 0400 | 0500 | Russia, Voice of | 7150na | 7180na | 7350na |
| | | 12010na | 15595na | 15595na | 17695as |
| 0400 | 0500 | Rwanda, Radio | 6055do | | |
| 0400 | 0500 | Sierra Leone, Radio UNAMSIL | | 6137do | |
| 0400 | 0500 | Singapore, Mediacorp Radio | | 6150do | |
| 0400 | 0500 | South Africa, Channel Africa | | 3345af | |
| 0400 | 0500 | Uganda, Radio | 4976do | 5026do | 7196do |
| 0400 | 0500 | DRM UK, BBC World Service | | 6010na | |
| 0400 | 0500 | UK, BBC World Service | | 3255af | 5975ca |
| | | 6005af 6135ca | 6190af | 6195eu | 9410as |
| | | 11760me | 11765af | 12035af | 15310as |
| | | 15280as | 15360as | 15420af | 15575me |
| | | 17760as | 17790as | 21660as | |
| 0400 | 0500 | vi/ mthwf UK, Sudan Radio Service | | 9625va | |
| 0400 | 0500 | USA, AFRTS | 4319usb | 5446usb | 5765usb |
| | | 6350usb | 7590usb | 7812usb | 10320usb |
| | | 12133usb | 12579usb | 13362usb | 13855usb |
| 0400 | 0500 | USA, KAIJ Dallas TX | 5755na | | |
| 0400 | 0500 | USA, KTBN Salt Lake City UT | | 7505na | |
| 0400 | 0500 | USA, KWHR Naalehu HI | | 17780as | |
| 0400 | 0500 | USA, Voice of America | | 4930af | 4960af |
| 0400 | 0500 | USA, WBQC Kennebunk ME | 9330na | 5105na | 7415na |
| 0400 | 0500 | USA, WBOH Newport NC | | 5920am | |
| 0400 | 0500 | USA, WEWN Birmingham AL | | 5810va | 7425va |
| 0400 | 0500 | USA, WHRA Greenbush ME | | 5850na | |
| 0400 | 0500 | USA, WHRI Noblesville IN | | 5835am | |
| 0400 | 0500 | USA, WHRI Noblesville IN | | 7535am | 17220am |
| 0400 | 0500 | USA, WINB Red Lion PA | | 9320am | |
| 0400 | 0500 | USA, WJIE Louisville KY | | 13595am | |
| 0400 | 0500 | USA, WMLK Bethel PA | | 9265eu | 9955eu |
| 0400 | 0500 | USA, WRMI Miami FL 7385am | | 9955am | |
| 0400 | 0500 | USA, WTJC Newport NC | | 9370na | |
| 0400 | 0500 | USA, WWCR Nashville TN | | 3210na | 5070na |
| | | 5770na 5935na | | | |
| 0400 | 0500 | USA, WWRB Manchester TN | | 5050na | 5085na |
| | | 5745na 6890na | | | |
| 0400 | 0500 | USA, WYFR Okeechobee FL | | 6065va | 6855va |
| | | 7355va 9505va | 9715va | | |
| 0400 | 0500 | USA, WYFR Okeechobee FL | | 6855va | 7355va |
| 0400 | 0500 | Zambia, Radio Christian Voice | | 6065af | |
| 0400 | 0500 | Zimbabwe, ZBC Corp 5975do | | | |
| 0405 | 0415 | Croatia, Croatia Radio | | 7285na | 9480au |
| | | 12105au | 12110au | | |
| 0430 | 0445 | Israel, Kol Israel | 7545va | 9345va | 11605va |
| | | 17600va | | | |
| 0430 | 0445 | Uzbekistan, Radio Toshkent | | 5025eu | 7185eu |
| | | 11905eu | | | |
| 0430 | 0500 | Australia, Radio | 9660as | 12080as | 13630pa |
| | | 15240pa | 15415pa | 15515va | 17750pa |
| | | 21725pa | | | |

| | | | | | |
|------|------|----------------------------|--------|---------|--------|
| 0430 | 0500 | Nigeria, Radio/Ibadan | | 6050do | |
| 0430 | 0500 | Nigeria, Radio/Kaduna | | 4770do | |
| 0430 | 0500 | Nigeria, Radio/Lagos | 3326do | 4990do | |
| 0430 | 0500 | mthwf Swaziland, TWR | 4775af | 6120af | |
| 0430 | 0500 | USA, Voice of America | | 6080af | 7290af |
| | | 9575af 9775af | | | |
| 0445 | 0500 | Italy, RAI Intl | 6110af | 7235af | 9800af |
| 0459 | 0500 | New Zealand, Radio NZ Intl | | 11820pa | |

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

| | | | | | |
|------|------|---------------------------------|----------|----------|----------|
| 0500 | 0530 | Australia, Radio | 9660as | 12080as | 13630pa |
| | | New Zealand, Radio | 15160pa | 15240pa | 15515va |
| | | 17750pa | | | |
| 0500 | 0530 | France, Radio France Intl | | 11850af | 11995af |
| 0500 | 0530 | Rwanda, Radio | 6055do | | |
| 0500 | 0530 | UK, BBC World Service | | 6005af | 6190af |
| | | 7160af 11765af | 11940af | 11955as | 15280as |
| | | 15310as | 15360as | 15420af | 17640af |
| | | 17760as | 17790as | 17885af | 21660as |
| 0500 | 0530 | Vatican City, Vatican Radio | | 7360af | 9660af |
| | | 11625af | | | |
| 0500 | 0555 | South Africa, Channel Africa | | 7240af | 11875af |
| 0500 | 0557 | China, China Radio Intl | | 6190as | 9560na |
| | | 11750as | 11770as | 11880as | 15350as |
| | | 15465as | 17505al | 17540as | |
| 0500 | 0600 | Anguilla, Caribbean Beacon | | 6090am | |
| 0500 | 0600 | Australia, ABC NT Alice Springs | | 2310irr | 4835do |
| 0500 | 0600 | Australia, ABC NT Katherine | | 5025do | |
| 0500 | 0600 | Australia, ABC NT Tennant Creek | | 4910do | |
| 0500 | 0600 | Canada, CBC Northern Service | | 9625do | |
| 0500 | 0600 | Canada, CFRX Toronto ON | | 6070do | |
| 0500 | 0600 | Canada, CKZN St John's NF | | 6160do | |
| 0500 | 0600 | Canada, CKZU Vancouver BC | | 6160do | |
| 0500 | 0600 | Costa Rica, University Network | | 5030va | 6150va |
| | | 7375va 9725va | | | |
| 0500 | 0600 | Cuba, Radio Havana | 6000na | 6060na | 9550na |
| | | 11760am | | | |
| 0500 | 0600 | Germany, Deutsche Welle | | 9630af | 9700af |
| | | 15410af | 17800af | | |
| 0500 | 0600 | Greece, Voice of | 5865eu | 7475eu | 9420eu |
| 0500 | 0600 | Guyana, Voice of | 3291do | | |
| 0500 | 0600 | Japan, Radio | 5975eu | 6110na | 7230eu |
| | | 15195as | 17810as | 21755pa | |
| 0500 | 0600 | Malaysia, Radio | 7295as | | |
| 0500 | 0600 | Malaysia, Voice of | 6175as | 9750as | 15295as |
| 0500 | 0600 | Namibia, Namibian BC Corp | 6060do | 3270do | 3290do |
| | | 6175do | | | |
| 0500 | 0600 | New Zealand, Radio NZ Intl | | 11820pa | |
| 0500 | 0600 | Nigeria, Radio/Ibadan | | 6050do | |
| 0500 | 0600 | Nigeria, Radio/Kaduna | | 4770do | 6090do |
| 0500 | 0600 | Nigeria, Radio/Lagos | 3326do | 4990do | |
| 0500 | 0600 | Nigeria, Voice of | 15120af | | |
| 0500 | 0600 | Oman, Radio | 15310as | | |
| 0500 | 0600 | Russia, Voice of | 7150na | 7180na | 7350na |
| | | 12010na | 15595na | 15595na | 17696as |
| 0500 | 0600 | Sierra Leone, Radio UNAMSIL | | 6137do | |
| 0500 | 0600 | Singapore, Mediacorp Radio | | 6150do | |
| 0500 | 0600 | Swaziland, TWR | 6120af | | |
| 0500 | 0600 | Swaziland, TWR | 4775af | | |
| 0500 | 0600 | Swaziland, TWR | 9500af | | |
| 0500 | 0600 | Uganda, Radio | 4976do | 5026do | 7196do |
| 0500 | 0600 | UK, BBC World Service | | 6135co | 6195eu |
| | | 9410eu 11760me | 15565eu | 15575me | |
| 0500 | 0600 | UK, Sudan Radio Service | | 11795va | |
| 0500 | 0600 | USA, AFRTS | 4319usb | 5446usb | 5765usb |
| | | 6350usb | 7590usb | 7812usb | 10320usb |
| | | 12133usb | 12579usb | 13362usb | 13855usb |
| 0500 | 0600 | USA, KAIJ Dallas TX | 5755na | | |
| 0500 | 0600 | USA, KTBN Salt Lake City UT | | 7505na | |
| 0500 | 0600 | USA, KWHR Naalehu HI | | 11565as | 17780as |
| 0500 | 0600 | USA, Voice of America | | 4930af | 4960af |
| | | 6035af 6105af | 7295af | 13710af | |
| 0500 | 0600 | USA, WBQC Kennebunk ME | 9330na | 5105na | 7415na |
| 0500 | 0600 | USA, WBOH Newport NC | | 5920am | |
| 0500 | 0600 | USA, WEWN Birmingham AL | | 5745va | 7425va |
| | | 7570va 11615va | | | |
| 0500 | 0600 | USA, WHRA Greenbush ME | | 5875na | |
| 0500 | 0600 | USA, WHRI Noblesville IN | | 5970am | |
| 0500 | 0600 | USA, WHRI Noblesville IN | | 7535am | 15220am |
| 0500 | 0600 | USA, WJIE Louisville KY | | 13595am | |
| 0500 | 0600 | USA, WMLK Bethel PA | | 9265eu | 9955eu |
| 0500 | 0600 | USA, WRMI Miami FL 7385am | | 9955am | |
| 0500 | 0600 | USA, WTJC Newport NC | | 9370na | |
| 0500 | 0600 | USA, WWCR Nashville TN | | 3210na | 5070na |
| | | 5770na 5935na | | | |
| 0500 | 0600 | USA, WWRB Manchester TN | | 5050na | 5085na |
| | | 6890na | | | |
| 0500 | 0600 | USA, WYFR Okeechobee FL | | 6855va | 7520na |
| 0500 | 0600 | Zambia, Radio Christian Voice | | 6065af | |
| 0500 | 0600 | Zimbabwe, ZBC Corp 5975do | | | |
| 0505 | 0515 | Croatia, Croatia Radio | | 7285na | 9470au |

Shortwave Guide

| | | | | | | | |
|------|------|-------|-----------------------|---------|---------|---------|--|
| 0525 | 0600 | vl | 12105au | 12110au | | | |
| 0530 | 0600 | | Ghana, Ghana BC Corp | | 3366do | 4915do | |
| | | | Australia, Radio | 9660as | 11750as | 12080as | |
| | | | 13630pa | 15160va | 15240as | 15415pa | |
| | | | 15515as | 17750as | | | |
| 0530 | 0600 | | Thailand, Radio | 13780eu | | | |
| 0530 | 0600 | | UAE, Emirates Radio | 15435va | 17830va | 21700va | |
| 0530 | 0600 | | UK, BBC World Service | | 6005af | 6190af | |
| | | | 7160af 9410af | 11765af | 11940af | 11955as | |
| | | | 15310as | 15360as | 15420af | 17640af | |
| | | | 17760as | 17790as | 21660as | | |
| 0530 | 0600 | mtwhf | UK, BBC World Service | | 17885af | | |
| 0545 | 0600 | vl | Rwanda, Radio | 6055do | | | |

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

| | | | | | | | |
|------|------|-----------|---------------------------------|----------|----------|----------|---------|
| 0600 | 0605 | as | South Africa, TWR | 11640af | | | |
| 0600 | 0620 | | Vatican City, Vatican Radio | | 4005eu | 5890eu | |
| | | | 7250eu | | | | |
| 0600 | 0630 | | France, Radio France Intl | | 9595af | 11665af | |
| | | | 15155af | | | | |
| 0600 | 0630 | | UK, BBC World Service | | 6005af | 7160af | |
| | | | 9410af 11765af | 11940af | 12095af | 17640af | |
| 0600 | 0630 | | USA, Voice of America | | 4930af | 4960af | |
| | | | 6105af 7295af | 9695af | 11835af | 13710af | |
| | | | 11995af | | | | |
| 0600 | 0630 | mtwhf | USA, Voice of America | | | | |
| 0600 | 0635 | mtwhf | South Africa, TWR | 11640af | | | |
| 0600 | 0657 | | China, China Radio Intl | | 6115na | 7385al | |
| | | | 11770na | 11880as | 15140as | 15350as | |
| | | | 15465as | | | | |
| 0600 | 0700 | | Anguilla, Caribbean Beacon | | 6090am | | |
| 0600 | 0700 | | Australia, ABC NT Alice Springs | | 2310irr | 4835do | |
| 0600 | 0700 | | Australia, ABC NT Katherine | | 5025do | | |
| 0600 | 0700 | | Australia, ABC NT Tennant Creek | | 4910do | | |
| 0600 | 0700 | | Australia, Radio | | 9660as | 12080as | |
| | | | 13630pa | 15160va | 15240as | 15415pa | |
| | | | 15515va | 17750as | | | |
| 0600 | 0700 | | Canada, CFRX Toronto ON | | 6070do | | |
| 0600 | 0700 | | Canada, CFVP Calgary AB | | 6030do | | |
| 0600 | 0700 | | Canada, CKZN St John's NF | | 6160do | | |
| 0600 | 0700 | | Canada, CKZU Vancouver BC | | 6160do | | |
| 0600 | 0700 | | Costa Rica, University Network | | 5030va | 6150va | |
| | | | 7375va 9725va | 11870va | | | |
| 0600 | 0700 | | Cuba, Radio Havana | 6000na | 6060na | 9550na | |
| | | | 11760am | | | | |
| 0600 | 0700 | | Germany, Deutsche Welle | | 6140eu | 7170af | |
| | | | 15275af | 17860af | | | |
| 0600 | 0700 | DRM | Germany, Deutsche Welle | | 21675eu | | |
| 0600 | 0700 | vl | Ghana, Ghana BC Corp | | 3366do | 4915do | |
| 0600 | 0700 | vl | Greece, Voice of | | 9420eu | 15630eu | |
| 0600 | 0700 | | Guyana, Voice of | | 3291do | | |
| 0600 | 0700 | | Japan, Radio | | 7230eu | 11715as | 11740as |
| | | | 11760as | 13630va | 15195as | 17870pa | |
| | | | 21755pa | | | | |
| 0600 | 0700 | | Liberia, ELWA | 4760do | | | |
| 0600 | 0700 | | Malaysia, Radio | 7295as | | | |
| 0600 | 0700 | | Malaysia, Voice of | 6175as | 9750as | 15295as | |
| 0600 | 0700 | vl | Namibia, Namibian BC Corp | | 3270do | 3290do | |
| | | | 6060do | 6175do | | | |
| 0600 | 0700 | | New Zealand, Radio NZ Intl | | 11820pa | | |
| 0600 | 0700 | | Nigeria, Radio/Ibadan | | 6050do | | |
| 0600 | 0700 | | Nigeria, Radio/Kaduna | | 4770do | 6090do | |
| 0600 | 0700 | | Nigeria, Radio/Lagos | 3326do | 4990do | | |
| 0600 | 0700 | | Nigeria, Voice of | 15120af | | | |
| 0600 | 0700 | | Russia, Voice of | 17665pa | 21790pa | | |
| 0600 | 0700 | | Sierra Leone, Radio UNAMSIL | | 6137do | | |
| 0600 | 0700 | irreg/ vl | Sierra Leone, SLBS | 3316do | | | |
| 0600 | 0700 | vl | Singapore, Mediakor Radio | | 6150do | | |
| 0600 | 0700 | vl | Solomon Islands, SIBC | | 5020do | 9545do | |
| 0600 | 0700 | | South Africa, Channel Africa | | 7240af | 15220af | |
| 0600 | 0700 | as | Swaziland, TWR | 4775af | | | |
| 0600 | 0700 | | Swaziland, TWR | 6120af | 9500af | | |
| 0600 | 0700 | | UK, BBC World Service | | 6195eu | 9410eu | |
| | | | 11955as | 12095eu | 15310as | 15360as | |
| | | | 15565eu | 15575me | 17760as | 17790as | |
| | | | 21660as | | | | |
| 0600 | 0700 | as | UK, BBC World Service | | 17885af | | |
| 0600 | 0700 | | USA, AFRTS | 4319usb | 5446usb | 5765usb | |
| | | | 6350usb | 7590usb | 7812usb | 10320usb | |
| | | | 12133usb | 12579usb | 13855usb | | |
| 0600 | 0700 | | USA, KAIJ Dallas TX | 5755na | | | |
| 0600 | 0700 | | USA, KBN Salt Lake City UT | | 7505na | | |
| 0600 | 0700 | | USA, KWHR Naalehu HI | | 9930as | 11565as | |
| 0600 | 0700 | | USA, WBCQ Kennebunk ME | | 5105na | 7415na | |
| 0600 | 0700 | | USA, WBOH Newport NC | | 5920am | | |
| 0600 | 0700 | | USA, WEWN Birmingham AL | | 5745va | 7425va | |
| | | | 7570va 11615va | | | | |
| 0600 | 0700 | | USA, WHRA Greenbush ME | | 7580na | | |
| 0600 | 0700 | | USA, WHRI Noblesville IN | | 9930am | 11565am | |
| | | | 9930am | 11565am | | | |
| 0600 | 0700 | | USA, WJIE Louisville KY | | 13595am | | |
| 0600 | 0700 | | USA, WMUK Bethel PA | | 9265eu | 9955eu | |

| | | | | | | | |
|------|------|-------|-----------------------------------|---------|---------|---------|--|
| 0600 | 0700 | | USA, WRMI Miami FL | 7385am | 9955am | | |
| 0600 | 0700 | | USA, WTJC Newport NC | | 9370na | | |
| 0600 | 0700 | | USA, WWCR Nashville TN | | 3210na | 5070na | |
| | | | 5770na 5935na | | | | |
| 0600 | 0700 | | USA, WYFR Okeechobee FL | | 5850eu | 7355eu | |
| | | | 9680eu 11530na | 11580va | | | |
| 0600 | 0700 | vl | Vanuatu, Radio | | 4960do | | |
| 0600 | 0700 | | Yemen, Rep of Yemen Radio | | | 9780me | |
| 0600 | 0700 | vl | Zimbabwe, ZBC Corp | 5975do | | | |
| 0605 | 0615 | vl | Croatia, Croatian Radio | | 9480au | 12105au | |
| | | | 12110au | | | | |
| 0605 | 0630 | as | Austria, Radio Austria Intl | | 17870me | | |
| 0630 | 0656 | | Romania, Radio Romania Intl | | 9565eu | 11710eu | |
| 0630 | 0700 | vl | Georgia, Radio Georgia | | 11805eu | | |
| 0630 | 0700 | s | Germany, Bible Voice Broadcasting | | 5945eu | | |
| 0630 | 0700 | | UK, BBC World Service | | 6005af | 6190af | |
| | | | 7160af 9410af | 11765af | 11940af | 12095af | |
| | | | 15400af | 17640af | | | |
| 0630 | 0700 | | USA, Voice of America | | 6080af | 7295af | |
| | | | 11835af | | | | |
| 0630 | 0700 | | Vatican City, Vatican Radio | | 9660af | 11625af | |
| | | | 13765af | | | | |
| 0635 | 0700 | as | Austria, Radio Austria Intl | | 17870me | | |
| 0645 | 0700 | s | Albania, TWR | | 11865eu | | |
| 0645 | 0700 | mtwhf | Austria, Radio Austria Intl | | 17870me | | |
| 0645 | 0700 | s | Monaco, TWR | | 9870eu | | |

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

| | | | | | | | |
|------|------|-----------|-----------------------------------|---------|---------|---------|--|
| 0700 | 0705 | | New Zealand, Radio NZ Intl | | 11820pa | | |
| 0700 | 0715 | vl | Croatia, Croatian Radio | | 9470au | 12105au | |
| | | | 12110au | 13820eu | | | |
| 0700 | 0715 | | UK, BBC World Service | | 6005af | 6190af | |
| | | | 11940af | 11765af | 12095af | 15400af | |
| | | | 17830af | | | | |
| 0700 | 0727 | | Czech Rep, Radio Prague Intl | | 9880eu | 11600eu | |
| 0700 | 0730 | vl | Slovakia, Slovak Radio | | 13715au | 15460au | |
| 0700 | 0730 | | UK, BBC World Service | | 11760me | 15575me | |
| 0700 | 0800 | mtwhf | Albania, TWR | 11865eu | | | |
| 0700 | 0800 | | Anguilla, Caribbean Beacon | | 6090am | | |
| 0700 | 0800 | | Australia, ABC NT Alice Springs | | 2310irr | 4835do | |
| 0700 | 0800 | | Australia, ABC NT Katherine | | 5025do | | |
| 0700 | 0800 | | Australia, ABC NT Tennant Creek | | 4910do | | |
| 0700 | 0800 | | Australia, HCJB | 11750au | | | |
| 0700 | 0800 | | Australia, Radio | 9660as | 11880as | 12080as | |
| | | | 13630pa | 15160va | 15240as | 15415pa | |
| | | | 17750pa | | | | |
| 0700 | 0800 | | Canada, CFRX Toronto ON | | 6070do | | |
| 0700 | 0800 | | Canada, CFVP Calgary AB | | 6030do | | |
| 0700 | 0800 | | Canada, CKZN St John's NF | | 6160do | | |
| 0700 | 0800 | | Canada, CKZU Vancouver BC | | 6160do | | |
| 0700 | 0800 | | China, China Radio Intl | | 11855as | 11880as | |
| | | | 15350as | 15465as | 17540as | 17490al | |
| 0700 | 0800 | | Costa Rica, University Network | | 5030va | 6150va | |
| | | | 7375va 9725va | 11870va | | | |
| 0700 | 0800 | | Eat Guinea, Radio Africa | | 15190af | | |
| 0700 | 0800 | | France, Radio France Intl | | 11700af | 11725af | |
| 0700 | 0800 | as | Germany, Bible Voice Broadcasting | | 5945eu | | |
| 0700 | 0800 | | Germany, Deutsche Welle | | 6140eu | | |
| 0700 | 0800 | DRM | Germany, Deutsche Welle | | 21675eu | | |
| 0700 | 0800 | vl | Ghana, Ghana BC Corp | | 3366do | 4915do | |
| 0700 | 0800 | vl | Greece, Voice of | 9420eu | 11645eu | 15630eu | |
| 0700 | 0800 | | Guyana, Voice of | 3291do | 5950do | | |
| 0700 | 0800 | | Liberia, ELWA | 4760do | | | |
| 0700 | 0800 | | Malaysia, Radio | 7295as | | | |
| 0700 | 0800 | | Malaysia, Voice of | 6175as | 9750as | 15295as | |
| 0700 | 0800 | mtwhf | Monaco, TWR | | 9870eu | | |
| 0700 | 0800 | | Myanmar, Radio | | 9730do | | |
| 0700 | 0800 | vl | Namibia, Namibian BC Corp | | 3270do | 3290do | |
| | | | 6060do | 6175do | | | |
| 0700 | 0800 | | Nigeria, Radio/Ibadan | | 6050do | | |
| 0700 | 0800 | | Nigeria, Radio/Kaduna | | 4770do | 6090do | |
| 0700 | 0800 | | Nigeria, Radio/Lagos | 3326do | 4990do | | |
| 0700 | 0800 | | Russia, Voice of | 12005pa | 12060pa | 17665pa | |
| | | | 21790pa | | | | |
| 0700 | 0800 | DRM | Russia, Voice of | 15780eu | | | |
| 0700 | 0800 | | Sierra Leone, Radio UNAMSIL | | 6137do | | |
| 0700 | 0800 | irreg/ vl | Sierra Leone, SLBS | 3316do | | | |
| 0700 | 0800 | | Singapore, Mediakor Radio | | 6150do | | |
| 0700 | 0800 | vl | Solomon Islands, SIBC | | 5020do | 9545do | |
| 0700 | 0800 | | South Africa, Channel Africa | | 11825af | | |
| 0700 | 0800 | | Swaziland, TWR</ | | | | |

Shortwave Guide



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|------|------|-------|-----------------------------------|---------|---------|
| 0700 | 0800 | | USA, KTBN Salt Lake City UT | 7505na | |
| 0700 | 0800 | | USA, KWHR Naalehu HI | 9930as | 11565as |
| 0700 | 0800 | | USA, Voice of America | 9959af | 9700af |
| | | | 11655af | | |
| 0700 | 0800 | | USA, WBCQ Kennebunk ME | 5105na | 7415na |
| 0700 | 0800 | | USA, WBOH Newport NC | 5920am | |
| 0700 | 0800 | | USA, WEWN Birmingham AL | 5745va | 7475va |
| | | | 7570va 11615va | | |
| 0700 | 0800 | | USA, WHRA Greenbush ME | 7580na | |
| 0700 | 0800 | | USA, WHRI Noblesville IN | 7315am | 7535am |
| | | | 9930am 11565am | | |
| 0700 | 0800 | | USA, WJIE Louisville KY | 13595am | |
| 0700 | 0800 | | USA, WMLK Bethel PA | 9265eu | 9955eu |
| 0700 | 0800 | | USA, WRMI Miami FL 7385am | 9955am | |
| 0700 | 0800 | | USA, WTJC Newport NC | 9370na | |
| 0700 | 0800 | | USA, WWCR Nashville TN | 3210na | 5070na |
| | | | 5770na 5935na | | |
| 0700 | 0800 | | USA, WYFR Okeechobee FL | 6855va | 5985va |
| | | | 9495va 9715va 9985va | | |
| 0700 | 0800 | vl | Vanuatu, Radio | 4960do | |
| 0706 | 0800 | | New Zealand, Radio NZ Intl | 9885pa | |
| 0715 | 0750 | a | Albania, TWR | 11865eu | |
| 0715 | 0750 | a | Monaco, TWR | 9870eu | |
| 0715 | 0800 | f | Germany, Bible Voice Broadcasting | 5945eu | |
| 0715 | 0800 | | UK, BBC World Service | 6190af | 11765af |
| | | | 11940af 12095af 15400af | | 17830af |
| 0730 | 0800 | | Bulgaria, Radio | 11600eu | 13600eu |
| 0730 | 0800 | | Georgia, Radio Georgia | | 11805eu |
| 0730 | 0800 | as | Guam, TWR/KTWR | 15255as | |
| 0740 | 0800 | mtwhf | Guam, TWR/KTWR | 15225as | |

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

| | | | | | |
|------|------|-----------|-----------------------------------|---------|-----------------|
| 0800 | 0815 | a | Germany, Bible Voice Broadcasting | 5945eu | |
| 0800 | 0820 | mtwhfs | Albania, TWR | 11865eu | |
| 0800 | 0820 | s | Monaco, TWR | 9870eu | |
| 0800 | 0830 | | Australia, ABC NT Katherine | 5025do | |
| 0800 | 0830 | | Australia, ABC NT Tennant Creek | 4910do | |
| 0800 | 0830 | | Australia, Radio | 5995as | 9590as |
| | | | 9710as 12080pa 13630pa | | 17750pa |
| 0800 | 0830 | | Liberia, ELWA | 4760do | |
| 0800 | 0830 | | Malaysia, Voice of | 6175as | 9750as |
| 0800 | 0830 | | Myanmar, Radio | 9730do | |
| 0800 | 0845 | s | Germany, Bible Voice Broadcasting | 5945eu | |
| 0800 | 0857 | | China, China Radio Intl | 15350as | 15465as |
| | | | 15350as 15465as | | 17540as 17490al |
| 0800 | 0900 | | Anguilla, Caribbean Beacon | 6090am | |
| 0800 | 0900 | | Australia, ABC NT Alice Springs | 2310irr | 4835do |
| 0800 | 0900 | | Australia, HCJB | 11750au | |
| 0800 | 0900 | | Canada, CFRX Toronto ON | 6070do | |
| 0800 | 0900 | | Canada, CFVP Calgary AB | 6030do | |
| 0800 | 0900 | | Canada, CKZV St John's NF | 6160do | |
| 0800 | 0900 | | Canada, CKZU Vancouver BC | 6160do | |
| 0800 | 0900 | | Costa Rica, University Network | 5030va | 6150va |
| | | | 7375va 9725va 11870va | | |
| 0800 | 0900 | | Eqt Guinea, Radio Africa | 15190af | |
| 0800 | 0900 | | Germany, Deutsche Welle | 6140eu | |
| 0800 | 0900 | DRM | Germany, Deutsche Welle | 21675eu | |
| 0800 | 0900 | vl | Ghana, Ghana BC Corp | 3366do | 4915do |
| 0800 | 0900 | mtwhf | Greece, Voice of | 9420eu | 15630eu |
| 0800 | 0900 | | Guam, TWR/KTWR | 11840as | 15225as |
| 0800 | 0900 | | Guyana, Voice of | 3291do | 5950do |
| 0800 | 0900 | | Indonesia, Voice of | 9525as | 11785pa |
| 0800 | 0900 | vl/as | Italy, IRRS 13840eu | | |
| 0800 | 0900 | | Malaysia, Radio | 7295as | |
| 0800 | 0900 | | Malaysia, Voice of | 15295as | |
| 0800 | 0900 | | New Zealand, Radio NZ Intl | 9885pa | |
| 0800 | 0900 | | Nigeria, Radio/Ibadan | 6050do | |
| 0800 | 0900 | | Nigeria, Radio/Kaduna | 4770do | 6090do |
| 0800 | 0900 | | Nigeria, Radio/Lagos | 3326do | 4990do |
| 0800 | 0900 | vl | Pakistan, Radio | 15100eu | 17835eu |
| 0800 | 0900 | | Papua New Guinea, Catholic Radio | | 4960do |
| 0800 | 0900 | | Papua New Guinea, NBC | 4890do | |
| 0800 | 0900 | DRM | Russia, Voice of | 15780eu | |
| 0800 | 0900 | | Russia, Voice of | 12005pa | 17495pa |
| | | | 17525pa 17570pa | | 17665pa 21790pa |
| 0800 | 0900 | | Sierra Leone, Radio UNAMSIL | 6137do | |
| 0800 | 0900 | irreg/ vl | Sierra Leone, SLBS | 3316do | |
| 0800 | 0900 | | Singapore, Mediacorp Radio | 6150do | |
| 0800 | 0900 | vl | Solomon Islands, SIBC | 5020do | 9545do |
| 0800 | 0900 | s | South Africa, SW Radio League | 9750af | 17700af |
| 0800 | 0900 | | South Korea, Radio Korea Intl | 9570as | 9640eu |
| 0800 | 0900 | as | Swaziland, TWR | 6120af | |
| 0800 | 0900 | | Swaziland, TWR | 9500af | |
| 0800 | 0900 | | Taiwan, Radio Taiwan Intl | 9610au | |
| 0800 | 0900 | | UK, BBC World Service | 6190af | 9410eu |
| | | | 11760me 11940af | | 11955as 12095eu |
| | | | 15310as 15360os | | 15400af 15485va |
| | | | 15565eu 17760os | | 17830af 17790as |
| | | | 17885af 21470af | | 21660os |
| 0800 | 0900 | as | UK, BBC World Service | 17640me | |
| 0800 | 0900 | | USA, AFRTS | 4319usb | 5765usb |

| | | | | | | | |
|------|------|----|---------------------------------|----------|----------|----------|----------|
| | | | | 6350usb | 7590usb | 7812usb | 10320usb |
| | | | | 12133usb | 12579usb | 13362usb | 13855usb |
| 0800 | 0900 | | USA, KAIJ Dallas TX | 5755na | | | |
| 0800 | 0900 | | USA, KNLS Anchor Point AK | | | 11765as | |
| 0800 | 0900 | | USA, KTBN Salt Lake City UT | | | 7505na | |
| 0800 | 0900 | | USA, KWHR Naalehu HI | | | 11565as | 17780as |
| 0800 | 0900 | | USA, Voice of America | | | 5995af | 9700af |
| | | | 11655af | | | | |
| 0800 | 0900 | | USA, WBCQ Kennebunk ME | | | 5105na | 7415na |
| 0800 | 0900 | | USA, WBOH Newport NC | | | 5920am | |
| 0800 | 0900 | | USA, WEWN Birmingham AL | | | 5745na | 7425na |
| | | | 11875na | | | | |
| 0800 | 0900 | | USA, WHRI Noblesville IN | | | 5860am | 7315am |
| | | | 9930am 11565am | | | | |
| 0800 | 0900 | | USA, WJIE Louisville KY | | | 13595am | |
| 0800 | 0900 | | USA, WMLK Bethel PA | | | 9265eu | 9955eu |
| 0800 | 0900 | | USA, WRMI Miami FL 7385am | | | 9955am | |
| 0800 | 0900 | | USA, WTJC Newport NC | | | 9370na | |
| 0800 | 0900 | | USA, WWCR Nashville TN | | | 3210na | 5070na |
| | | | 5770na 5935na | | | | |
| 0800 | 0900 | | USA, WYFR Okeechobee FL | | | 5950af | 6855af |
| | | | 7455af 9985af | | | | |
| 0800 | 0900 | vl | Vanuatu, Radio | 4960do | | | |
| 0805 | 0815 | vl | Croatia, Croatian Radio | | | 12105au | 12110au |
| 0815 | 0900 | as | Guam, TWR/KTWR | 11840as | | | |
| 0830 | 0900 | | Australia, ABC NT Katherine | | | 2485do | |
| 0830 | 0900 | | Australia, ABC NT Tennant Creek | | | 2325do | |
| 0830 | 0900 | | Australia, Radio | 5995as | | 9580as | 9590as |
| | | | 9710as 12080pa 13630pa | | | 15240pa | 15415pa |
| | | | 17750pa | | | | |
| 0830 | 0900 | | Georgia, Radio Georgia | | | 11910eu | |

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

| | | | | | |
|------|------|-----------|----------------------------------|---------|-------------------|
| 0900 | 0915 | vl | Ghana, Ghana BC Corp | 3366do | 4915do |
| 0900 | 0929 | | Czech Rep, Radio Prague Intl | 21745va | |
| 0900 | 0930 | | Australia, Radio | 9580as | 9590as |
| | | | 15240pa | | 11880as |
| 0900 | 0930 | | Guam, TWR/KTWR | 11840as | |
| 0900 | 0930 | | UK, BBC World Service | 6195as | 9605as |
| | | | 9740as 15310as 15360as | | 17760as 17790as |
| | | | 21660as | | |
| 0900 | 0957 | | China, China Radio Intl | 15210pa | 17490eu |
| | | | 17690pa | | |
| 0900 | 1000 | | Anguilla, Caribbean Beacon | 6090am | |
| 0900 | 1000 | | Australia, ABC NT Alice Springs | 2310do | 4835irr |
| 0900 | 1000 | | Australia, ABC NT Katherine | 2485do | |
| 0900 | 1000 | | Australia, ABC NT Tennant Creek | 2325do | |
| 0900 | 1000 | | Australia, HCJB | 11750au | |
| 0900 | 1000 | | Australia, Voice Intl | 11955as | 13685as |
| 0900 | 1000 | | Canada, CFRX Toronto ON | 6070do | |
| 0900 | 1000 | | Canada, CFVP Calgary AB | 6030do | |
| 0900 | 1000 | | Canada, CKZV St John's NF | 6160do | |
| 0900 | 1000 | | Canada, CKZU Vancouver BC | 6160do | |
| 0900 | 1000 | | Costa Rica, University Network | 5030va | 6150va |
| | | | 7375va 9725va 11870va | | 13750va |
| 0900 | 1000 | | Eqt Guinea, Radio Africa | 15190af | |
| 0900 | 1000 | | Germany, Deutsche Welle | 6140eu | |
| 0900 | 1000 | DRM | Germany, Deutsche Welle | 21675eu | |
| 0900 | 1000 | vl | Greece, Voice of | 9375eu | 9420eu |
| | | | 15630eu | | 11645eu |
| 0900 | 1000 | | Guyana, Voice of | 3291do | 5950do |
| 0900 | 1000 | vl/as | Italy, IRRS 13840eu | | |
| 0900 | 1000 | | Malaysia, Radio | 7295as | |
| 0900 | 1000 | | Malaysia, Voice of | 15295as | |
| 0900 | 1000 | vl | Namibia, Nambian BC Corp | 6060do | 3290do |
| | | | 6175do | | |
| 0900 | 1000 | | New Zealand, Radio NZ Intl | 9885pa | |
| 0900 | 1000 | | Nigeria, Radio/Ibadan | 6050do | |
| 0900 | 1000 | | Nigeria, Radio/Kaduna | 4770do | 6090do |
| 0900 | 1000 | | Nigeria, Radio/Lagos | 3326do | 4990do |
| 0900 | 1000 | vl | Pakistan, Radio | 15100eu | 17835eu |
| 0900 | 1000 | | Papua New Guinea, Catholic Radio | | 4960do |
| 0900 | 1000 | | Papua New Guinea, NBC | 4890do | |
| 0900 | 1000 | DRM | Russia, Voice of | 15780eu | |
| 0900 | 1000 | | Russia, Voice of | 17495pa | 17525pa |
| | | | 17665pa | | 17570va |
| 0900 | 1000 | vl | Rwanda, Radio | 6055do | |
| 0900 | 1000 | | Sierra Leone, Radio UNAMSIL | 6137do | |
| 0900 | 1000 | irreg/ vl | Sierra Leone, SLBS | 3316do | |
| 0900 | 1000 | | Singapore, Mediacorp Radio | 6150do | |
| 0900 | 1000 | vl | Solomon Islands, SIBC | 5020do | 9545do |
| 0900 | 1000 | | UK, BBC World Service | 6190af | 11760me |
| | | | 11940af 15190co | | 15400af 15485va |
| | | | 15565eu 15575me | | 17640me 17885af |
| | | | 21470af | | |
| 0900 | 1000 | | USA, AFRTS | 4319usb | 5446usb |
| | | | 6350usb 7590usb | | 7812usb 10320usb |
| | | | 12133usb 12579usb | | 13362usb 13855usb |
| 0900 | 1000 | | USA, KAIJ Dallas TX | 5755na | |
| 0900 | 1000 | | USA, KTBN Salt Lake City UT | | 7505na |
| 0900 | 1000 | | USA, KWHR Naalehu HI | | 11565as |

Shortwave Guide



| | | | | | | | | |
|------|------|---------------------------|---------|---------|---------|--|--|--|
| 0900 | 1000 | USA, Voice of America | 15615me | 17555me | | | | |
| 0900 | 1000 | USA, WBCQ Kennebunk ME | 5105na | 7415nc | | | | |
| 0900 | 1000 | USA, WBOH Newport NC | 5920am | | | | | |
| 0900 | 1000 | USA, WEWN Birmingham AL | 5745na | 7425na | | | | |
| | | 11875na | | | | | | |
| 0900 | 1000 | USA, WHRI Noblesville IN | 5860am | 7315am | | | | |
| | | 9930am | 11565am | | | | | |
| 0900 | 1000 | USA, WJIE Louisville KY | 13595am | | | | | |
| 0900 | 1000 | USA, WRMI Miami FL 7385am | 9955am | | | | | |
| 0900 | 1000 | USA, WTJC Newport NC | 9370na | | | | | |
| 0900 | 1000 | USA, WWCR Nashville TN | 3210na | 5070na | | | | |
| | | 5770na5935na | | | | | | |
| 0900 | 1000 | USA, WYFR Okeechobee FL | 5950af | 6855af | | | | |
| | | 6890af 7455af 9450af | | | | | | |
| 0900 | 1000 | Vanuatu, Radio | 4960do | | | | | |
| 0905 | 0915 | Croatia, Croatian Radio | 12105ou | 12110au | | | | |
| 0930 | 0945 | Israel, Kol Israel | 15640va | 17535va | | | | |
| 0930 | 1000 | Australia, Radio | 9580as | 9590as | 11880as | | | |
| | | 15240pa | 15415pa | | | | | |
| 0930 | 1000 | Georgia, Radio Georgia | 11910me | | | | | |
| 0930 | 1000 | UAE, Radio UNMEE | 21460af | | | | | |

| 1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT | | | | | | | | |
|--|------|----------------------------------|----------|----------|----------|--|--|--|
| 1000 | 1030 | Australia, Voice Intl | 11955as | 13685as | | | | |
| 1000 | 1030 | Guam, AWR/KSDA | 11930as | | | | | |
| 1000 | 1030 | Mongolia, Voice of | 12085as | | | | | |
| 1000 | 1030 | UK, BBC World Service | 9605as | 9740as | | | | |
| | | 15310as | 15360as | 17760as | 17790as | | | |
| 1000 | 1057 | China, China Radio Intl | 15210pa | 17490pa | | | | |
| | | 17690pa | | | | | | |
| 1000 | 1059 | New Zealand, Radio NZ Intl | 9885pa | | | | | |
| 1000 | 1100 | Anguilla, Caribbean Beacon | 11775am | | | | | |
| 1000 | 1100 | Australia, ABC NT Alice Springs | 2310do | 4835irr | | | | |
| 1000 | 1100 | Australia, ABC NT Katherine | 2485do | | | | | |
| 1000 | 1100 | Australia, ABC NT Tennant Creek | 2325do | | | | | |
| 1000 | 1100 | Australia, Radio | 9580as | 9590as | 11880as | | | |
| | | 15240pa | 15415pa | | | | | |
| 1000 | 1100 | Canada, CFRX Toronto ON | 6070do | | | | | |
| 1000 | 1100 | Canada, CFVP Calgary AB | 6030do | | | | | |
| 1000 | 1100 | Canada, CKZN St John's NF | 6160do | | | | | |
| 1000 | 1100 | Canada, CKZU Vancouver BC | 6160do | | | | | |
| 1000 | 1100 | Costa Rica, University Network | 5030va | 6150va | | | | |
| | | 7375va 9725va | 11870va | | | | | |
| 1000 | 1100 | Guyana, Voice of | 3291da | 5950do | | | | |
| 1000 | 1100 | India, All India Radio | 7510pa | 13710pa | 15020as | | | |
| | | 15235as | 15260as | 17800pa | 17895pa | | | |
| 1000 | 1100 | Italy, IRRS 13840eu | | | | | | |
| 1000 | 1100 | Japan, Radio | 6120na | 9695as | 11730as | | | |
| | | 17585eu | 17720va | 21755pa | | | | |
| 1000 | 1100 | Malaysia, Radio | 7295as | | | | | |
| 1000 | 1100 | Malaysia, Voice of | 15295as | | | | | |
| 1000 | 1100 | Netherlands, Radio | 9790va | 12065va | 13710va | | | |
| | | 13820va | | | | | | |
| 1000 | 1100 | Nigeria, Voice of | 11770af | 15120va | | | | |
| 1000 | 1100 | North Korea, Voice of | 6285as | 9335ca | 9850ca | | | |
| | | | | | | | | |
| 1000 | 1100 | Papua New Guinea, Catholic Radio | | 4960do | | | | |
| 1000 | 1100 | Papua New Guinea, NBC | 4890do | | | | | |
| 1000 | 1100 | Singapore, Mediastar Radio | 6150do | | | | | |
| 1000 | 1100 | Solomon Islands, SIBC | 5020do | 9545do | | | | |
| 1000 | 1100 | South Africa, Channel Africa | 11825af | | | | | |
| 1000 | 1100 | UK, BBC World Service | 6190af | 6195ca | | | | |
| | | 11760me | 1194caf | 12095eu | 15485va | | | |
| | | 15565eu | 15575me | 17640va | 17385af | | | |
| | | 21470af | | | | | | |
| 1000 | 1100 | UK, BBC World Service | 17830af | 15190ca | 1540caf | | | |
| 1000 | 1100 | USA, AFRTS | 4319usb | 5446usb | 5765usb | | | |
| | | 6350usb | 7590usb | 7812usb | 10320usb | | | |
| | | 12133usb | 12579usb | 13362usb | 13855usb | | | |
| 1000 | 1100 | USA, KAIJ Dallas TX | 5755na | | | | | |
| 1000 | 1100 | USA, KTVN Salt Lake City UT | | 7505na | | | | |
| 1000 | 1100 | USA, KWHR Naalehu HI | 9930as | 11565as | | | | |
| 1000 | 1100 | USA, Voice of America | 15615me | 17555me | | | | |
| 1000 | 1100 | USA, WBCQ Kennebunk ME | 5105na | | | | | |
| 1000 | 1100 | USA, WBOH Newport NC | 5920am | | | | | |
| 1000 | 1100 | USA, WEWN Birmingham AL | 5850na | 7425na | | | | |
| | | 11875na | | | | | | |
| 1000 | 1100 | USA, WHRI Noblesville IN | 5860am | 9930am | | | | |
| 1000 | 1100 | USA, WRMI Miami FL 7385am | 9955am | | | | | |
| 1000 | 1100 | USA, WTJC Newport NC | 9370na | | | | | |
| 1000 | 1100 | USA, WWCR Nashville TN | 5070na | 5770na | | | | |
| | | 5935na 9985na | | | | | | |
| 1000 | 1100 | USA, WYFR Okeechobee FL | 5950na | 6855na | | | | |
| | | 6890na 7455na 9450na | | | | | | |
| 1000 | 1100 | USA, WHRI Noblesville IN | 11565am | | | | | |
| 1030 | 1045 | Ethiopia, Radio | 7110af | 9790af | | | | |
| 1030 | 1057 | Czech Rep., Radio Prague Intl | 9880eu | 11615eu | | | | |
| 1030 | 1058 | Vietnam, Voice of | 12020as | | | | | |
| 1030 | 1100 | Iran, Voice of the Islamic Rep | 15660as | 17660as | | | | |

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|------|------|----------------------------|---------|---------|---------|---------|--|--|
| 1030 | 1100 | UAE, Emirates Radio | 13675va | 15370va | 15395va | | | |
| | | 21605va | | | | | | |
| 1030 | 1100 | UK, BBC World Service | 17760as | 17790as | 9740as | 15310as | | |
| 1030 | 1100 | French City, Vatican Radio | 5885eu | | | | | |

| 1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT | | | | | | | | |
|--|------|-----------------------------------|----------|----------|----------|--|--|--|
| 1100 | 1104 | Pakistan, Radio | 15100eu | 17835eu | | | | |
| 1100 | 1128 | Vietnam, Voice of | 7285as | | | | | |
| 1100 | 1130 | Australia, Radio | 5995as | 6020as | 9475as | | | |
| | | 9560as 9580as | 9590as | 11880as | 12080as | | | |
| | | 15240pa | | | | | | |
| 1100 | 1130 | Iran, Voice of the Islamic Rep | | 15660as | 17660as | | | |
| 1100 | 1157 | China, China Radio Intl | 17490na | 5960na | 13665al | | | |
| 1100 | 1159 | Germany, Overcomer Ministries | 6110eu | | | | | |
| 1100 | 1159 | Germany, Universal Life | 6055me | | | | | |
| 1100 | 1200 | Anguilla, Caribbean Beacon | 11775am | | | | | |
| 1100 | 1200 | Australia, ABC NT Alice Springs | 2310do | 4835irr | | | | |
| 1100 | 1200 | Australia, ABC NT Katherine | 2485do | | | | | |
| 1100 | 1200 | Australia, ABC NT Tennant Creek | 2325do | | | | | |
| 1100 | 1200 | Australia, Voice Intl | 13635as | 13685as | | | | |
| 1100 | 1200 | Canada, CFRX Toronto ON | 6070do | | | | | |
| 1100 | 1200 | Canada, CFVP Calgary AB | 6030do | | | | | |
| 1100 | 1200 | Canada, CKZN St John's NF | 6160do | | | | | |
| 1100 | 1200 | Canada, CKZU Vancouver BC | 6160do | | | | | |
| 1100 | 1200 | Costa Rica, University Network | 5030va | 6150va | | | | |
| | | 7375va 9725va | 11870va | 1375va | | | | |
| 1100 | 1200 | Ecuador, HCJB | 12005am | 21455am | | | | |
| 1100 | 1200 | Greece, Voice of | 9375eu | 9420eu | 9775eu | | | |
| | | 15630eu | 15650eu | | | | | |
| 1100 | 1200 | Italy, IRRS 13840eu | | | | | | |
| 1100 | 1200 | Italy, IRRS 15665va | | | | | | |
| 1100 | 1200 | Japan, Radio | 6120na | 9695as | 11730as | | | |
| 1100 | 1200 | Malaysia, Radio | 7295as | | | | | |
| 1100 | 1200 | Malaysia, Voice of | 15295as | | | | | |
| 1100 | 1200 | New Zealand, Radio NZ Intl | 9885pa | | | | | |
| 1100 | 1200 | Nigeria, Voice of | 11770af | 15120vc | | | | |
| 1100 | 1200 | Papua New Guinea, Catholic Radio | | 4960do | | | | |
| 1100 | 1200 | Papua New Guinea, NBC | 4890do | | | | | |
| 1100 | 1200 | Singapore, Radio Singapore Intl | 6080as | 6150as | | | | |
| 1100 | 1200 | South Africa, Channel Africa | 11825af | | | | | |
| 1100 | 1200 | Taiwan, Radio Taiwan Intl | 7445as | | | | | |
| 1100 | 1200 | UK, BBC World Service | 6190af | 6195ca | | | | |
| | | 9740as 11940af | 11760me | 12095eu | 15190ca | | | |
| | | 15310as | 15485va | 15565eu | 15575eu | | | |
| | | 17640va | 17760as | 17790vc | 17885af | | | |
| | | 17830af | 21470af | | | | | |
| 1100 | 1200 | Ukraine, Radio Ukraine Intl | | 15675eu | | | | |
| 1100 | 1200 | USA, AFRTS | 4319usb | 5446usb | 5765usb | | | |
| | | 6350usb | 7590usb | 7812usb | 10320usb | | | |
| | | 12133usb | 12579usb | 13362usb | 13855usb | | | |
| 1100 | 1200 | USA, KAIJ Dallas TX | 5755na | | | | | |
| 1100 | 1200 | USA, KTVN Salt Lake City UT | | 7505na | | | | |
| 1100 | 1200 | USA, KWHR Naalehu HI | 9930as | 11565as | | | | |
| 1100 | 1200 | USA, Voice of America | 15615me | 17555me | | | | |
| 1100 | 1200 | USA, WBCQ Kennebunk ME | 5105na | | | | | |
| 1100 | 1200 | USA, WBOH Newport NC | 5920am | | | | | |
| 1100 | 1200 | USA, WEWN Birmingham AL | 5850na | 7425na | | | | |
| | | 11875na | | | | | | |
| 1100 | 1200 | USA, WHRI Noblesville IN | 5860am | 9930am | | | | |
| 1100 | 1200 | USA, WHRI Noblesville IN | 11565am | | | | | |
| 1100 | 1200 | USA, WINB Red Lion PA | 9320am | | | | | |
| 1100 | 1200 | USA, WJIE Louisville KY | 7490am | | | | | |
| 1100 | 1200 | USA, WRMI Miami FL 7385am | 9955am | | | | | |
| 1100 | 1200 | USA, WTJC Newport NC | 9370na | | | | | |
| 1100 | 1200 | USA, WWCR Nashville TN | 5070na | 5770na | | | | |
| | | 5935na 15825na | | | | | | |
| 1100 | 1200 | USA, WYFR Okeechobee FL | 5950am | 6890am | | | | |
| | | 7355am | 9555am | 11725am | 11830am | | | |
| 1130 | 1159 | Germany, Universal Life | 6055me | | | | | |
| 1130 | 1200 | Australia, Radio | 5995as | 6020as | 9475as | | | |
| | | 9560as 9580as | 9590as | 11880as | 12080as | | | |
| 1130 | 1200 | Germany, Bible Voice Broadcasting | 12065as | | | | | |
| 1130 | 1200 | UAE, Radio UNMEE | 21550af | | | | | |
| 1130 | 1200 | UK, Wales Radio Intl | 17625pa | | | | | |
| 1130 | 1200 | Vatican City, Vatican Radio | 11625af | 13765af | | | | |
| | | 15570af | | | | | | |
| 1145 | 1200 | Libya, Voice of Africa | 17695af | 21675af | 21695af | | | |

| 1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT | | | | | | | | |
|--|------|----------------------------|---------|---------|--------|--|--|--|
| 1200 | 1215 | Cambodia, National Radio | 11940cs | | | | | |
| 1200 | 1230 | France, Radio France Intl | 15275cf | 17815as | | | | |
| | | 21620af | | | | | | |
| 1200 | 1230 | Malaysia, Voice of | 15295as | | | | | |
| 1200 | 1230 | UAE, AWR Africa | 15135as | | | | | |
| 1200 | 1230 | Uzbekistan, Radio Tashkent | | 5060as | 5975as | | | |
| | | 6025as 9715as | | | | | | |

Shortwave Guide

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|------|------|-----------------------------------|----------|----------|----------|---------|
| 1200 | 1257 | China, China Radio Intl | 9730as | 9795pa | | |
| | | 11760pa | 11980as | 11760pa | 13665af | |
| | | 13790eu | 17490eu | | | |
| 1200 | 1259 | New Zealand, Radio NZ Intl | 9885pa | | | |
| 1200 | 1300 | Anguilla, Caribbean Beacon | 11775am | | | |
| 1200 | 1300 | Australia, ABC NT Alice Springs | 2310do | 4835irr | | |
| 1200 | 1300 | Australia, ABC NT Katherine | 2485do | | | |
| 1200 | 1300 | Australia, ABC NT Tennant Creek | 2325do | | | |
| 1200 | 1300 | Australia, Radio | 5995as | 6020as | 9475as | |
| | | 9560as | 9580as | 9590as | 11880as | |
| 1200 | 1300 | Australia, Voice Intl | 13635as | 13685as | | |
| 1200 | 1300 | Canada, CBC Northern Service | 9625do | | | |
| 1200 | 1300 | Canada, CFRX Toronto ON | 6070do | | | |
| 1200 | 1300 | Canada, CFVP Calgary AB | 6030do | | | |
| 1200 | 1300 | Canada, CKZN St John's NF | 6160do | | | |
| 1200 | 1300 | Canada, CKZU Vancouver BC | 6160do | | | |
| 1200 | 1300 | Canada, Radio Canada Intl | 9515as | 13655am | | |
| | | 17800am | | | | |
| 1200 | 1300 | Costa Rica, University Network | 9725va | 11870va | | |
| | | 13750va | | | | |
| 1200 | 1300 | Ecuador, HCJB | 12005am | 21455am | | |
| 1200 | 1300 | Italy, IRRS 13840eu | | | | |
| 1200 | 1300 | Malaysia, Radio | 7295as | | | |
| 1200 | 1300 | Nigeria, Voice of | 11770af | 15120va | | |
| 1200 | 1300 | Papua New Guinea, Catholic Radio | | 4960do | | |
| 1200 | 1300 | Papua New Guinea, NBC | 4890da | | | |
| 1200 | 1300 | Singapore, Radio Singapore Intl | 6080as | 6150as | | |
| 1200 | 1300 | South Korea, Radio Korea Intl | 9650na | | | |
| 1200 | 1300 | Taiwan, Radio Taiwan Intl | 7130as | | | |
| 1200 | 1300 | UK, BBC World Service | 6190af | 6195va | | |
| | | 9740as | 11760me | 11940af | 12095eu | 15190ca |
| | | 15310as | | 15485va | 15565va | 17640va |
| | | 17760as | | 17790as | 17830af | 17885af |
| | | 21470af | | | | |
| 1200 | 1300 | USA, AFRTS | 4319usb | 5446usb | 5765usb | |
| | | 6350usb | 7590usb | 7812usb | 10320usb | |
| | | 12133usb | 12579usb | 13362usb | 13855usb | |
| 1200 | 1300 | USA, KAIJ Dallas TX | 5755na | | | |
| 1200 | 1300 | USA, KTNB Salt Lake City UT | 7505na | | | |
| 1200 | 1300 | USA, WJIE Louisville KY | 9930as | 11565as | | |
| 1200 | 1300 | USA, WRMI Naalehu HI | 6110va | 9645va | | |
| 1200 | 1300 | USA, Voice of America | 9760va | 11705va | 15665va | |
| | | 11715va | | | | |
| 1200 | 1300 | USA, WBCQ Kennebunk ME | 5105na | 9330na | | |
| | | 17495na | | | | |
| 1200 | 1300 | USA, WBOH Newport NC | 5920am | | | |
| 1200 | 1300 | USA, WEWN Birmingham AL | 5850na | 7425na | | |
| | | 11875na | | | | |
| 1200 | 1300 | USA, WHRI Noblesville IN | 7535am | 9495am | | |
| | | 9930am | | | | |
| 1200 | 1300 | USA, WINB Red Lion PA | 9320am | | | |
| 1200 | 1300 | USA, WJIE Louisville KY | 7490am | | | |
| 1200 | 1300 | USA, WRMI Miami FL 7385am | 9955am | | | |
| 1200 | 1300 | USA, WTJC Newport NC | 9370na | | | |
| 1200 | 1300 | USA, WWCR Nashville TN | 5070na | 5770na | | |
| | | 5935na | | | | |
| 1200 | 1300 | USA, WYFR Okeechobee FL | 6890na | 7355na | | |
| | | 11530na | 11970na | | | |
| 1215 | 1300 | Egypt, Radio Cairo | 17670as | | | |
| 1230 | 1245 | Germany, Bible Voice Broadcasting | 12065as | | | |
| 1230 | 1245 | Guam, TWR/KTWR | 11750as | | | |
| 1230 | 1258 | Vietnam, Voice of | 9840as | 12020as | | |
| 1230 | 1300 | Bangladesh, Bangla Betar | 7185as | | | |
| 1230 | 1300 | Bulgaria, Radio | 11700eu | 15700eu | | |
| 1230 | 1300 | Germany, Bible Voice Broadcasting | 5890as | | | |
| 1230 | 1300 | Sri Lanka, SLBC | 6005as | 11930as | 15745as | |
| 1230 | 1300 | Sweden, Radio | 13580va | 15240na | 15735va | |
| 1230 | 1300 | Thailand, Radio | 9810va | | | |
| 1230 | 1300 | Turkey, Voice of | 15225va | 15535eu | | |

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|------|------|----------------------------------|---------------------------------|----------|----------|---------|
| 1300 | 1400 | 17800am | | | | |
| | | Costa Rica, University Network | 9725va | 11870va | | |
| | | 13750va | | | | |
| 1300 | 1400 | Germany, Deutsche Welle | 6140eu | | | |
| 1300 | 1400 | Malaysia, Radio | 7295as | | | |
| 1300 | 1400 | New Zealand, Radio NZ Intl | 6095pa | | | |
| 1300 | 1400 | Nigeria, Voice of | 11770af | 15120va | | |
| 1300 | 1400 | North Korea, Voice of | 9325na | 11710na | 12015eu | 4405eu |
| | | 12015eu | | | | |
| 1300 | 1400 | Papua New Guinea, Catholic Radio | | 4960do | | |
| 1300 | 1400 | Papua New Guinea, NBC | 4890do | | | |
| 1300 | 1400 | Singapore, Radio Singapore Intl | 6080as | 6150as | | |
| 1300 | 1400 | South Korea, Radio Korea Intl | 9570as | 9770as | | |
| 1300 | 1400 | Sri Lanka, SLBC | 6005as | 11930as | 15745as | |
| 1300 | 1400 | UK, BBC World Service | 6190af | 6195va | | |
| | | 9740as | 11760me | 11940af | 12095eu | 15190ca |
| | | 15420af | | 15310as | 15485eu | 15565va |
| | | 15575me | | 17640va | 17660as | 17790as |
| | | 17830af | | 17885af | 21470af | |
| 1300 | 1400 | USA, AFRTS | 4319usb | 5446usb | 5765usb | |
| | | 6350usb | 7590usb | 7812usb | 10320usb | |
| | | 12133usb | 12579usb | 13362usb | 13855usb | |
| 1300 | 1400 | USA, KAIJ Dallas TX | 5755na | | | |
| 1300 | 1400 | USA, KNLS Anchor Point AK | 11765as | | | |
| 1300 | 1400 | USA, KTNB Salt Lake City UT | 7505na | | | |
| 1300 | 1400 | USA, KWHR Naalehu HI | 9930as | 11565as | | |
| 1300 | 1400 | USA, Voice of America | 9760va | 11705va | 9645va | |
| | | 11715va | | | | |
| 1300 | 1400 | USA, WBCQ Kennebunk ME | 5105na | 7415na | | |
| | | 9330na | | | | |
| 1300 | 1400 | USA, WBOH Newport NC | 5920am | | | |
| 1300 | 1400 | USA, WEWN Birmingham AL | 7425na | 9955na | | |
| | | 15745na | | | | |
| 1300 | 1400 | USA, WHRA Greenbush ME | 17560na | | | |
| 1300 | 1400 | USA, WHRI Noblesville IN | 9840am | 9930am | | |
| | | 15105am | | | | |
| 1300 | 1400 | USA, WINB Red Lion PA | 13570am | | | |
| 1300 | 1400 | USA, WJIE Louisville KY | 7490am | | | |
| 1300 | 1400 | USA, WRMI Miami FL 7385am | 15725am | | | |
| 1300 | 1400 | USA, WTJC Newport NC | 9370na | | | |
| 1300 | 1400 | USA, WWCR Nashville TN | 7465na | 9985na | | |
| | | 13845na | | | | |
| 1300 | 1400 | USA, WWRB Manchester TN | 9320na | 12170na | | |
| 1300 | 1400 | USA, WYFR Okeechobee FL | 7355va | 7580va | | |
| | | 11830va | 11855va | 11970va | | |
| 1305 | 1330 | os | Austria, Radio Austria Intl | 6155eu | 13730eu | |
| | | | 17855va | | | |
| 1315 | 1330 | mtwhf | Austria, Radio Austria Intl | 17855va | | |
| 1315 | 1330 | o | Russia, TWR | 7535eu | 7560as | |
| 1330 | 1400 | | Guam, AWR/KSDA | 11980as | | |
| 1330 | 1400 | mwhta | Guam, AWR/KSDA | 15275as | | |
| 1330 | 1400 | | India, All India Radio | 9690as | 11620as | |
| 1330 | 1400 | | Laos, National Radio | 7145as | | |
| 1330 | 1400 | mtwhf | Serbia & Montenegro, Intl Radio | 11835pa | | |
| 1330 | 1400 | | South Korea, Radio Korea Intl | 9770eu | | |
| 1330 | 1400 | | Sweden, Radio | 15240na | 15735va | |
| 1330 | 1400 | | UAE, Emirates Radio | 13630va | 13675va | 15395va |
| | | | 21605va | | | |
| 1330 | 1400 | | Uzbekistan, Radio Tashkent | 5060as | 5975as | |
| | | | 6025as | 9715as | | |
| 1335 | 1400 | os | Austria, Radio Austria Intl | 6155eu | 13730eu | |
| | | | 17855va | | | |
| 1345 | 1400 | mtwhf | Austria, Radio Austria Intl | 6155eu | 13730eu | |
| | | | 17855va | | | |

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

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

| | | | | | | |
|------|------|-----|-----------------------------------|---------|---------|---------|
| 1300 | 1315 | s | Germany, Bible Voice Broadcasting | 5890eu | | |
| 1300 | 1320 | | Turkey, Voice of | 15225va | 15535eu | |
| 1300 | 1329 | | Czech Rep, Radio Prague Intl | 13580eu | 21745af | |
| 1300 | 1330 | | Ecuador, HCJB | 12005am | 21455am | |
| 1300 | 1330 | | Egypt, Radio Cairo | 17670as | | |
| 1300 | 1330 | | France, Radio France Intl | 9875eu | | |
| 1300 | 1356 | | Romania, Radio Romania Intl | 15105eu | 17745eu | |
| 1300 | 1357 | | China, China Radio Intl | 7250va | 9795pa | |
| | | | 11760pa | 11885as | 11990na | 13790na |
| | | | 11980as | 15180na | 15230na | 17625na |
| 1300 | 1357 | DRM | China, China Radio Intl | 11810va | | |
| 1300 | 1400 | | Anguilla, Caribbean Beacon | 11775am | | |
| 1300 | 1400 | | Australia, Radio | 5995as | 6020as | 9475as |
| | | | 9560as | 9580as | 9590as | |
| 1300 | 1400 | | Australia, Voice Intl | 13635as | 13685as | |
| 1300 | 1400 | | Canada, CBC Northern Service | 9625do | | |
| 1300 | 1400 | | Canada, CFRX Toronto ON | 6070do | | |
| 1300 | 1400 | | Canada, CFVP Calgary AB | 6030do | | |
| 1300 | 1400 | | Canada, CKZN St John's NF | 6160do | | |
| 1300 | 1400 | | Canada, CKZU Vancouver BC | 6160do | | |
| 1300 | 1400 | | Canada, Radio Canada Intl | 9515am | 13655am | |

| | | | | | | |
|------|------|-----|-----------------------------------|---------|---------|---------|
| 1400 | 1415 | h | Germany, Bible Voice Broadcasting | 17485as | | |
| 1400 | 1415 | | Russia, FEBA | 9445as | | |
| 1400 | 1430 | | Australia, Radio | 5995as | 6080as | 7240as |
| | | | 9590as | 11750pa | | |
| 1400 | 1430 | | Australia, Voice Intl | 13635as | 13685as | |
| 1400 | 1430 | | Thailand, Radio | 9725as | | |
| 1400 | 1445 | o | Germany, Pan American BC | 15650me | | |
| 1400 | 1457 | | China, China Radio Intl | 7405na | 9560as | |
| | | | 9700eu | 9795eu | 11765eu | 13675as |
| | | | 17630af | | | |
| 1400 | 1459 | | Canada, Radio Canada Intl | 9515am | 13655am | |
| | | | 17800am | | | |
| 1400 | 1459 | | Poland, Radio Polonia | 9525eu | 11850eu | |
| 1400 | 1500 | | Anguilla, Caribbean Beacon | 11775am | | |
| 1400 | 1500 | | Canada, CBC Northern Service | 9625do | | |
| 1400 | 1500 | | Canada, CFRX Toronto ON | 6070do | | |
| 1400 | 1500 | | Canada, CFVP Calgary AB | 6030do | | |
| 1400 | 1500 | | Canada, CKZN St John's NF | 6160do | | |
| 1400 | 1500 | | Canada, CKZU Vancouver BC | 6160do | | |
| 1400 | 1500 | DRM | China, China Radio Intl | 9610va | | |
| 1400 | 1500 | | Costa Rica, University Network | 9725va | 11870va | |
| | | | 13750va | | | |
| 1400 | 1500 | | France, Radio France Intl | 9580va | 17620va | |
| 1400 | 1500 | os | Germany, Bible Voice Broadcasting | 17485as | | |
| 1400 | 1500 | | Germany, Deutsche Welle | 6140eu | | |

Shortwave Guide



| | | | | | | | | | | |
|------|------|-------------------------------|-------------------------------|----------|----------|--|--|--|--|--|
| 1400 | 1500 | Germany, Overcomer Ministries | 6110eu | 13810eu | | | | | | |
| 1400 | 1500 | India, All India Radio | 9690as | 11620as | | | | | | |
| 1400 | 1500 | Japan, Radio | 7200as | 11730as | 11840pa | | | | | |
| 1400 | 1500 | Jordan, Radio | 11690na | | | | | | | |
| 1400 | 1500 | Malaysia, Radio | 7295as | | | | | | | |
| 1400 | 1500 | Netherlands, Radio | 9345as | 9890as | 11835as | | | | | |
| 1400 | 1500 | New Zealand, Radio NZ Intl | 6095pa | | | | | | | |
| 1400 | 1500 | Nigeria, Voice of | 11770af | 15120va | | | | | | |
| 1400 | 1500 | Oman, Radio | 15140as | | | | | | | |
| 1400 | 1500 | Singapore, Mediacorp Radio | 6150do | | | | | | | |
| 1400 | 1500 | South Africa, Channel Africa | 11825af | | | | | | | |
| 1400 | 1500 | Sri Lanka, SLBC | 6005as | 11930as | 15745as | | | | | |
| 1400 | 1500 | Taiwan, Radio Taiwan Intl | | 15265as | | | | | | |
| 1400 | 1500 | UK, BBC World Service | | 6190af | 6195as | | | | | |
| | | 7105as 9740as | 11940af | 12095eu | 15190ca | | | | | |
| | | 15310as | 15485va | 15565va | 15575me | | | | | |
| | | 17640va | 17790as | 17830af | 21470af | | | | | |
| | | 21660af | | | | | | | | |
| 1400 | 1500 | USA, AFRTS | 4319usb | 5446usb | 5765usb | | | | | |
| | | 6350usb | 7590usb | 7812usb | 10320usb | | | | | |
| | | 12133usb | 12579usb | 13362usb | 13855usb | | | | | |
| 1400 | 1500 | USA, KAIJ Dallas TX | 13815na | | | | | | | |
| 1400 | 1500 | USA, KJES Vado NM | 11715na | | | | | | | |
| 1400 | 1500 | USA, KTBN Salt Lake City UT | | 7505na | | | | | | |
| 1400 | 1500 | USA, KWHR Naalehu HI | | 9930as | 11565as | | | | | |
| 1400 | 1500 | USA, Voice of America | | 6110va | 7125va | | | | | |
| | | 9645va 9760va | 11705va | 15425va | | | | | | |
| 1400 | 1500 | USA, WBCQ Kennebunk ME | | 5105na | 7415na | | | | | |
| | | 9330na 17495na | | | | | | | | |
| 1400 | 1500 | USA, WBOH Newport NC | | 5920am | | | | | | |
| 1400 | 1500 | USA, WEWN Birmingham AL | | 9955na | 11530na | | | | | |
| | | 15745na | | | | | | | | |
| 1400 | 1500 | USA, WHRA Greenbush ME | | 17560na | | | | | | |
| 1400 | 1500 | USA, WHRI Noblesville IN | | 9840am | 9930am | | | | | |
| | | 15105am | | | | | | | | |
| 1400 | 1500 | USA, WINB Red Lion PA | | 13570am | | | | | | |
| 1400 | 1500 | USA, WJIE Louisville KY | | 7490am | | | | | | |
| 1400 | 1500 | USA, WRMI Miami FL | 7385am | 15725am | | | | | | |
| 1400 | 1500 | USA, WTJC Newport NC | | 9370na | | | | | | |
| 1400 | 1500 | USA, WWCN Nashville TN | | 7465na | 9985na | | | | | |
| | | 13845na | | | | | | | | |
| 1400 | 1500 | USA, WWRB Manchester TN | | 9320na | 12170na | | | | | |
| 1400 | 1500 | USA, WYFR Okeechobee FL | | 7580va | 11615va | | | | | |
| | | 11855va | 13695va | 17760va | | | | | | |
| 1415 | 1430 | Nepal, Radio | 3230cs | 5005as | 6100as | | | | | |
| | | 7165as | | | | | | | | |
| 1430 | 1445 | s | Germany, Pan American BC | 16650as | | | | | | |
| 1430 | 1500 | s | Australia, HCJB | 15390as | | | | | | |
| 1430 | 1500 | DRM | South Korea, Radio Korea Intl | 9770eu | | | | | | |
| 1445 | 1500 | as | Germany, Pan American BC | 15650me | | | | | | |

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

| | | | | | | | | | | |
|------|------|--------|-----------------------------------|---------|---------|---------|--|--|--|--|
| 1500 | 1515 | s | Germany, Pan American BC | 15650as | | | | | | |
| 1500 | 1528 | s | Hungary, Radio Budapest | 6025eu | 9655eu | | | | | |
| 1500 | 1528 | mwhtf | Romania, Radio Romania Intl | 15725na | | | | | | |
| 1500 | 1528 | | Vietnam, Voice of | 9840as | 12020as | | | | | |
| 1500 | 1530 | | France, Radio France Intl | | 9875eu | | | | | |
| 1500 | 1530 | | Mongolia, Voice of | 12015eu | | | | | | |
| 1500 | 1530 | | Sri Lanka, SLBC | 6005as | 11930as | 15745as | | | | |
| 1500 | 1530 | | UK, BBC World Service | | 6190af | 11860af | | | | |
| | | | 11940af | 12095af | 15400af | 15420af | | | | |
| | | | 15485af | 17830af | 21470af | 21490af | | | | |
| | | | 21660af | | | | | | | |
| 1500 | 1557 | | China, China Radio Intl | 7160eu | 7405na | | | | | |
| | | | 9435eu 9525eu | 9785as | 13675na | 17730na | | | | |
| 1500 | 1557 | | China, China Radio Intl | | 13685af | 17630af | | | | |
| 1500 | 1559 | as | Canada, Radio Canada Intl | 9515am | 13655am | | | | | |
| | | | 17800am | | | | | | | |
| 1500 | 1600 | | Anguilla, Caribbean Beacon | | 11775am | | | | | |
| 1500 | 1600 | | Australia, HCJB | 15390as | | | | | | |
| 1500 | 1600 | | Australia, Radio | 5995as | 6080as | 7240us | | | | |
| | | | 9590as 11750pa | | | | | | | |
| 1500 | 1600 | | Australia, Voice Intl | 11840as | 13635as | | | | | |
| 1500 | 1600 | | Canada, CBC Northern Service | | 9625do | | | | | |
| 1500 | 1600 | | Canada, CFRX Toronto ON | | 6070do | | | | | |
| 1500 | 1600 | | Canada, CFVP Calgary AB | | 6030do | | | | | |
| 1500 | 1600 | | Canada, CKZN St John's NF | | 6160do | | | | | |
| 1500 | 1600 | | Canada, CKZU Vancouver BC | | 6160do | | | | | |
| 1500 | 1600 | DRM | China, China Radio Intl | | 9610va | | | | | |
| 1500 | 1600 | | Costa Rica, University Network | | 9725va | 11870va | | | | |
| | | | 13750va | | | | | | | |
| 1500 | 1600 | n | Germany, Bible Voice Broadcasting | 13590me | | | | | | |
| 1500 | 1600 | | Germany, Deutsche Welle | 6140eu | | | | | | |
| 1500 | 1600 | | Germany, Overcomer Ministries | 6110eu | 13810eu | | | | | |
| 1500 | 1600 | vl/ as | Greece, Voice of | 9420eu | 9775eu | 15485eu | | | | |
| | | | 15630eu | 15650eu | | | | | | |
| 1500 | 1600 | | Guam, TWR/KTWR | 12105as | | | | | | |
| 1500 | 1600 | | Japan, Radio | 6190as | 7200as | 9505va | | | | |
| | | | 11730as | | | | | | | |
| 1500 | 1600 | | Jordan, Radio | 11690na | | | | | | |
| 1500 | 1600 | | Malaysia, Radio | 7295as | | | | | | |

| | | | | | | | | | | |
|------|------|-----------|-----------------------------------|----------|----------|----------|--|--|--|--|
| 1500 | 1600 | | Netherlands, Radio | 11835va | | | | | | |
| 1500 | 1600 | | New Zealand, Radio NZ Intl | | 6095pa | | | | | |
| 1500 | 1600 | | North Korea, Voice of | | 3560af | 4405eu | | | | |
| | | | 7570eu 9335na | 9990me | 11545me | | | | | |
| 1500 | 1600 | | Russia, FEBA | 7340as | | | | | | |
| 1500 | 1600 | | Russia, Voice of | 5945as | 6205as | 7260as | | | | |
| | | | 7350as 7415as | 9900as | 11500as | 12025as | | | | |
| 1500 | 1600 | as | Russia, Voice of | 12060eu | | | | | | |
| 1500 | 1600 | | Singapore, Mediacorp Radio | | 6150do | | | | | |
| 1500 | 1600 | | South Africa, Channel Africa | | 11825af | 17770af | | | | |
| 1500 | 1600 | DRM | Taiwan, Radio Taiwan Intl | | 9770eu | | | | | |
| 1500 | 1600 | | UK, BBC World Service | | 5975as | 6195as | | | | |
| | | | 7105as 9410eu | 9740as | 12095eu | 15190ca | | | | |
| | | | 15310as | 15485eu | 15565va | 17790as | | | | |
| 1500 | 1600 | vl/ mtwhf | UK, Sudan Radio Service | | 15530va | | | | | |
| 1500 | 1600 | | USA, AFRTS | 4319usb | 5446usb | 5765usb | | | | |
| | | | 6350usb | 7590usb | 7812usb | 10320usb | | | | |
| | | | 12133usb | 12579usb | 13362usb | 13855usb | | | | |
| 1500 | 1600 | | USA, KAIJ Dallas TX | 13815na | | | | | | |
| 1500 | 1600 | | USA, KJES Vado NM | 11715na | | | | | | |
| 1500 | 1600 | | USA, KTBN Salt Lake City UT | | 15590na | | | | | |
| 1500 | 1600 | | USA, KWHR Naalehu HI | | 9930as | 11565as | | | | |
| 1500 | 1600 | | USA, Voice of America | | 6110va | 9685va | | | | |
| | | | 9795va 9825va | 11835va | 13865af | 15255va | | | | |
| | | | 15460va | 17715af | 17895af | | | | | |
| 1500 | 1600 | | USA, WBCQ Kennebunk ME | | 5105na | 7415na | | | | |
| | | | 9330na 17495na | | | | | | | |
| 1500 | 1600 | | USA, WBOH Newport NC | | 5920am | | | | | |
| 1500 | 1600 | | USA, WEWN Birmingham AL | | 9955na | 11530na | | | | |
| | | | 15745na | | | | | | | |
| 1500 | 1600 | | USA, WHRA Greenbush ME | | 17560na | | | | | |
| 1500 | 1600 | | USA, WHRI Noblesville IN | | 9840am | 9930am | | | | |
| | | | 15105am | | | | | | | |
| 1500 | 1600 | | USA, WINB Red Lion PA | | 13570am | | | | | |
| 1500 | 1600 | | USA, WJIE Louisville KY | | 7490am | | | | | |
| 1500 | 1600 | | USA, WRMI Miami FL | 7385am | 15725am | | | | | |
| 1500 | 1600 | | USA, WTJC Newport NC | | 9370na | | | | | |
| 1500 | 1600 | | USA, WWCN Nashville TN | | 7465na | 9985na | | | | |
| | | | 13845na | | | | | | | |
| 1500 | 1600 | | USA, WWRB Manchester TN | | 9320na | 12170na | | | | |
| 1500 | 1600 | | USA, WYFR Okeechobee FL | | 11615va | 11855va | | | | |
| | | | 15210va | 15520as | 17760va | | | | | |
| 1530 | 1545 | w | Germany, Pan American BC | | 11610as | | | | | |
| 1530 | 1545 | s | Germany, Pan American BC | | 15650me | | | | | |
| 1530 | 1545 | | India, All India Radio | 7255va | 9820va | 9910va | | | | |
| | | | 11740va | | | | | | | |
| 1530 | 1600 | a | Germany, Bible Voice Broadcasting | 17510as | | | | | | |
| 1530 | 1600 | wh | Germany, Bible Voice Broadcasting | 17510as | | | | | | |
| 1530 | 1600 | s | Germany, Bible Voice Broadcasting | 13590me | | | | | | |
| 1530 | 1600 | | Iran, Voice of the Islamic Rep | 9635as | 11650as | | | | | |
| 1530 | 1600 | mtwhf | South Korea, Radio Korea Intl | | 15725na | | | | | |
| 1530 | 1600 | | UAE, AWR Africa | 15225as | | | | | | |
| 1530 | 1600 | | UK, BBC World Service | | 6190af | 11940af | | | | |
| | | | 15400af | 17830af | 21470af | 21660af | | | | |
| 1540 | 1600 | whf | Germany, Bible Voice Broadcasting | 13590me | | | | | | |
| 1545 | 1600 | a | Germany, Bible Voice Broadcasting | 13590me | | | | | | |
| 1545 | 1600 | s | Germany, Pan American BC | 15650me | | | | | | |

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

| | | | | | | | | | | |
|------|------|-----|-----------------------------------|---------|---------|---------|--|--|--|--|
| 1600 | 1615 | mwf | Germany, Bible Voice Broadcasting | 13590me | | | | | | |
| 1600 | 1615 | | Pakistan, Radio | 9390va | 11570va | 11850va | | | | |
| | | | 15725va | | | | | | | |
| 1600 | 1627 | | Czech Rep, Radio Prague Intl | | 5930eu | 17485af | | | | |
| 1600 | 1628 | | Vietnam, Voice of | 7220va | 7280va | 9550va | | | | |
| | | | 11630va | | | | | | | |
| 1600 | 1630 | s | Germany, Pan American BC | | 15650 | su | | | | |
| 1600 | 1630 | | Guam, AWR/KSDA | 11640as | 11680as | | | | | |
| 1600 | 1630 | | Guam, TWR/KTWR | 12105as | | | | | | |
| 1600 | 1630 | | Iran, Voice of the Islamic Rep | | 9635as | 11650as | | | | |
| 1600 | 1630 | | Myanmar, Radio | 9730do | | | | | | |
| 1600 | 1630 | as | Swaziland, TWR | 6070af | | | | | | |
| 1600 | 1635 | | UAE, Emirates Radio | 13630va | 13675va | 15395va | | | | |
| | | | 21605va | | | | | | | |
| 1600 | 1645 | h | Germany, Bible Voice Broadcasting | 13590me | | | | | | |
| 1600 | 1650 | | New Zealand, Radio NZ Intl | 6095pa | | | | | | |
| 1600 | 1657 | | China | | | | | | | |

Shortwave Guide



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|-----------|--------|-----------------------------------|----------|----------|
| 1800 1900 | | Canada, CKZN St John's NF | 6160do | |
| 1800 1900 | | Canada, CKZU Vancouver BC | 6160do | |
| 1800 1900 | | China, China Radio Intl | 6100eu | 12080va |
| 1800 1900 | DRM | China, China Radio Intl | 17510va | |
| 1800 1900 | | Costa Rica, University Network | 11870va | 13750va |
| 1800 1900 | | Eqt Guinea, Radio Africa | 15190af | |
| 1800 1900 | f | Germany, Bible Voice Broadcasting | 9430me | |
| 1800 1900 | vl | Greece, Voice of | 7430eu | 15485eu |
| 1800 1900 | | India, All India Radio | 7410eu | 9445af |
| | | | 11620eu | 11935af |
| | | | 15155af | 17670af |
| 1800 1900 | | Liberia, ELWA | 4760do | |
| 1800 1900 | | Malaysia, Radio | 7295as | |
| 1800 1900 | | Netherlands, Radio | 6020af | 9895af |
| 1800 1900 | | Nigeria, Voice of | 15120va | |
| 1800 1900 | | North Korea, Voice of | 12015eu | 4405eu |
| | | | | 7570eu |
| 1800 1900 | vl | Philippines, Radio Pilipinas | 11730as | 11890as |
| | | | 15190pa | |
| 1800 1900 | | Russia, Voice of | 5910as | 5945as |
| | | | 7415as | 9830me |
| | | | 11510af | |
| 1800 1900 | as | Russia, Voice of | 5950eu | 6175eu |
| 1800 1900 | | South Africa, AWR Africa | 9590af | |
| 1800 1900 | | Swaziland, TWR | 3200af | 9500af |
| 1800 1900 | | Taiwan, Radio Taiwan Intl | 3965eu | |
| 1800 1900 | | UK, BBC World Service | 3255af | 5975va |
| | | | 6190af | 6195eu |
| | | | 9410eu | 12095va |
| | | | 15420af | 17830af |
| 1800 1900 | | USA, AFRTS | 4319usb | 546usb |
| | | | 6350usb | 7590usb |
| | | | 12133usb | 12579usb |
| | | | 13362usb | 13855usb |
| 1800 1900 | | USA, KAIJ Dallas TX | 13815na | |
| 1800 1900 | | USA, KTBN Salt Lake City UT | 15590na | |
| 1800 1900 | | USA, KWHR Honolulu HI | 9930as | |
| 1800 1900 | | USA, Voice of America | 4930af | 4960af |
| | | | 6035af | 11975af |
| | | | 13710af | 15240af |
| 1800 1900 | | USA, WBCQ Kennebunk ME | 5105na | 7415na |
| | | | 9330na | 17495na |
| 1800 1900 | | USA, WBOH Newport NC | 5920am | |
| 1800 1900 | | USA, WEWN Birmingham AL | 11530va | 13615va |
| | | | 15695va | 15745va |
| 1800 1900 | | USA, WHRA Greenbush ME | 17650na | |
| 1800 1900 | | USA, WHRI Noblesville IN | 9840am | 9930om |
| | | | 15105am | |
| 1800 1900 | mtwhf | USA, WINB Red Lion PA | 9740am | |
| 1800 1900 | cs | USA, WINB Red Lion PA | 13570am | |
| 1800 1900 | | USA, WJIE Louisville KY | 7490am | |
| 1800 1900 | | USA, WMLK Bethel PA | 9265eu | 15265eu |
| 1800 1900 | | USA, WRMI Miami FL | 9955am | 15725am |
| 1800 1900 | | USA, WTJC Newport NC | 9370na | |
| 1800 1900 | | USA, WWCR Nashville TN | 9985na | 12160na |
| | | | 13845na | |
| 1800 1900 | | USA, WWRB Manchester TN | 9320na | 12170na |
| 1800 1900 | | USA, WYFR Okeechobee FL | 7240eu | 13780eu |
| | | | 15115eu | 17510eu |
| 1800 1900 | | Yemen, Rep of Yemen Radio | 9780me | |
| 1800 1900 | | Zambia, Radio Christian Voice | 4965af | |
| 1815 1830 | vl | Libya, Voice of Africa | 11635af | 11715af |
| | | | 11860af | 15660af |
| 1830 1900 | | Bulgaria, Radio | 5800eu | 7500eu |
| 1830 1900 | | Turkey, Voice of | 9785eu | |
| 1830 1900 | | UK, BBC World Service | 6005af | 9630af |
| 1845 1858 | mtwhfo | Albania, Radio Tirana | 6115eu | 7210eu |
| 1845 1900 | | Congo, RTV Congolaise | 4765af | 5985af |
| 1851 1900 | | New Zealand, Radio NZ Intl | 9845pa | |

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

| | | | | |
|-----------|-----|-----------------------------------|---------|---------|
| 1900 1915 | | Congo, RTV Congolaise | 4765af | 5985af |
| 1900 1915 | ts | Germany, Bible Voice Broadcasting | 9430me | |
| 1900 1920 | | Turkey, Voice of | 9785eu | |
| 1900 1925 | | Israel, Kol Israel | 11605va | 15615va |
| 1900 1928 | | Hungary, Radio Budapest | 3975eu | 6025eu |
| 1900 1928 | | Vietnam, Voice of | 7280eu | 11630as |
| 1900 1929 | s | Germany, Universal Life | 13820me | |
| 1900 1930 | a | Germany, Bible Voice Broadcasting | 9430af | |
| 1900 1930 | | Lithuania, Radio Vilnius | 9710eu | |
| 1900 1930 | vl | Philippines, Radio Pilipinas | 11730as | 11890as |
| | | | 15190pa | |
| 1900 1945 | DRM | China, China Radio Intl | 12080va | |
| 1900 1945 | | India, All India Radio | 7410eu | 9950eu |
| | | | 11620eu | 11935af |
| | | | 15155af | 17670af |
| 1900 1950 | | New Zealand, Radio NZ Intl | 9845pa | |
| 1900 1957 | | China, China Radio Intl | 6100eu | 7295af |
| | | | 9440af | 9585af |
| 1900 1959 | | Poland, Radio Polonia | 7265eu | 7270eu |
| 1900 2000 | | Anguilla, Caribbean Beacon | 11775am | |
| 1900 2000 | | Australia, Radio | 6080as | 7240as |
| | | | 9580as | 9710as |
| 11880pa | | | | |
| 1900 2000 | | Australia, Voice Intl | 11685as | |
| 1900 2000 | | Canada, CBC Northern Service | 9625do | |

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|-----------|----------|-----------------------------------|----------|----------|
| 1900 2000 | | Canada, CFRX Toronto ON | 6070do | |
| 1900 2000 | | Canada, CFVP Calgary AB | 6030do | |
| 1900 2000 | | Canada, CKZN St John's NF | 6160do | |
| 1900 2000 | | Canada, CKZU Vancouver BC | 6160do | |
| 1900 2000 | | Canada, Radio Canada Intl | 17765am | |
| 1900 2000 | | Costa Rica, University Network | 11870va | 13750va |
| 1900 2000 | | Eqt Guinea, Radio Africa | 15190af | |
| 1900 2000 | | Germany, Deutsche Welle | 13780af | 15520af |
| 1900 2000 | vl | Ghana, Ghana BC Corp | 3366do | 4915do |
| 1900 2000 | | Greece, Voice of | 7430eu | 15485eu |
| 1900 2000 | | Liberia, ELWA | 4760do | |
| 1900 2000 | | Malaysia, Radio | 7295as | |
| 1900 2000 | vl | Namibia, Namibian 8C Corp | 6060do | 3270do |
| | | | 6175do | 3290do |
| 1900 2000 | as | Netherlands, Radio | 15315na | 17660na |
| 1900 2000 | | Netherlands, Radio | 7120af | 9895af |
| | | | 17810af | |
| 1900 2000 | | Nigeria, Radio/Ibadan | 6050do | |
| 1900 2000 | | Nigeria, Radio/Kaduna | 4770do | 6090do |
| 1900 2000 | | Nigeria, Radio/Lagos | 3326do | 4990do |
| 1900 2000 | | Nigeria, Voice of | 15120va | |
| 1900 2000 | | North Korea, Voice of | 11535eu | 7100eu |
| | | | 11910eu | 9975eu |
| 1900 2000 | | Papua New Guinea, Catholic Radio | | 4960do |
| 1900 2000 | | Papua New Guinea, NBC | 4890do | |
| 1900 2000 | | Russia, Voice of | 6175eu | 6235eu |
| | | | 7335eu | 7400eu |
| 1900 2000 | | Sierra Leone, Radio UNAMSIL | | 6137do |
| 1900 2000 | irreg/vl | Sierra Leone, SILS | 3316do | |
| 1900 2000 | vl | Solomon Islands, SIBC | | 5020do |
| 1900 2000 | | South Africa, Channel Africa | | 3345af |
| 1900 2000 | m | South Africa, SW Radio League | | 3215af |
| 1900 2000 | | South Korea, Radio Korea Intl | | 5975eu |
| 1900 2000 | a | Sri Lanka, SIBC | 6010eu | |
| 1900 2000 | | Swaziland, TWR | 3200af | |
| 1900 2000 | | Thailand, Radio | 9840eu | |
| 1900 2000 | vl | Uganda, Radio | 4976do | 5026do |
| 1900 2000 | | UK, BBC World Service | 3255af | 5975me |
| | | | 6005af | 6190af |
| | | | 12095af | 15400af |
| 1900 2000 | | USA, AFRTS | 4319usb | 5446usb |
| | | | 6350usb | 7590usb |
| | | | 12133usb | 12579usb |
| 1900 2000 | | USA, KAIJ Dallas TX | 13815na | |
| 1900 2000 | | USA, KJES Vado NM | 15385na | |
| 1900 2000 | | USA, KTBN Salt Lake City UT | 15590na | |
| 1900 2000 | | USA, Voice of America | 4930af | 4940af |
| | | | 4960af | 6035af |
| | | | 9785me | 11975af |
| | | | 13640af | 13710af |
| | | | 17895af | 15240af |
| 1900 2000 | | USA, WBCQ Kennebunk ME | 5105na | 7415na |
| | | | 9330na | 17495na |
| 1900 2000 | | USA, WBOH Newport NC | 5920am | |
| 1900 2000 | | USA, WEWN Birmingham AL | 11530va | 13615va |
| | | | 15695va | 15745va |
| 1900 2000 | | USA, WHRA Greenbush ME | 17650na | |
| 1900 2000 | | USA, WHRI Noblesville IN | 9840am | 15665am |
| 1900 2000 | mtwhf | USA, WINB Red Lion PA | 9740am | |
| 1900 2000 | os | USA, WINB Red Lion PA | 13570am | |
| 1900 2000 | | USA, WJIE Louisville KY | 7490am | |
| 1900 2000 | | USA, WMLK Bethel PA | 9265eu | 15265eu |
| 1900 2000 | | USA, WRMI Miami FL | 9955am | 15725am |
| 1900 2000 | | USA, WTJC Newport NC | 9370na | |
| 1900 2000 | | USA, WWCR Nashville TN | 9985na | 12160na |
| | | | 13845na | |
| 1900 2000 | | USA, WYFR Okeechobee FL | 7240eu | 13780eu |
| | | | 15695va | 15745va |
| 1900 2000 | | Zambia, Radio Christian Voice | 4965af | |
| 1900 2000 | vl | Zimbabwe, ZBC Corp | 5975do | |
| 1905 1915 | vl | Croatia, Croatian Radio | 6165na | 13830na |
| 1915 1930 | s | Germany, Bible Voice Broadcasting | 9430me | |
| 1915 1930 | vl | Libya, Voice of Africa | 11635af | 11715af |
| 1915 2000 | | China, China Radio Intl | 12080va | |
| 1925 1945 | | Armenia, Voice of | 4810eu | 9965as |
| 1930 1945 | vl | Libya, Voice of Africa | 11715af | |
| 1930 2000 | mtfh | Belarus, Radio | 7105eu | 7340eu |
| 1930 2000 | as | Germany, Bible Voice Broadcasting | 9430af | |
| 1930 2000 | | Iran, Voice of the Islamic Rep | 7205eu | 9800eu |
| | | | 9925af | 11660af |
| | | | 11670af | |
| 1930 2000 | | Serbia & Montenegro, Intl Radio | 6100eu | |
| 1930 2000 | vl | Slovakia, Slovak Radio | 5915eu | 7345eu |
| 1930 2000 | | Sweden, Radio | 6065va | |
| 1935 1955 | | Italy, RAI Intl | 5960eu | 9845eu |
| 1945 2000 | DRM | Canada, Radio Canada Intl | 9800na | |
| 1945 2000 | vl | Rwanda, Radio | 6055do | |
| 1951 2000 | | New Zealand, Radio NZ Intl | | 11725pa |

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

| | | | | |
|-----------|-----|------------------------------|---------|---------|
| 2000 2027 | | Czech Rep, Radio Prague Intl | 5930eu | 11600va |
| 2000 2030 | | Australia, Voice Intl | 11685as | |
| 2000 2030 | DRM | Canada, Radio Canada Intl | 9800na | |

Shortwave Guide

MT

| | | | | | | | | | | | |
|------|------|--------|---------------------------------|---------|---------|------|------|------------------------------|---------------------------|---------|---------|
| 2100 | 2200 | | Zambia, Radio Christian Voice | 4965af | | 2205 | 2230 | Italy, RAI Intl | 11895as | | |
| 2100 | 2200 | vi | Zimbabwe, ZBC Corp | 5975do | | 2230 | 2257 | Czech Rep, Radio Prague Intl | 7345na | 9415na | |
| 2110 | 2130 | mtwhf | UK, BBC World Service | 11675ca | 1539Cca | 2230 | 2259 | Canada, Radio Canada Intl | 6160as | 7195as | |
| 2115 | 2130 | vi | Libya, Voice of Africa | 11635af | | | | 9730as | | | |
| 2115 | 2157 | | China, China Radio Intl | 21080va | | 2230 | 2300 | DRM | Canada, Radio Canada Intl | 9800na | |
| 2115 | 2200 | | Egypt, Radio Cairo | 9990eu | | 2230 | 2300 | | Guam, AWR/KSDA | 11850as | 15320as |
| 2130 | 2145 | ff | UK, BBC World Service | 11680ca | | 2230 | 2300 | vl/fs | Italy, IRRS5775eu | | |
| 2130 | 2156 | | Romania, Radio Romania Intl | 6015eu | 6055eu | 2230 | 2300 | | USA, Voice of America | 9545va | 9785va |
| | | | 7145eu9540na | | | | | | 11935as | 13755va | |
| 2130 | 2157 | | Czech Rep, Radio Prague Intl | 9800af | 1160Cna | 2245 | 2300 | | India, All India Radio | 9705as | 9950as |
| 2130 | 2158 | mtwhfa | Albania, Radio Tirana | 7120eu | | | | | 11645as | 13605as | 11620as |
| 2130 | 2200 | | Australia, ABC NT Katherine | 5025do | | | | | | | |
| 2130 | 2200 | | Australia, ABC NT Tennant Creek | 4910do | | | | | | | |
| 2130 | 2200 | | Australia, Radio | 9660as | 11650as | | | | | | |
| | | | 13630pa | 15515pa | | | | | | | |
| 2130 | 2200 | | Sweden, Radio | 6065va | 7420va | | | | | | |
| 2130 | 2200 | | UK, Wales Radio Intl | 7110eu | | | | | | | |
| 2130 | 2200 | | Uzbekistan, Radio Tashkent | 5025eu | 7185eu | | | | | | |
| | | | 11905eu | | | | | | | | |
| 2150 | 2200 | | New Zealand, Radio NZ Intl | 15720pa | | | | | | | |

| 2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT | | | | | | | | | | | |
|--|------|----------|----------------------------------|----------|----------|----------|------|------|-------------------------------|----------|----------|
| 2200 | 2205 | DRM | Syria, Radio Damascus | 12085eu | 13610eu | | | | | | |
| 2200 | 2230 | | Germany, Deutsche Welle | 9800as | | | | | | | |
| 2200 | 2230 | | India, All India Radio | 7410eu | 9910eu | | | | | | |
| | | | 9950eu | 11620pa | 11715pa | | | | | | |
| 2200 | 2230 | vi | Italy, IRRS5775eu | | | | | | | | |
| 2200 | 2230 | | Serbia & Montenegro, Intl Radio | 6100eu | | | | | | | |
| 2200 | 2230 | | USA, Voice of America | 11835as | | | | | | | |
| 2200 | 2245 | | Egypt, Radio Cairo | 9990eu | | | | | | | |
| 2200 | 2250 | | Turkey, Voice of | 9830as | | | | | | | |
| 2200 | 2257 | DRM | China, China Radio Intl | 7170eu | | | | | | | |
| 2200 | 2257 | as | Netherlands, Radio | 15525na | | | | | | | |
| 2200 | 2259 | | Spain, Radio Exterior Espana | 9595af | 9630eu | | | | | | |
| 2200 | 2300 | | Anguilla, Caribbean Beacon | 6090am | | | | | | | |
| 2200 | 2300 | | Australia, ABC NT Alice Springs | 2310do | 4835irr | | | | | | |
| 2200 | 2300 | | Australia, ABC NT Katherine | 5025do | | | | | | | |
| 2200 | 2300 | | Australia, ABC NT Tennant Creek | 4910do | | | | | | | |
| 2200 | 2300 | | Australia, Radio | 13620as | 13630pa | 15230pa | | | | | |
| | | | 15240pa | 15515pa | 21740pa | | | | | | |
| 2200 | 2300 | | Bulgaria, Radio | 5800eu | 7500eu | | | | | | |
| 2200 | 2300 | | Canada, CBC Northern Service | 9625do | | | | | | | |
| 2200 | 2300 | | Canada, CFRX Toronto ON | 6070do | | | | | | | |
| 2200 | 2300 | | Canada, CFVP Calgary AB | 6030do | | | | | | | |
| 2200 | 2300 | | Canada, CKZN St John's NF | 6160do | | | | | | | |
| 2200 | 2300 | | Canada, CKZU Vancouver BC | 6160do | | | | | | | |
| 2200 | 2300 | | Costa Rica, University Network | 13750va | | | | | | | |
| 2200 | 2300 | | Eq Guinea, Radio Africa | 15190af | | | | | | | |
| 2200 | 2300 | | Germany, Deutsche Welle | 7115as | 9720as | | | | | | |
| 2200 | 2300 | vi | Ghana, Ghana BC Corp | 3366do | 4915do | | | | | | |
| 2200 | 2300 | | Guyana, Voice of | 3291do | | | | | | | |
| 2200 | 2300 | | Malaysia, Radio | 7295as | | | | | | | |
| 2200 | 2300 | vi | Namibia, Namibian BC Corp | 3270do | 3290do | | | | | | |
| | | | 6060do | 6175do | | | | | | | |
| 2200 | 2300 | | New Zealand, Radio NZ Intl | 15720pa | | | | | | | |
| 2200 | 2300 | | Nigeria, Radio/Ibadan | 6050do | | | | | | | |
| 2200 | 2300 | | Nigeria, Radio/Kaduna | 4770do | 6090do | | | | | | |
| 2200 | 2300 | | Nigeria, Radio/Lagos | 3326do | 4990do | | | | | | |
| 2200 | 2300 | | Papua New Guinea, Catholic Radio | 9675do | 4960do | | | | | | |
| 2200 | 2300 | | Papua New Guinea, NBC | 6137do | | | | | | | |
| 2200 | 2300 | irreg/vl | Sierra Leone, Radio UNAMSIL | 6137do | | | | | | | |
| 2200 | 2300 | v | Sierra Leone, SLBS | 3316do | | | | | | | |
| 2200 | 2300 | | Solomon Islands, SIBC | 5020do | 9545do | | | | | | |
| 2200 | 2300 | | Taiwan, Radio Taiwan Intl | 9355eu | | | | | | | |
| 2200 | 2300 | | UK, BBC World Service | 5965as | 5975ca | | | | | | |
| | | | 6195va | 7105as | 9605af | 11685as | | | | | |
| | | | 12095ca | 15400af | | | | | | | |
| 2200 | 2300 | | USA, AFRTS | 4319usb | 5446usb | 5765usb | 2300 | 0000 | USA, AFRTS | 4319usb | 5446usb |
| | | | 6350usb | 7590usb | 7812usb | 10320usb | 2300 | 0000 | 6350usb | 7590usb | 7812usb |
| | | | 12133usb | 12579usb | 13362usb | 13855usb | 2300 | 0000 | 12133usb | 12579usb | 13362usb |
| 2200 | 2300 | | USA, KAIJ Dallas TX | 13815na | | | 2300 | 0000 | USA, KAIJ Dallas TX | 13815na | |
| 2200 | 2300 | | USA, KTBN Salt Lake City UT | 15590na | | | 2300 | 2315 | USA, KTBN Salt Lake City UT | 15590na | |
| 2200 | 2300 | | USA, KWHR Naalehu HI | 11565as | 17510as | | 2300 | 2315 | USA, KWHR Naalehu HI | 11565as | 17510as |
| 2200 | 2300 | | USA, Voice of America | 7215va | 9E90va | | 2300 | 2330 | USA, Voice of America | 7215va | 9E90va |
| | | | 15185va | 15290va | 15305va | 17740va | | | 15185va | 15290va | 15305va |
| 2200 | 2300 | | USA, WBCQ Kennebunk ME | 5105na | 7415na | | 2300 | 2330 | USA, WBCQ Kennebunk ME | 5105na | 7415na |
| | | | 9330na | 17495na | | | | | 9330na | 17495na | |
| 2200 | 2300 | | USA, WBOH Newport NC | 5920am | | | 2300 | 2356 | USA, WBOH Newport NC | 5920am | |
| 2200 | 2300 | | USA, WEWN Birmingham AL | 9975va | 11530va | | | | USA, WEWN Birmingham AL | 9975va | 11530va |
| | | | 15695va | 15745va | | | 2300 | 2357 | | | |
| 2200 | 2300 | | USA, WHRA Greenbush ME | 9455na | | | | | USA, WHRA Greenbush ME | 9455na | |
| 2200 | 2300 | | USA, WINB Red Lion PA | 13570am | | | 2315 | 2330 | USA, WINB Red Lion PA | 13570am | |
| 2200 | 2300 | | USA, WJIE Louisville KY | 13595am | | | 2330 | 0000 | USA, WJIE Louisville KY | 13595am | |
| 2200 | 2300 | | USA, WRMI Miami FL | 9955am | 15725am | | | | USA, WRMI Miami FL | 9955am | 15725am |
| 2200 | 2300 | | USA, WRMI Miami FL | 9955am | 15725am | | | | USA, WRMI Miami FL | 9955am | 15725am |
| 2200 | 2300 | | USA, WTJC Newport NC | 9370na | | | | | USA, WTJC Newport NC | 9370na | |
| 2200 | 2300 | | USA, WWCR Nashville TN | 7465na | 9985na | | 2330 | 0000 | USA, WWCR Nashville TN | 7465na | 9985na |
| | | | 12160na | 13845na | | | 2330 | 0000 | 12160na | 13845na | |
| 2200 | 2300 | | USA, WWRB Manchester TN | 9320na | 12170na | | 2330 | 2358 | USA, WWRB Manchester TN | 9320na | 12170na |
| 2200 | 2300 | | USA, WYFR Okeechobee FL | 5810va | 9690va | | 2335 | 0000 | USA, WYFR Okeechobee FL | 5810va | 9690va |
| | | | 11740va | 21525va | | | 2340 | 0000 | 11740va | 21525va | |
| 2200 | 2300 | | Zambia, Radio Christian Voice | 4965af | | | 2340 | 0000 | Zambia, Radio Christian Voice | 4965af | |

| 2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT | | | | | | | | | | | |
|--|------|----------|----------------------------------|----------|----------|----------|------|------|-----------------------------|----------|----------|
| 2300 | 0000 | | Anguilla, Caribbean Beacon | 6090am | | | | | | | |
| 2300 | 0000 | | Australia, ABC NT Alice Springs | 2310do | 4835irr | | | | | | |
| 2300 | 0000 | | Australia, ABC NT Katherine | 5025do | | | | | | | |
| 2300 | 0000 | | Australia, ABC NT Tennant Creek | 4910do | | | | | | | |
| 2300 | 0000 | | Canada, CBC Northern Service | 9625do | | | | | | | |
| 2300 | 0000 | | Canada, CFRX Toronto ON | 6070do | | | | | | | |
| 2300 | 0000 | | Canada, CFVP Calgary AB | 6030do | | | | | | | |
| 2300 | 0000 | | Canada, CKZN St John's NF | 6160do | | | | | | | |
| 2300 | 0000 | | Canada, CKZU Vancouver BC | 6160do | | | | | | | |
| 2300 | 0000 | | Costa Rica, University Network | 13750va | | | | | | | |
| 2300 | 0000 | | Cuba, Radio Havana | 9550na | | | | | | | |
| 2300 | 0000 | | Egypt, Radio Cairo | 7115na | | | | | | | |
| 2300 | 0000 | | Germany, Deutsche Welle | 5955as | 9890as | | | | | | |
| | | | 15135as | | | | | | | | |
| 2300 | 0000 | vi | Ghana, Ghana BC Corp | 3366do | 4915do | | | | | | |
| 2300 | 0000 | | Guyana, Voice of | 3291do | | | | | | | |
| 2300 | 0000 | | India, All India Radio | 9705as | 9950as | 11620as | | | | | |
| | | | 11645as | 13605as | | | | | | | |
| 2300 | 0000 | | Malaysia, Radio | 7295as | | | | | | | |
| 2300 | 0000 | vi | Namibia, Namibian BC Corp | 3270do | 3290do | | | | | | |
| | | | 6060do | 6175do | | | | | | | |
| 2300 | 0000 | | New Zealand, Radio NZ Intl | 15720pa | | | | | | | |
| 2300 | 0000 | | Papua New Guinea, Catholic Radio | 9675do | 4960do | | | | | | |
| 2300 | 0000 | | Papua New Guinea, NBC | 6137do | | | | | | | |
| 2300 | 0000 | irreg/vl | Sierra Leone, Radio UNAMSIL | 6137do | | | | | | | |
| 2300 | 0000 | v | Sierra Leone, SLBS | 3316do | | | | | | | |
| 2300 | 0000 | | Solomon Islands, SIBC | 5020do | 9545do | | | | | | |
| 2300 | 0000 | vl | Taiwan, Radio Taiwan Intl | 9355eu | | | | | | | |
| 2300 | 0000 | | UK, BBC World Service | 5965as | 5975ca | | | | | | |
| | | | 6195va | 7105as | 9605af | 11685as | 2300 | 0000 | 6195va | 7105as | 9605af |
| | | | 12095ca | 15400af | | | 2300 | 0000 | 12095ca | 15400af | |
| 2300 | 0000 | | USA, AFRTS | 4319usb | 5446usb | 5765usb | 2300 | 0000 | 4319usb | 5446usb | 5765usb |
| | | | 6350usb | 7590usb | 7812usb | 10320usb | 2300 | 0000 | 6350usb | 7590usb | 7812usb |
| | | | 12133usb | 12579usb | 13362usb | 13855usb | 2300 | 0000 | 12133usb | 12579usb | 13362usb |
| 2300 | 0000 | | USA, KAIJ Dallas TX | 13815na | | | 2300 | 2315 | USA, KAIJ Dallas TX | 13815na | |
| 2300 | 0000 | | USA, KTBN Salt Lake City UT | 15590na | | | 2300 | 2315 | USA, KTBN Salt Lake City UT | 15590na | |
| 2300 | 0000 | | USA, KWHR Naalehu HI | 11565as | 17510as | | 2300 | 2330 | USA, KWHR Naalehu HI | 11565as | 17510as |
| 2300 | 0000 | | USA, Voice of America | 7215va | 9E90va | | | | USA, Voice of America | 7215va | 9E90va |
| | | | 15185va | 15290va | 15305va | 17740va | | | 15185va | 15290va | 15305va |
| 2300 | 2330 | | USA, WBCQ Kennebunk ME | 5105na | 7415na | | 2300 | 2330 | USA, WBCQ Kennebunk ME | 5105na | 7415na |
| | | | 9330na | 17495na | | | | | 9330na | 17495na | |
| 2300 | 2356 | | USA, WBOH Newport NC | 5920am | | | 2300 | 2356 | USA, WBOH Newport NC | 5920am | |
| 2300 | 2357 | | USA, WEWN Birmingham AL | 9975va | 11530va | | | | USA, WEWN Birmingham AL | 9975va | 11530va |
| | | | 15695va | 15745va | | | 2300 | 2357 | | | |
| 2300 | 2330 | vl | USA, WHRA Greenbush ME | 9455na | | | | | USA, WHRA Greenbush ME | 9455na | |
| 2300 | 2330 | | USA, WINB Red Lion PA | 13570am | | | 2315 | 2330 | USA, WINB Red Lion PA | 13570am | |
| 2300 | 2330 | | USA, WJIE Louisville KY | 13595am | | | 2330 | 0000 | USA, WJIE Louisville KY | 13595am | |
| 2300 | 2330 | | USA, WRMI Miami FL | 9955am | 15725am | | | | | | |

Aero Monitoring on the Space Coast

Anytime the space shuttle is launched, communications activity is not confined to the land mobile radio spectrum. There is also quite a bit of activity on military and civilian aircraft frequencies by NASA and Department of Defense aircraft in support of a shuttle launch.

DoD is the Main Launch Player

The Department of Defense Manned Space (DDMS) Flight Support Office coordinates all DoD contingency support to our nation's manned space flight programs. Chartered in 1958 by the Secretary of Defense, DDMS was originally formed with the express purpose of providing much needed DoD support to our initial manned space flight effort.

Since those early days, this support office has continued to be the focal point for all DoD contingency support to Project Mercury, Gemini, Apollo, Apollo/Soyuz Test Project and the Space Shuttle program. This support includes astronaut and spacecraft recovery, worldwide communications, tracking and data relay, public affairs, and medical support.

The commander of the U.S. Strategic Command (USSTRATCOM) is the manager for this program, and the 45th Space Wing commander at Patrick AFB, Florida, is his deputy manager. The DDMS offices and staff are located at Patrick and are responsible for the day-to-day operations and support to NASA's manned space flights. Additionally, DDMS maintains a landing support office at the Johnson Space Center in Houston, Texas.

In the space shuttle program, DDMS has the responsibility for astronaut rescue and recovery, contingency landing site support, payload security, medical support, coordination of airlift/sealift for contingency operations, as well as other support services required in the event of a shuttle emergency.

In the Kennedy Space Center area, U.S. Air Force air refueled H-60 helicopters, HC-130 tanker aircraft, pararescue and medical personnel; and U.S. Navy and Coast Guard ships are deployed to support launch contingencies and astronaut recovery. Additionally, the Navy provides a Marine KC-130 tanker for refueling the helicopters, E-2C aircraft for enhanced air traffic control and P-3 aircraft for search and rescue operations in the mid-Atlantic region.

To support the potential for a Transoceanic Abort Landing (TAL), NASA has selected four TAL sites in Spain and Africa. These sites are Moran and Zaragoza Air Bases in Spain; Ben Guerir, Morocco; and Yundum Inter-

national Airport, Banjul, The Gambia. Three of these four TAL sites are activated for each shuttle launch. DDMS supports these TAL sites with C-12 or C-21 aircraft for on-scene weather reconnaissance and in-flight checks of space shuttle unique landing aids; C-130 aircraft with pararescue and medical support personnel; and DoD fire/crash/rescue equipment and personnel.

DDMS operates the DoD Support Operations Center at Patrick starting the day prior to a space shuttle launch and continuing through landing. Manned by staff officers, the support operations center maintains 24-hour contact with those DoD forces and facilities around the world supporting each mission. The center is the DoD focal point for managing a contingency response in the event of a shuttle emergency landing or astronaut bailout. The center, for example, played a key role in providing support to NASA in response to the Space Shuttle *Columbia* disaster in 2003.

While a shuttle is on orbit, designated DoD sites worldwide are ready to support a shuttle contingency landing. The center receives status reports from these locations during mission support periods. On landing day, the support operations center coordinates the DoD fire/crash/rescue support and medevac helicopters at Kennedy Space Center, Edwards Air Force Base, California, and Holloman Air Force Base, New Mexico.

After landing at locations other than Kennedy Space Center, the shuttle is ferried back to Florida on a modified Boeing 747 Shuttle Carrier Aircraft. DDMS coordinates a U.S. Air Force C-141 "Pathfinder" aircraft to transport NASA personnel and equipment supporting ferry flight operations.



Shuttle being ferried by carrier aircraft (NASA photo)

The office personnel fly with the NASA team on these ferry flights, providing specialized support en route at DoD installation stops.

Due to the unique weather sensitivities of ferry flights, a dedicated weather support team is also assembled to monitor en route weather. This includes a DoD meteorologist to monitor weather conditions from the Cape Canaveral Forecast Facility in Florida, as well as a DoD meteorologist who travels with the ferry flight team, providing direct en route weather support.

The NASA STA

In addition to the T-38 aircraft based at Ellington AFB, Texas, used by the NASA astronauts for training and cross country trips,



NASA STA aircraft landing at KSC (NASA)

NASA has four very special aircraft to train mission commanders and pilots in landing the shuttle. This training is conducted using a Shuttle Training Aircraft (STA) that is designed to simulate space shuttle flight characteristics during flight from approximately 35,000 feet to touch down. Its seats are identical to those of a space shuttle, which enables the crew to acquire an accurate sense of the shuttle landing.

The space shuttle is both a spaceship and an airplane; thus, when training a shuttle crew member, both spaceflight and atmospheric flight must be taught.

STA is a modified Grumman Gulfstream II aircraft with an onboard special computer system to enable the aircraft to simulate the orbiter. That onboard computer, named the Advanced Digital Avionics System (ADAS), simulates mode controls, the direct lift control (DLC) and the in-flight reverse thrust, as well as the conventional aircraft control of the shuttle during the landing phase.

NASA has four of these customized aircraft, most of which are kept at the NASA Forward Operating Location in El Paso, Texas. The fleet is rotated through Ellington Field for maintenance as needed.

Most of the STA training takes place at the White Sands Space Harbor, a part of the White Sands Test Facility in New Mexico. The location is ideal because it not only has an actual Shuttle landing strip – an STA training requirement – but it provides more remote, undisturbed airspace than its counterparts at Kennedy Space Center and at Edwards Air Force Base in California.

Astronauts are shuttled to El Paso on their T-38 NASA aircraft. Each STA training session includes 10 approaches and landings. After a session, the training crew refuels the aircraft, picks up a different astronaut and begins again.

Monitoring NASA Comms

So where can you catch NASA and DoD aircraft comms associated with the space shuttle program? In our exclusive list below we have two different lists – a nationwide list and some of the main frequencies used in the Kennedy Space Center area and the Eastern Test Range (ETR).

General NASA Frequencies

ETR contingency search and rescue: 11440 kHz (USB)
 ETR support: 264.800 284.100 291.800 (AM mode)
 HF Air-to-Ground: 3089.5 6743.5 9003.5 11192.5 15062.5 kHz (All USB)
 NASA VHF/UHF Air-to-Air: 123.050 123.125 (T-38 interplane) 123.350 126.650 (NASA Weather aircraft/Shuttle training aircraft) 230.650 235.400 (T-38 interplane) 351.000 (All AM)
 Search and Rescue Operations: 282.800 (AM mode)

Eastern Test Range

Air Rescue Support: 46.650 (FM) 138.450 "DoD Cape and Jolly/King" (AM)
 Air-to-Ground Support (Aerial Refueling) "Jolly" (AM): 253.000
 Clearance function: 2638 kHz (USB)
 FACSAC Jacksonville (Navy) Warning Area

Coordination Net: 120.950 133.950 134.650 135.825 267.500 270.600 284.500 307.200 349.900 369.900 385.100 (AM)
 Launch Operations: 266.200 308.950 320.050 (AM)
 Pegasus Mission Support: 128.150 (AM)
 Range Control/Support: 133.800/264.800 "Cape Control" 320.200 "Cape Radio" 324.700 340.800 349.600 "DoD Cape" 350.600 Net 5 Alpha (AM)
 Range Projects: 270.000 (AM)
 Range Safety Support: 46.650 (FM) 125.900 "Variety" 141.300 "Variety" 229.000 294.600 "Cape Leader/Variety" (AM)
 SRB Recovery Net Discrete: 310.000 "Liberty Star/Raven 2" (AM)

Kennedy Shuttle Landing Facility (KX68)(All AM mode)
 Approach/Departure (Daytona): 132.650/281.425 (South) 134.950/239.275 (North)
 Civilian/Military Guard/Emergency: 121.500 243.000
 Civilian Traffic Advisory: 123.600
 Ground Control: 121.750
 Orbiter to ground: 259.700 279.000 (also EVA) 296.800
 Shuttle Launch Air Support (Weather/Shuttle training aircraft): 126.650
 Tower Local/Helicopter Control: 128.550/284.000

Cape Skid Strip (KXMR)(All AM mode)
 Approach/Departure (Daytona): 132.650/281.425 (South) 134.950/239.275 (North)
 ASOS Weather: 119.325
 Tower: 118.625/393.000 126.200
 Weather: 344.600 "Cape Metro"
 Note: 118.625 Cape Tower has been heard also on 136.650 and 138.450

Patrick AFB/Cocoa Beach (KCOF)
 920th Rescue Wing Air-to-Air (Refueling): 138.475 "Jolly/King" (AM)
 920th Rescue Wing Parajump Air-to-Ground (Judy Drop Zone): 251.900 "Jolly/King" (AM)
 920th Rescue Wing Search and Rescue Contingency/Training: 236.000 (AM)
 920th Rescue Wing/39RQS Operations: 321.000 "King Ops" (AM)
 920th Rescue Wing/301RQS Air-to-Air: 46.650 "Jolly" (FM)
 920th Rescue Wing/301RQS Operations: 255.500 "Jolly Ops" (AM)
 Air Show Boss (2001 air show): 121.050/257.425 (AM)
 Air Show SAR Demonstration (2001 air show): 122.925 (AM)
 ALCF (Global HF through Cape Radio) 139.050/383.0 (AM)
 Approach (Single Frequency): 126.400/290.800 (AM)
 Approach/Departure (Daytona): 132.650/281.425 (South) 134.950/239.275 (North)
 Approach/Departure Control (Regional): 290.800 297.200 358.300 369.200 372.800 378.800 (AM)
 Automatic Terminal Information Service: 119.175/273.500 (AM)
 Clearance Delivery: 118.400/289.400 (AM)
 Consolidated Command Post: 138.300 383.000 "MAYAAP" (AM)
 Flight Check (Federal Aviation Administration): 135.850 (AM)
 Ground Control: 124.350/335.800 (AM)
 NASA ER-2 Operations: 138.025 290.800 328.025 378.800 (AM)
 NORAD Air Defense Air-to-Ground: 148.125

282.400 364.200 (AM)
 Pilot-to-Dispatcher (PTD): 139.300/372.200 (AM)
 Search and Rescue Training: 236.000 251.900 252.800 259.000 (AM)
 Tower: 133.750/269.375 372.800 (AM)
 Training Operations: 225.350 316.275 351.200 363.900 383.200 385.700 395.100 (All AM)
 Weather (Metro): 344.600 (AM)

Melbourne International Airport (KLMB)(All AM mode unless otherwise indicated)
 ATIS: 132.550
 Approach/Departure (Daytona): 134.950/239.275 (North)
 Flight Service Station (St. Petersburg FSS): 123.600 (Titusville RCO)
 Ground Control/Clearance Delivery: 121.900
 Northrup-Grumman Operations: 123.200
 TACAN (Titusville-TTS): 1146.0000 (Channel 59Y)
 Tower: 118.200 124.050 257.800
 Unicom: 122.950

Space Coast Regional Airport (KTIX)(All AM mode unless otherwise indicated)
 Air Sean Inc: 123.475 "Bat Cave"
 Approach/Departure (Daytona): 134.950/239.275 (North)
 ATIS: 120.625
 Flight Service Station (St. Petersburg FSS): 123.600 (Titusville RCO)
 Ground Control: 121.850
 Helicopter Control: 119.875
 Tower: 118.900
 Unicom: 122.950 123.025 (Helicopter)

Miami ARTCC – Melbourne RCAG
 133.475/269.300 128.650/343.700 135.075/348.700 119.825/379.250

❖ 380-400 MHz DoD LMR Trunk Update

As most of you who regularly follow this column know, we are closely tracking new trunk systems that are coming online in the new land mobile radio band from 380-400 MHz.

Gary Mitchelson reported on the SCAN-DC message board a new P25 control channel on 380.0750. He theorizes this might be a Fort Detrick trunk system control channel.

Another report we have received from Maryland by an anonymous contributor indicates the following system frequencies at Fort Detrick trunk system: 385.7000 385.7750 387.3375 387.6750 MHz. Our reporter in the area also passed along two new frequencies at Fort Meade, Maryland: 380.3875 and 380.8375 MHz.

There is a new listing on Lindsay Blanton's *Radioreference.com* website of a new system in the Los Angeles, California, area. The system apparently consists of three sites:

Site 101 385.0125 385.2125 385.8875 386.1250
 Site 102 386.1000
 Site 103 386.0375 386.3375

I am looking for reports from *Milcom* monitors in the LA Basin area who may be able to shed some light on this new trunk system.

And that does it for this edition of *Milcom*. Until next month, 73 and good hunting.

Flying High with Federal Communications

If you are limiting your federal monitoring to the VHF or UHF land mobile bands, you might consider spending some time listening to some of the air traffic control frequencies in your area. Many federal agencies operate aircraft as part of their missions. While most non-commercial airplanes use their FAA issued "N" number to identify themselves, planes operated by some agencies have special radio call signs that are used on the air traffic control frequencies as well as their own VHF or UHF radios.

Why do these agencies use these call signs? Some believe that it's to keep their true nature a secret, but more likely it is to alert the FAA controllers that they are dealing with an aircraft that may have special mission requirements or need priority handling. Many of the air missions of law enforcement agencies require the planes to be flying low or around in circles for extended periods, even near other air traffic. When the flight controllers hear the FLINT or ROSS call sign, they know what they are likely to be dealing with.

Here are a few of the known federal agency call signs you may hear when listening to air traffic control frequencies:

- AKRON** Reported to belong to the Bureau of Alcohol, Tobacco, and Firearms.
- BOISE** The BOISE flights are believed to be federal law enforcement operations, sometimes flown with Department of Defense aircraft. Many monitors have reported BOISE flights using Army Guard helicopters, possibly for surveillance or drug interdiction work. BOISE flights have been monitored arriving and departing many military fields, including

- Fart Lewis, Washington.
- FLINT** Used by the Drug Enforcement Administration, FLINT aircraft numbers seem to be assigned to personnel rather than the aircraft. You will hear the FLINT pilots using the same call sign when talking on DEA frequencies.
- HOMELAND 1** Used by the Secretary of the Department of Homeland Security.
- IDAHO** Reported to be used by FBI aircraft, but may be used by other federal law enforcement agencies.
- INTERIOR US** Department of the Interior aircraft.
- JUSTICE** These are flights of the Justice Prisoner and Alien Transportation Service (JPATS) missions of the US Marshal's Service. Contract flights, such as Planet Airways and others, use the JUSTICE call sign when they are flying with prisoners aboard, but revert to the company name when flying empty. If you missed our mention of JPATS in the March edition of Fed Files, check out the JPATS web site, <http://www.usdoj.gov/marshals/jpats>.
- OMAHA** Used by the Bureau of Customs and Border Protection aircraft, OMAHA unit numbers seem to be assigned to the aircraft hardware and in some cases they seem to be derived from the airplane's FAA "N" registration number. The OMAHA flights can switch to a LIMA call sign when they are using the Customs radio nets. We'll talk more about Customs aircraft later in this column.
- ROSS** Federal Bureau of Investigation, this call sign is heard all over the country.
- SALEM** Bureau of Customs and Border Protection aircraft can use this call sign, as well as OMAHA, but I have not heard it used.
- ZEALUS** Coast Guard aircraft on law enforcement missions may use this call sign instead of COAST GUARD.

What about frequencies for these federal aircraft? Most of the time, you will hear these federal agencies using these call signs on normal VHF air traffic frequencies for the airports and flight paths around you between 118 MHz and 137 MHz. When not talking with the FAA flight controllers, these aircraft can be heard using their normal agency VHF or UHF communications frequencies, but they can also show up on some other air band frequencies. Here are some that you should keep an ear on, and remember that all these frequencies are in the AM mode:

- Freqs MHz
- 120.325 DHS Customs Air Operations
 - 120.350 Justice Department (FBI)
 - 120.375 Justice Department (FBI)
 - 120.450 DHS Customs Air Operations
 - 120.650 Justice Department
 - 120.775 Justice Department - I've heard DEA FLINT aircraft using this one.
 - 120.825 DHS Customs Air Operations
 - 122.750 Department of Energy
 - 122.800 A variety of government agencies have services on this frequency, also used as a UNICOM frequency.
 - 122.850 US Forest Service, Army Corps of Engineers, Environmental Research Labs severe storms studies (backup frequency) and NASA.
 - 122.900 National VHF search and rescue training frequency, also used by the Department of Agriculture, Bureau of Indian Affairs, Coast Guard, Environmental Research Labs severe storms studies, Environmental Protection Agency aircraft, US Forest Service, Department of Interior, National Park Service, NASA, NOAA.
 - 122.925 Environmental Research Labs severe storms studies, NOAA
 - 122.975 US Forest Service
 - 123.025 This is a nationwide helicopter multicom frequency, so any federal agency using helicopters may show up here.
 - 123.050 US Forest Service, NASA, NOAA
 - 123.075 Also a nationwide helicopter multicom frequency.
 - 123.125 This is a favorite of the NASA T-38 aircraft flying all over the country, so keep this one in your scanner and you are sure to catch some NASA air-to-air chatter.
 - 135.850 Federal Aviation Administration flight inspection
 - 135.950 Federal Aviation Administration flight inspection
 - 135.975 US Forest Service

❖ Coast Guard Aviation

Coast Guard aviation assets have become more important for not only emergency rescue and lifesaving operations, but also law enforcement and security. The US Coast Guard was included in the Department of Homeland Security



A Customs and Border Protection Cessna (CBP)

and along with Customs and Border Protection, now provides security and surveillance for our nation's ports and waterways.

As we reported in the March edition of the *Fed Files*, the Coast Guard is in the process of changing many of their aviation communications frequencies. The main Coast Guard UHF aviation frequencies have been changed starting in early 2005. The exact reasons for this change has not been officially defined, but most federal and military monitors believe that it is due to the wider use of the 380 MHz to 400 MHz band for military land-mobile use, specifically, new digital trunking systems. While these new systems are supposed to co-exist with aviation users in the band, it's possible that the Coast Guard simply wanted to avoid any possible conflict or interference problems in the future.

Here are the new nationwide Coast Guard UHF air operations frequencies, all in the AM mode:

- 345.0000 MHz – Air Primary
- 237.9000 MHz – Air Secondary
- 326.1500 MHz – Working Primary
- 379.0500 MHz – Working Secondary

These new frequencies will replace the former USCG frequencies of 381.7, 381.8 and 383.9 MHz. Listeners report that the 345.0 MHz has become active all over the country.

The Coast Guard is also in the process of implementing a program they call "Rescue 21," which will provide a major upgrade to their communications systems nationwide. Improvements of the Coast Guard VHF marine communications sites as well as all the USCG VHF and UHF land mobile radio systems are planned. They will include moving to the new narrow-band requirements and allow interoperability with the APCO P-25 digital radios used by other DHS and DOD agencies. Here's the official web site of this new project, <http://www.uscg.mil/rescue21>. I'll have more information on the progress of Project 21 in future *Fed Files* columns..

❖ Customs Air Operations

The Customs and Border Protection bureau (CBP) of the Department of Homeland Security (DHS) operates a large number of aircraft, both fixed-wing and helicopters. The CBP air assets have started to take on a more significant role in protecting not only our national borders, but also airspace surveillance around large events and potential targets of terrorism. You can find information of some of their aircraft at the Customs and Border Protection web site, <http://www.cbp.gov/>.

Both the Presidential Inauguration and the Super Bowl in Jacksonville, Florida, were patrolled with Customs air assets. Listeners near Washington, DC during the week of the Inauguration reported OMAHA aircraft were involved in airborne patrols. During the Super Bowl in February, Customs aircraft were involved in controlling the airspace near the stadium.

In addition to the VHF air band frequencies listed above, CBP aircraft are often heard on UHF military frequencies as well. Their primary UHF frequency in most areas is 282.425 MHz (AM), still referred to as BLUE 1 by some Customs pilots. Often these pilots are communicating with HAMMER, the Customs Air and Marine Opera-

tions Center at March Joint Air Reserve Base in California.

HAMMER has numerous remote transmitter sites around that country that can reach the OMAHA flights anywhere they fly. If you don't have this frequency in one of your scanners, put it in now! You never know when it may become active in your area.

There have been many versions of the Customs aviation frequency lists circulating for years. I'm not sure how accurate my information is today, but here is one list of possible UHF frequencies for Customs aviation operations:

- BLUE 1 – 282.425 MHz
- BLUE 2 – 303.825 MHz
- BLUE 3 – 336.600 MHz
- BLUE 4 – 254.200 MHz
- BLUE 5 – 234.600 MHz
- BLUE 7 – 238.400 MHz
- BLUE 8 – 387.800 MHz
- BLUE 9 – 361.800 MHz

For years, the BLUE 1 frequency has been very quiet up in the Pacific Northwest, but it has recently started to come alive with activity. I received some information from Matt Cawby up in the Seattle, Washington, area about some increased traffic by Customs aircraft in support of the CBP operations along the US - Canadian border: "I had Scanner Recorder on 282.425 MHz and got OMAHA 838 being vectored to a target north of Darrington, Washington, by call sign HAMMER. HAMMER advised that a UH-1 would be launching from Snohomish (I assume the Snohomish County helicopter), but I didn't hear them on 282.425. They lost radar contact near Arlington and 838 went back to Bellingham, Washington. ATC call sign was StationAir 60838, a Cessna 206." Thanks for that information, Matt!

❖ Checking in with the FAA

Your input to this column is critical and it's time to ask for some help in trying to answer some federal communications riddles. My question for the *Fed Files* readers is what has happened to the Federal Aviation Administration?

In past years the FAA's National Radio Communications Network, known as NARACS, was an interesting set of frequencies to monitor. You could often hear maintenance operations concerning the FAA's vast radar, data and voice communications systems. But about 5 years ago, all of the traffic I used to hear on the NARACS frequencies seemed to have disappeared – where did it go?

In 1995, contracts were awarded to upgrade the NARACS hardware, along with other FAA communications systems. But it appears the funding for the new narrow-band radio equipment may have been re-allocated to higher priority programs. Searching publicly available FAA documents on the Internet tells us very little of the current status of NARACS.

Some have suggested cell phones have taken over, which is a definite cause of a lot of federal radio traffic vanishing. But I'm still curious as to what has happened to the NARACS activity. Here is the original radio channel lineup for the FAA NARACS frequencies:

| CH | Receive | Transmit |
|----|----------|----------|
| 1 | 172.9250 | 169.3250 |
| 2 | 172.9500 | 169.3500 |
| 3 | 172.9750 | 169.3750 |
| 4 | 172.8500 | 169.2500 |
| 5 | 172.8750 | 169.2750 |
| 6 | 172.9000 | 169.3000 |
| 7 | 172.8250 | 169.2250 |
| 8 | 172.1250 | 172.1250 |
| 9 | 172.1500 | 172.1500 |
| 10 | 172.1750 | 172.1750 |
| 11 | 166.1750 | 166.1750 |

Since the formation of the Transportation Security Administration, the frequencies 172.9000 and 172.1500 have been given to them for nationwide use. In Portland, Oregon, the frequency of 166.1750 MHz recently became active with at the Portland International Airport, but it's unknown if the communications were FAA or another agency. The other NARACS channels remain curiously silent.

Are you are hearing activity on these FAA frequencies? If so, please let us know.

See you in July with another edition of *Fed Files!*

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by David Lawson

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Monitoring Transoceanic Flights

How do aircraft flying over the oceans communicate with land stations for Air Traffic Control purposes? Usable communications in the 118-136 MHz aircraft band only work at a fraction of the needed distances. Satellite services have attracted some business, but the bulk of communications still exist on the shortwave bands, since signals at these frequencies can travel thousands of miles – plus there is a very large base of already-installed HF radio equipment. Let's explore the communications we are able to receive, where they can be found, and how to understand them.

Receivers First

A scanner will not receive these transmissions since they are mostly below 18 MHz and use single sideband (SSB) modulation. Hmmm, you don't have a shortwave / World Band / HF (high frequency) receiver? Well, maybe it's time to go shopping! When selecting a receiver, it is important to buy one that is known for its good SSB reception and it's helpful to have one with at least one hundred memories.

If your budget is in the \$500 range or more, an excellent receiver is the Icom R75. There are others, of course, but the R75 is a great value for the money. For information on the R75 or any other receiver, go to <http://www.google.com> and enter the make and model.



The Icom R75 is a great receiver for monitoring transoceanic flights.

❖ Where to Tune

MWARA Frequencies

The world is divided up into Major World Air Route Areas (MWARA). Each area has its set of HF frequencies for aircraft out of VHF range. Just as an example, the Central East Pacific CEP-1 area (off

CEP-1 Frequencies in KHz USB

| | |
|------|-------|
| 3413 | 8843 |
| 3452 | 10067 |
| 5574 | 13364 |
| 6673 | |

the U.S./Canadian West Coast) uses the frequencies shown in the CEP-1 chart insert.

For the ARINC (Aeronautical Radio, Inc.) San Francisco (Pacific) and New York (Atlantic) frequencies, see: <http://www.faa.gov/ats/aat/ifim/ifim0109.htm> For worldwide MWARA frequencies, go to <http://www.flightradio.com/hf.htm> or to Google (link above) and enter "MWARA frequencies." You can try individual frequencies or you can simply tune around within the HF aero bands at different times of the day and night to see what pops up. See the "HF Aero Bands" chart insert.

HF Aero Frequency Bands in KHz USB

| | |
|-----------|-------------|
| 2850-3155 | 8815-9040 |
| 3400-3500 | 10005-10100 |
| 4650-4750 | 11175-11400 |
| 5480-5730 | 13200-13360 |
| 6525-6765 | 15010-15100 |

ARINC

Aeronautical Radio, Inc. (ARINC) handles HF aeronautical radio traffic for a large part of the world. In their words, "ARINC's Air/Ground International Radio Service provides high-frequency (HF) single side band aeronautical operational control (AOC) voice communications for aircraft flying over the Atlantic, Caribbean, and Pacific oceans; Canadian and Arctic regions; and the Gulf of Mexico and Central and South America." ARINC operators relay information and requests back and forth between Air Traffic Controllers and the aircraft.

Propagation

HF propagation varies some during the day and considerably between night and day. The lower MWARA frequencies tend to be used more at night and higher ones during the day. The season, the point in the eleven-year sunspot cycle, and the current solar activity also affect HF propagation. Here is an informative, animated site on propagation: <http://www.ae4rv.com/tn/propflash.htm>. (Requires Macromedia Flash Player, with a link to a free download, if you need it).

Primary and Secondary

As you listen to the MWARA frequencies, you will hear the operator designate one frequency as "Primary" and another as "Secondary." Sometimes you will hear the term "Backup." If the aircraft cannot make contact on the Primary frequency, then attempts will be made on the Secondary or

Backup.

The Primary and Secondary frequencies for given routes and directions of travel vary throughout that day depending on propagation and frequency congestion. Try all the frequencies that you hear mentioned.

❖ Understanding What You Hear

SELCAL

The Selective Calling System (SELCAL) tones can be heard frequently on the MWARA frequencies. With SELCAL activated, the pilot will be alerted when there is a transmission for him (or her). He doesn't have to listen to the background noise or to radio traffic that doesn't pertain to him. As a listener, you will hear what sounds like two tones. Actually, each "tone" is a combination of two tones, so overall, there are four tones involved. The pilot tells the operator what four tones he requires. This is done by speaking four letters in the phonetic alphabet, such as Quebec Romeo Delta Sierra for QRDS.

Each SELCAL code is registered via ARINC. You can use these codes to identify the specific aircraft, the airline, the registration, and more. Please look at *SELCALs for the Enthusiast* at: <http://www.selcal.co.uk/>. The very helpful 1 MB ZIP file at "Database Download Page" expands to a 3 MB Microsoft Excel file that lists the registered SELCAL codes. (If you don't have Excel on your computer, a free Excel Viewer can be downloaded at: <http://www.microsoft.com/office/000/viewers.asp>).

Aircraft Type Codes

There are many types of aircraft. For brevity, each model is reduced to three digits using the International Air Transport Association (IATA) Code. The *SELCALs for the Enthusiast* database uses this code in their "Manucode" column. A "727" in the list means a "Boeing 727" (not a difficult guess). Other codes may not be as easily recognized. To the rescue is <http://www.airlinecodes.co.uk/acrtypes.htm> with most all of the codes.

Airline Company Codes

Passenger and cargo airline companies are represented by ICAO three-letter codes. They are used in various ways in the business and by hobbyists. Examples are: KAL for Korean Air Lines and QFA for Qantas Airways.

To decode the three-letter airline codes in the *SELCALs for the Enthusiast* database "OPCODE" column, and other places you find them, go to <http://www.faa.gov/ATPubs/CNT/3-3.htm> "Section 3 by 3-Letter Identifier" and select the first letter.

Call Signs and Registrations

Airliners identify by call sign and flight number. One can guess that "Alaska" is for Alaska Airlines. Listeners may know that "Speedbird" is British Airways. Many other call sign names are not so obvious or common. To decode the call sign and find the company name, go to "Section 2 by Telephony" at the above website and select the first letter of the call sign.

BizJets and private aircraft may identify with their aircraft registration number. Such numbers – gained from monitoring, from the *SELCALs for the Enthusiast* database, and from other sources – can lead to the Aircraft Description, Registered Owner, and more. For links to aircraft registration decodes worldwide, see: <http://www.lgw.org.uk/registers.htm>

Reporting Points / Charts

Transoceanic aircraft follow defined routes, or tracks. Along these routes are "Reporting Points." You will hear them by name on the MWARA frequencies during "Position Reports." One route between Los Angeles and Hawaii, for example, has points DANKA, DEROK, DIALO, DOPPS, DONER, and DUETS along its way. Some routes also have points specified by latitude and longitude, such as 50N140W, 55N150W, 57N160W. Route Charts show the named Reporting Points and, of course, the Lat./Long. grids.

To learn about and/or obtain these useful charts, see <http://avn.faa.gov/index.asp?xml=naco/catalog> and click on "Supplemental Charts/Pubs," then explore the "North Pacific Route" and "North Atlantic Route" links.

You can also look up Reporting Points at <http://www.airnav.com/airspace/fix/> but spelling can be tricky. At AirNav.com, DIALO, for example reads, in part, "Location: 28-42-06.000N / 139-25-36.000W (OFFSHORE PACIFIC)." With a world globe in hand (another useful tool), you can find the approximate location of aircraft from the latitude and longitude. For a primer on latitude and longitude, see: <http://www.maptools.com/UsingLatLon/> and the links there.

Position Reports

A position report on an oceanic flight track may go as follows – with the aircraft speaking first: "San Francisco, ALOHA 463, Position on 88." "ALOHA 463, San Francisco, Go ahead." "ALOHA 463, Position DIALO 2137, Flight Level 380, Estimate DEROK 2219, DANKA next, Fuel 21 decimal 2, Minus 42, Wind 280 diagonal 56, Smooth." "ALOHA 463, San Francisco, Roger, you have the Primary, the Secondary is 5574." "Secondary 5574, ALOHA 463." "San Francisco."

Here's some translation and links to more information: "San Francisco" is the ARINC station identification. "ALOHA 463" is the aircraft call sign / flight number. As above, the call sign ALOHA can

be looked up and yields Aloha Airlines. "Position on 88" is stating the intention to make a Position Report and letting the operator know on what frequency, in this case, 8843 kHz. "Position DIALO 2137" is the aircraft's current position at time 2137 in Coordinated Universal Time (UTC). (For info on UTC, see: <http://www.dxing.com/utgmt.htm>).

"Flight Level 380" is an altitude of 38,000 feet. (For interesting info on Flight Level, see: http://en.wikipedia.org/wiki/Flight_level). "Estimate DEROK 2219, DANKA next," is the estimated arrival time at DEROK with DANKA following that. On the North Pacific Route Chart – Northeast Area, one can see that the aircraft is half way between Los Angeles and Hawaii and from the sequence of reporting points, it shows the aircraft is Hawaii bound.

"Fuel 21 decimal 2" is 21,200 pounds of fuel on board. "Minus 42" is the outside air temperature in degrees Celsius. "Wind 280 diagonal 56" is the direction in degrees Magnetic North that the wind is coming from and at 56 knots – as if the plane had stopped momentarily to take the reading. "Smooth," in this case, is the observed quality of air turbulence.

Following Aircraft

It is possible to follow a transoceanic aircraft on HF for hours on its track as it progresses through the reporting points. Helpful in this pursuit is <http://www.aeroseek.com/webtrax/>. Enter the airline and the flight number and it offers info on the flight and a map showing where it is.

If you live near a large coastal international airport and are following an inbound aircraft, you will eventually hear a handoff to an Air Route Traffic Control Center (ARTCC) controller on VHF when near the coast. It can then be followed through more frequency changes / handoffs – to Approach, Tower, and finally to Ground Control after landing.

For more info on handoffs and the different controllers' functions, see the *Monitoring Times* November 2004 issue – "Air Traffic Control for the Hobby Listener."

SELCAL Checks

A SELCAL check might go like this: "San Francisco, Pacific 811 Heavy, Requests SELCAL check on Delta Hotel Mike Quebec" "Pacific 811 Heavy, Roger, here is the SELCAL Check, Standby, (then tones)" "San Francisco, Pacific 811 Heavy, SELCAL check confirmed, thank you." "San Francisco, Roger"

Translation: "Pacific 811," from the decode site mentioned above, is Air Pacific Limited based in Fiji. "Heavy," though not a term related to SELCALs, means the aircraft has a gross takeoff weight capability greater than 255,000 pounds (formerly 300,000). See <http://www.faa.gov/atpubs/PCG/A.HTM> and scroll to Aircraft Classes. "Heavy" is added onto the call signs of the planes over a certain size to warn controllers and other aircraft of the increased and dangerous wake turbulence. (For an interesting piece on wake turbulence, please see; <http://www.aopa.org/asf/asfarticles/sp9403.html>).

From the *SELCALs for the Enthusiast* database, there are two aircraft with the code DHMQ. Duplications, though undesirable, do occur due to limited number of SELCAL codes.

From the list, the one with the operator code of "FJI" confirms it – the three-letter code for Air Pacific Limited. The aircraft is a "744" and when decoded, as described above, turns out to be a "Boeing 747-400 pax" – "pax" meaning a passenger model.

SELCAL Decoders

You may hear SELCAL tones, but without the pilot or operator speaking the code each time, since the operator often already has the code. A listener still has a chance to obtain the SELCAL code, and thus the information it leads to, by using a SELCAL decoder. Here is an example: <http://www.airnavsystems.com/ANSD/>.

The decoder connects from the receiver to the computer sound card via an audio cable. Their info says, "After each SELCAL is decoded, information concerning the Flight will be shown, including aircraft type and company." They do say that the decode "success rate usually varies between 70 and 90%." (This column editor has no personal experience with a SELCAL decoder but the idea is certainly intriguing).

Aircraft Photos

After monitoring a plane and identifying the airline or aircraft type, it can be fun to see some photos. Go to <http://www.airliners.net/> and click on "Take me to the Photo Search Page!" Using the Air Pacific example, select Air Pacific in the "Airline" search box. In the results, look for 747 photos. There are other searches. Explore them. Have fun!

See you next time.

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Information as of 2/17/2005 6 29 33 PM GMT

FlightID: AAH481 (Commercial Jet)

Status: IN FLIGHT

Owner: ALOHA AIRLINES

Radio Call: ALOHA

Ground Spd: 426 kts Altitude: 38,000

Type: B737 (Boeing Company Model 737-700)

Origin Apt: SNA JOHN WAYNE AIRPORT-ORANGE COUNTY

Dest Apt: HNL HONOLULU INTL

Departed: 09 31 AM PST (1731Z)

Original ETA: 01 29 PM HST (2325Z)

Calculated ETA: 01 04 PM HST (2304Z), In 4h 29m

Dist Fr Dept: 335 nm Dist To Dest: 1907 nm

More from the Mailbag

I am pleased to see the increased mail and loggings arriving at the *Below 500 kHz* desk. Mail typically runs a little higher at the close of the winter DX season, but this year has been far above normal. I can only conclude that interest in the band is alive and well, and that many new listeners are discovering what can be heard here. This month, we have a mix of historical information, DX loggings, and reader mail for you to enjoy.

Just a quick reminder that, when writing by e-mail, please include some LF-related text in the subject line, such as "Below 500 kHz" or "Longwave." In this way, I'll know your letter is not "spam" and it won't end up in the wrong bin.

❖ Longwave in the 1950s

We start this month off with a letter from Gene Mavretic (PA). Gene writes: "I just finished my Feb 2005 issue of *MT* magazine and your article regarding *500 kHz and Below*. Back in the mid-'50s I was a Navy Radioman (CW operator) assigned to Navy Radio Station Pt. Lyautey, French Morocco. We monitored 500 kHz during the quiet periods 24 hours a day. That was one of my duties besides guarding the Navy Air/Ground frequencies. Back in those days, Naval Patrol Aircraft (P2V Neptunes - sub hunters) used CW to maintain radio contact. I did copy a signal from a Soviet Naval Cruiser on 500 kHz advising us of a hazard to maritime navigation. Brings back a lot of good old memories of CW ops in the Navy. Everything was done via CW and 60-wpm RTTY."

Thanks, Gene. It's always nice to hear about these topics from someone "who was there." Your mention of 60-wpm RTTY reminded me of my foray into that activity as a new ham. In the late-1980s, I was probably one of the last operators still using a mechanical teleprinter (Model 15, I believe). I inherited it from another ham, and with a combination of grease, fine-tuning, and general good luck, I managed to get it on the air. I even had a perforator and transmitter-distributor (TD) unit, which could be used to cut and send paper "brag" tapes. PSK31 comes close to the thrill of those days, but I miss the sound (and shaking) of the old machine!

❖ Vintage Marine Band

Reader Perry Crabill, W3HQX (VA) offered additional insight into vintage users of the LF and MF marine band. He writes: "I used to listen to the Radio Compass Stations on 800 meters (375 kHz) when they were still active. A ship requesting

a bearing would send QTE? to establish contact, and would then send 'MO' in slow Morse code on 375 kHz for about a minute while the bearings were taken by the compass stations in the group involved. I can still hear that 'MO' in my mind when I think about it."

"Did I ever mention that I also used to listen to CW traffic on the Great Lakes on 410 kHz? That was the distress and calling frequency on that body of water until the service was replaced by radiotelephone operation on the Great Lakes, Ohio, and Mississippi Rivers. This was mostly on 2 MHz frequencies, although there were also 4 and 6 MHz assignments. I used to hear WMI, Lorain, Ohio, giving weather reports each morning."

Thanks, Perry. One of my earliest SWL memories was hearing a ship on the 2 MHz marine band calling a shore station in AM mode. Even then (mid 1970s) AM was nearly gone from the marine band, so I felt lucky to receive this signal. I was using an old Heath AR-2 receiver with a BFO that didn't work, so AM was about all I could hear. On the plus side, it allowed me to hear notable ham radio operators who used AM, such as the famous WA3PUN, and WA1HLR (both still licensed). I got quite a thrill when a QSL card arrived in the mail from WA3PUN. (No, I don't go back far enough to claim a card from the legendary W2OY, but I do have a recording of him - "CQ CQ CQ ... no kids, no lids, no space cadets"!)

❖ Australian Loggings

Kriss Larson (KG6UOS), recently vacationed in Australia, and brought his longwave gear along for use between sightseeing stops. He set up his gear in five different locations, but the best receiving site was at Ayers Rock, says Kriss, due to its central location and "total absence of any interference." According to Kriss, he simply didn't have the time to log everything he heard at Ayers Rock! Table 1 shows a selection of loggings from Kriss' trip. He notes that the VLF loggings (0-100 kHz) are speculative, based on record frequencies. Many of the beacons in Australia still contain voice weather broadcasts - a rarity in the U.S. today.

Finally, Kriss mentions that his longwave website has been upgraded with numerous maps and pictures, including the high-power beacon map of the U.S. that was featured in *MT*. You can access the site at: <http://members.aol.com/trekkspill/Longwaveradio.html>.

Jacques d'Avignon (ON) submitted this QSL received from Algiers Radio on 153 kHz:



Table 1. Selected Australian Logs

| | | | | | | | | |
|------|-------|-----------------|-----|-----|---------------|-----|-----|-------------------|
| 16.4 | JXN | Noviken Nor | 268 | FRT | Forrest | 352 | PRL | Parkerville |
| 18 | -- | Russia? | 269 | CV | Charleville | 353 | LRE | Longreach |
| 19.8 | NWC | Exmouth Aus | 272 | LHI | Lord Howe | 356 | EN | Essendon |
| 20.5 | -- | China? | 272 | PH | Perth | 359 | AMB | Amberley |
| 21.4 | NPM | Lualualei, HI | 275 | CWS | Cowes | 359 | NWA | Nowra |
| 25 | -- | Russia? | 276 | TVL | Townsville | 359 | GEL | Geraldton |
| 37.5 | NRK | Iceland? | 281 | DPO | Devonport | 362 | BOL | Bolinda |
| 40 | JJY | Fukushima Jap | 281 | JT | Jandakot | 364 | CS | Cairns |
| 54 | NDI | Okinawa Jap | 287 | KG | Kalgoorlie | 365 | WLM | Williamtown |
| 60 | JJY | Fukuoka Jap | 293 | CUN | Cunderdin | 371 | TRE | Taree |
| 100 | Loran | various loc. | 296 | FLI | Flinders Is. | 371 | HUG | Hughenden |
| | | | 302 | BN | Brisbane | 372 | GIG | Gingin |
| | | | 302 | WYY | Wynyard | 374 | TTR | Tea Tree |
| | | | 305 | GTH | Griffith | 377 | EPP | Epping |
| 200 | CKL | Clackline | 311 | CH | Coffs Harbour | 380 | COR | Corowa |
| 206 | BWX | Barrow Island | 311 | EDN | Edinburgh | 383 | WON | Wonthaggi |
| 212 | IFL | Innisfail | 317 | GLS | Giles | 386 | BLN | Busselton |
| 218 | PLE | Plenty | 317 | RTI | Rottneest Is. | 389 | GFN | Grafton |
| 218 | WBR | Warburton Range | 323 | CAR | Carnarvon | 389 | YWE | Yarrowee |
| 224 | RPY | Ripley | 326 | NHL | Nhill | 395 | PMQ | Port Macquarie |
| 233 | AYE | Ayers Rock | 326 | ESP | Esperance | 396 | LM | Learmonth |
| 239 | BLT | Ballarat | 329 | CVM | Caversham | 398 | MB | Moorabbin |
| 240 | ABA | Albany | 332 | CAS | Casino | 404 | KA | Karratha |
| 242 | LT | Launceston | 332 | BHI | Broken Hill | 407 | LTN | Laverton |
| 245 | BDG | Bendigo | 335 | AS | Alice Springs | 407 | MRW | Morawa |
| 248 | SMI | Smithton | 338 | ROC | Rockdale | 413 | SBG | Strathbogie |
| 248 | WR | Woomera | 340 | PEA | Pearce | 416 | BK | Bankstown |
| 251 | MEK | Meekatharra | 344 | DN | Darwin | 416 | MTI | Mornington Island |
| 260 | NF | Norfolk Is. | 347 | RIC | Richmond | 419 | PCK | Pt Cook |
| 260 | CKN | Cooktown | 347 | NSM | Norseman | 428 | GLF | Glenfield |
| 260 | PD | Port Hedland | 350 | ESL | East Sale | 446 | TNG | Thangool |
| 266 | SDM | Sydenham | 350 | CIN | Curtin | 486 | LTV | Latrobe Valley |

FM Pirate Busts Continue

As we often mention in this column, unlicensed pirate radio broadcasting is not authorized by the United States government. The Federal Communications Commission sometimes closes down pirate stations and levies fines against the station operators. Once again this month we have news of a variety of FM pirates who have been bagged by the FCC.

One bust last month was somewhat unusual. In Bossier City, LA, the FCC visited the pastor of a church who was broadcasting in Spanish on 88.3 MHz FM. He was advised to cease this by the FCC. In a more standard operation, the FCC visited and closed down **Dream Team Radio**, a hip hop pirate operating on 103.3 MHz in Naples, FL. Even the FCC pointed out during this bust that many dozens of pirates operate in southern Florida, which may be the FM pirate hotbed of the United States.

A debate continues between pirate radio advocates who support community-based stations like the two that were recently busted, and opponents of pirate radio that include the FCC and the National Association of Broadcasters. This debate has strong political overtones, and is not just a free radio issue. Many licensed stations are anxious to protect the economic value of their radio licenses. Many pirate advocates cite freedom of expression factors that they claim should justify expansion of radio outlets in the USA. Meanwhile, pirate radio operators transmit at their own risk, as has been true for many decades.

❖ Why 6925 kHz?

Another debate that has been ongoing for decades within pirate radio revolves around the frequency that pirates use for their North American pirate broadcasts. Some pirate radio advocates have long suggested that pirates should use a standard frequency, such as the current favorite of 6925 kHz. This maximizes the audience for pirate programming, since listeners know where to look for the transmissions, and they will be important parts of the audience for broadcasting. After all, some maintain, why transmit pirate programming if nobody is listening?

Another school of thought maintains that variable frequencies are a better strategy for shortwave pirate broadcasts. If frequencies are not known in advance, the stations make a much better DX target that is difficult to hear. This position maintains that much of the lure of pirate radio DXing relates to the skill needed to find and hear the broadcasts.

This month we have commentary from The Poet of **The Crystal Ship**. His station uses a variety of unusual and strange frequencies, but he sometimes also operates on the standard 6925 kHz frequency. He reports that he hopes to build an audience for his shows, even when he operates on an odd frequency such as 4071 kHz where few DXers are likely to look for him. He notes that he regularly tips off selected listeners in advance when he moves his transmitter to a strange part of the shortwave bands. He also notes that he enjoys being a difficult DX target, and that he takes pleasure when he gets a reception report from somewhere at a great distance from his transmitter location, especially when he uses an unusual frequency that is hard to find. He says, "For us (at The Crystal Ship) the two motivations of maximizing audience and being a DX target work hand in hand."

So, not everybody thinks that there are conflicting perspectives in this argument within pirate radio.

❖ Eritrea Quasi-Clandestine Address

Via DXplorer, Bruce Churchill reports receipt of a QSL that provides the address of the **Voice of the Broad Masses** in Eritrea. If you hear this one on 7100 kHz around 1500 UTC, the address that works for reception reports is Ministry of Information, Radio Department, Radio Engineering Division, PO Box 242, Asmara, Eritrea.

❖ What We Are Hearing

Monitoring Times readers heard 18 different North American pirates this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regular announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but the primary North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz remains the best place to scan for the pirates. More than 90% of all North American shortwave pirate broadcasts are heard on or near 6925 kHz.

Ann Hoffer- Rumors are circulating in the pirate community that this mysterious new station is a reincarnation of **Radio Free Ancaster**. (Uncertain; try Belfast)

Channel Z- This new one is puzzling so far. The announcer appears to be Sal Amonioc of Radio Three, but the shows are mostly rock music. (Belfast, or try

channelzradio@gmail.com e-mail)

Grasscutter Radio- Rock music and two-way pirate QSO conversations are still the staple format on this station. (Uses grasscutterrado@yahoo.com e-mail)

Ground Zero Radio- Dave Gunn's parodies nuclear war, if you can believe that. He also plays plenty of rock music and other comedy bits. (Elkhorn)

Ironman Radio- Scruffy Swab clearly has a new collector's series of QSLs, as we see here this month. (Belfast)

Indira Calling- Their parody of **All India Radio** normally includes east Indian tunes that were "requested" by pirate DXers. (Providence)

KIPM- The existential dramas on Alan Maxwell's station still provoke controversy. Some love the creative programming, while others hate the shows. (Elkhorn)

Melvin Malfunction- This one has returned with computer generated music and voices, a format you will not hear on licensed radio. (Uses melvinmalfunction@yahoo.com e-mail)

Pirate Radio Boston- Announcer Charlie Loudenboomer claims to be a reactivation of a station previously busted by the FCC. Alternative rock and pirate comedy are featured here. (Uses pirateradioboston@yahoo.com e-mail)

Radio Azteca- Bram Stoker has been producing a parody of himself with dozens of phony IDs including **Radio Gerbil** and other unlikely station names. (Belfast)

Radio FCC- A number of pirate stations have used this identification over the years. Rest assured that this one is not coming from the Federal Communications Commission. (None)

The Crystal Ship- The Poet's rock music sometimes is heard on 6925 kHz, but he sometimes broadcasts on other oddball frequencies such as 4071 and 6856 kHz as well. (Belfast and tcshortwave@yahoo.com e-mail)

Voice of Captain Ron Shortwave- Coptoin Ron normally programs heavy metal and punk rock music. (Uses captainronswr@yahoo.com e-mail)

Voice of Laryngitis- Pirate DXers have been delighted by the return of Genghis and Stanley Huxley, who produce one of the best classic pirate stations ever. (None, try Belfast)

Voice of Pink Panther Radio- Guess which movie theme is featured on this one? Yup, it is the Pink Panther. (Unsure)

WHGW- The format on this one is variable. It ranges from rock music to relays of old time radio shows. (Uses whgw6925@myway.com e-mail)

WHYP- The James Brown memorial station from North East, PA, is probably the most widely heard pirate radio station on the air today. (Providence)

WSPY- This mysterious station transmits a mix of spy numbers transmissions, telephone audio tones, and rock music. (None)

QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations, especially in Europe where the

IRONMAN RADIO



RECEIVED FROM THE NATURAL
GOLF IS FOR THE FUTURE BROADCAST
OF THE BOSTON PIRATE STATION
TRANSMISSION
THANKS FOR LISTENING Scruffy Swab

continued on page 61

Waking the Dead, Unruding the Rude

Recently I had the opportunity to drive through a region of the country I have not had reason to visit for about ten years or so. In looking over my logs I recalled the area to have quite a few fine and very active repeater systems. Consulting the current edition of the ARRL *Repeater Directory* revealed almost a dozen machines that should have made my stay in this area lots of fun for amateur radio. In preparation for the trip I programmed all the aforementioned systems into the memories of my handheld and looked forward to many hours of relaxing rag chewing.

What I discovered, however, did not speak well of the state of VHF/UHF repeater activity in 2005, at least in that particular part of the country. I shall keep the region nameless, because I know the situation to be similar in more than a few locations around the country.

As I drove through the area and set up shop in a number of bed & breakfasts and motels during my travels, I found incredibly little repeater activity. On many of the machines my calls went unanswered, even during peak *drive time* hours. (This does not bode well for travelers in need of aid in an unfamiliar part of the land.) Those machines where my call was answered almost always resulted in curt responses, sometimes with an overt indication that outsiders were not all that welcome. Roundtables consisted of a handful of friends talking only to one another and not opening up matters to general discussion.

I recall passing through this area in the past and being invited *twice* on two different repeaters to meet some local hams for coffee at local eateries. Now I find only dead air or the cold shoulder.

Something is not healthy in ham radio land. While most areas are not in as dire straits as the part of the world I was visiting, I think we can all think of one or two machines near our QTHs that are either unfriendly or have been so inactive that dust comes out of the speaker when you key them up.

❖ What Happened?

I guess we could begin the analysis by looking at how the area might have started down the road to radio hobby entropy. The most common excuse I hear folks give is, "The Internet is to blame!"

I suppose by some stretch of the imagination an argument could be made that some folks have stopped playing radio in favor of playing with computers. My experience, and

that of most of my friends, does not reflect that scenario. I cannot think of any ham who has become inactive due to the addition of a computer in the shack. Every radio person I know – ham or otherwise – has seen the computer as a tool to enhance their hobby fun. While computer technology is a convenient target, I just don't see anything that really supports this notion. Have you ever seen an ad in the ham radio press stating "Must sell my ham gear to buy a PC?" Nope, me either.

A more reasonable argument might be made for the growth of the cellular phone industry cutting into ham repeater activity. Many repeaters sprang up around the use of, and access to, a viable area telephone patch system. I know more than a few folks (whose ham activity is mainly in the HF bands), who bought a 2 meter rig and supported a local repeater just for the security of being able to make an emergency call from the road. Today, for most folks, cell phones do the job instead. So, the lack of need for phone-patch based systems and their group support brings us to where the problem probably really comes home to roost.

I think we have nobody but ourselves to blame for the lack of repeater activity. Most metropolitan areas (with the reduction in phone patch use) probably have more repeater systems than they reasonably require. In the late seventies and early eighties, everyone who could get a channel off of their regional frequency coordinator (and even some who didn't) put a repeater system on the air. So, instead of a large number of folks sharing the fun in a few good places, smaller and smaller groups broke out onto the different machines and, over time, there just wasn't enough activity to keep folks interested. And, with fewer folks depending on phone patching to let their significant other know when they would be home for dinner, a lot of machines have gotten awfully quiet. Quantity is seldom quality.

❖ No Ham is an Island

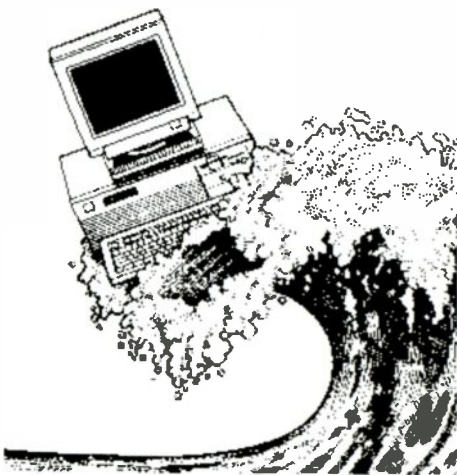
So, we have addressed the dead systems: What about those unfriendly ones? That might be a tougher nut to crack, but it's something we need to look at, because, along with a drop in repeater system use, has come a drop in the interest in emergency service activity. In spite of efforts to tighten up emergency response for increased homeland security, many local groups still find it hard to get folks out for ARES/RACES nets and field activities. Sadly, even some of those groups that are active can

tend to be rather insular. While they may pay lip service to the desire for new participants, their actions and attitudes treat newcomers like outsiders.

This is actually a fairly complicated subject that goes well beyond the ham radio world. An excellent book that looks at the problem and some of the solutions is called *Bowling Alone: The Collapse and Revival of American Community* by Robert D. Putnam (New York: Simon & Schuster, 2000). I commend it to you for further study.

Some systems that were once open, with gregarious memberships who encouraged new activity, have turned in on themselves, feeling little or no connection with hams outside of the local group. I once drove through an area and made a call on a system listed in the ARRL *Repeater Directory* as "open." Before the squelch tail dropped, someone (who, by the way, neglected to give his call sign), felt the need to inform me in no uncertain terms that people who did not pay dues on the system were not allowed to talk on it. Even if this was a case where the system had gone "closed" for some reason (it hadn't), I am sure you can think of quite a few ways that interaction could have been handled with better amateur radio spirit and camaraderie!

So how do we get these inactive and insular repeater systems to wake up and operate in the best traditions of the amateur radio fraternity? In checking out matters with some of my local repeater groups and talking with folks in other parts of the country, I think there are lots of ways



Contrary to popular belief, the wave of interest in personal computing did not kill off repeater use.

to turn dead and unfriendly systems around. Let me outline a few that might be useful should you run into similar situations in your area.

❖ Join Your Local Repeater Group

Regardless whether a system is considered open or closed, the people who pay the bills always have the most say in how a system is run. Contributing membership in your local system(s) allows you to have input into matters, or at least have direct access to those who set policy.

Remember that system I spoke of where I was told to get off the air because I wasn't a paying member? I made a point of finding out who the system trustee was and getting in contact with him. That gentleman assured me that this unknown individual was not speaking for the repeater group, that the system was open and use by travelers was encouraged. He assured me that the matter would be discussed at the next quarterly repeater group meeting and that he would advise regular users to keep an ear out for anyone making such inappropriate statements on behalf of the group.

I wasn't a member of that group and my concerns were still well heard. Think of how much more clout a ham's position would have if he was a card carrying member!

❖ Go to Group Meetings

This is sort of a chicken and egg situation. I know of some repeater groups that, as they have become more inactive, have held less frequent meetings. This is 180 degrees out of phase. You need to hold *more frequent* meetings to discuss how to improve system participation, to meet and welcome new hams to the group, and to find out about any emerging matters that could have a negative effect on the system. More meetings will produce more activity. A more active repeater will have more members, who will come to more meetings... Get the picture?

And while you're at those meetings, be a voice for the kind of repeater group you would want to be a member of. Remind folks of the public service aspects of the hobby as well as the brotherhood and sisterhood all hams should show for each other.

❖ Lead by Example

As a bona fide member of your local system, make a point of getting on the air frequently and taking the time to greet and reach out to newcomers and travelers you hear on the system. Often, these folks will be amateurs just starting out in their ham radio experience. Not only can you help them to feel welcome, you can help them to learn correct practice and procedures and make them a better ham in doing so.

Since the general demise of the Novice Bands, newcomers have no safe place to cut their amateur radio teeth. New folks need support and encouragement. A little effort on your part will go a long way and probably even bring in a new member to your local group. You may even make a friend for life.

❖ Consider System Consolidation

This can be a touchy subject, because some folks have a lot of sweat equity as well as personal finances tied up in building and maintaining their particular systems. But what good is it to have a bunch of systems with nobody to talk to? In areas where the need for multiple systems has fallen off for the reasons mentioned above, repeater groups need to reach out to one another for their mutual survival. Most areas of our country could be better served if repeater groups would begin to look at consolidation seriously and reasonably.

❖ On Air Activities

It's easy to encourage repeater system use through organized activities. How about a weekly swap net? Code practice? Technical discussion? Encourage taking turns moderating the activities to get more people involved.

Here's a great activity that allows for participation by retirees and shut ins: Set up a schedule for repeater monitoring so that as many hours as possible of the day or night are covered by someone from the group. It's easy enough to do: just get folks to sign up for an hour or two where they promise to keep their rig on and answer any call that comes in. Even if you can't get 24/7 coverage, try to see that your machine is covered during peak commuter hours and on weekends. What a great service to travelers and newcomers!

No repeater has to fall into disuse or, worse yet, rudeness. With a little effort and some reflection on what makes the amateur radio hobby great, any repeater can become a popular place that performs good service and is fun to hang around.

I'll see you on the bottom end of 40 meters – that is, unless you answer my call on your local machine!

UNCLE SKIP'S CONTEST CALENDAR

AGCW QRP/QRP Party
May 1 1300 -1900 UTC

MARAC County Hunter Contest (CW)
May 7 0000 UTC - May 8 2400 UTC

Nevada QSO Party
May 7 0000 UTC - May 8 0600 UTC

10-10 Int. Spring Contest (CW)
May 7 0001 UTC - May 8 2400 UTC

Microwave Spring Sprint
May 7 0600 - 1300 Local Time

Oregon QSO Party
May 7 1400 UTC - May 8 0200 UTC

Indiana QSO Party
May 7 1600 UTC - May 8 0400 UTC

New England QSO Party
May 7 2000 UTC - May 8 0500 UTC

Mid-Atlantic QSO Party
May 14 1600 UTC - May 15 0400 UTC

FISTS Spring Sprint
May 14 1700 UTC - 2100 UTC

50 MHz Spring Sprint
May 14 2300 UTC - May 15 0300 UTC

CQ WW WPX Contest (CW)
May 28 0000 UTC - May 29 2359 UTC

QRPARCI Hootowl Sprint
May 29 2000 UTC - 2400 UTC

MI QRP Memorial Day CW Sprint
May 29 2300 UTC - May 30 0300 UTC

Outer Limits continued from Page 59

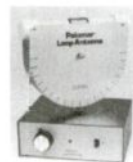
value of the US dollar is plunging rapidly. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 69, Elkhorn, NE 68022; PO Box 28413, Providence, RI 02908; and PO Box 293, Merlin, Ontario N0P 1W0.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for submitting pirate loggings remain *The ACE* (\$2 US for sample copies via the Belfast address above) and the e-mailed Free Radio Weekly newsletter, free to contributors via niel@icam.net. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at <http://www.frn.net>, and a few pirates will occasionally QSL a web site report left on the FRN.

Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Artie Bigley, Columbus, OH; Jerry Berg, Lexington, MA; Bruce Churchill, Falbrook, CA; Rich D'Angelo, Wyomissing, PA; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; William T. Hassig, Mt. Prospect, IL; Harry Helms, Wimberly, TX; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Dan Malloy, Everett, MA; Mark Morgan, Cincinnati, OH; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Bryan Smith, Bethlehem, PA; Niel Wolfish, Toronto, Ontario, and Joe Wood, Greenback, TN.

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

Antenna Types: Antennas with Reflectors

As we discussed in the first column in this series, around 1887 Heinrich Hertz demonstrated the existence of electromagnetic (EM) waves. Although it was once popular to call these waves “Hertzian waves,” today we often call them “radio waves.” And, remarkably, in his early work Hertz developed several antenna designs which utilized the basic features found in the majority of antennas in use today! This month we will consider antennas which utilize reflectors. And, yes, Hertz developed the first antenna to utilize a reflector in its design.

❖ The Use of Reflectors with Antennas

A receiving antenna element which is fed current from a transmitter or which captures received signals and feeds them to a feed line or receiver, is sometimes called the “driven element.” A driven element can capture a portion of a signal which propagates to its location. In many antenna designs an element called a “reflector” is also used. The reflector’s purpose is to capture some of the incoming signal’s energy which was not captured by the driven element, and reflect some of that energy to the driven element. In well-designed antennas the use of a reflector can give a useful increase in the level of received-signal strength.

This increase in signal strength, or “gain” as it is called, is usually a welcome factor. However, its contribution to the quality of reception is often overshadowed by the directivity that

results from antenna designs which utilize reflectors. This is due to the fact that a directional pattern is frequently quite useful in reducing the strength of received noise and other interference. This can occur in two different ways.

One way is that the overall reception pattern for a directional antenna diminishes reception from most directions except for its favored directions. Thus, interference is reduced if it doesn’t arrive from the directions favored by the directional antenna. Due to the prevalence of received noise and other interference at HF and lower frequencies, this kind of interference reduction is quite important on these bands.

The second useful feature of directional antennas is that the strength of received interference from one specific direction can often be dramatically reduced. This is accomplished by orienting the antenna such that a deep null, or direction of minimal response, in the antenna’s pattern is pointing in the direction of the received interference.

At VHF and higher in frequency, received noise and interference are much less prevalent, and at these frequencies the primary value of a directional antenna is more likely to be its ability to deliver a higher level of received signal than that available from a non-directional, lower-gain antenna.

❖ Non-Resonant Reflecting Surfaces

Today, the most common reflecting surfaces for antennas are configured as: flat, V or

corner-shaped, trough-shaped, and “dishes” with a parabolic or spherical-section shape. In his work, Hertz utilized a parabolically-curved sheet of conductive metal as his reflector (fig. 1A). A Hertzian dipole was placed on the focal line to which the energy reflected from the parabolic surface. This added energy gave the antenna an increase in received-signal strength over what it captured without the reflector.

Many of today’s antennas utilize a dish reflector whose surface is shaped as a parabola revolved around its axis (fig. 1B). This surface focuses the EM energy back to a focal point rather than the focal line of Hertz’s original cylindrical-parabolic reflector. Today, various kinds of driven elements – including but not limited to Hertzian dipoles – are used as the focal point receiving element for dish antennas.

❖ Resonant Wire Reflectors

Wires as reflectors? I’ve got to be joking, right? Well, let’s see. To be effective, the surface reflectors discussed above must be at least a minimum size in relation to their wavelength; however, such reflectors aren’t actually tuned to a specific frequency. But let’s now consider the idea of reflectors that are *tuned*.

When an antenna element receives energy from a passing EM wave, the current induced by that wave flows in the antenna. If a load, such as a transmission line leading to a receiver, is attached to the element, then some, but not all of the induced current will flow from the antenna to the load. Also, the energy from a portion of the received current will be re-radiated, just as EM energy is radiated when current flows in a transmitting antenna.

For an element with no load there is no route for current to flow from the antenna, and so more current remains available for re-radiation as EM waves. When a half-wavelength dipole with no load attached is spaced appropriately behind a driven element, then a portion of the energy re-radiated (reflected) from that dipole will be directed to the driven element (fig. 1C). This reflected energy increases the level of received signal flowing in the driven element. Thus, the antenna’s gain is increased.

The Yagi-Uda beam is an example of one antenna which depends on a tuned-reflector element for its gain and directivity. We might note here also that half wavelength dipoles placed at an appropriate spacing ahead of the driven element can be designed to serve as directors (fig. 1C) somewhat as a magnifying lens can focus light.

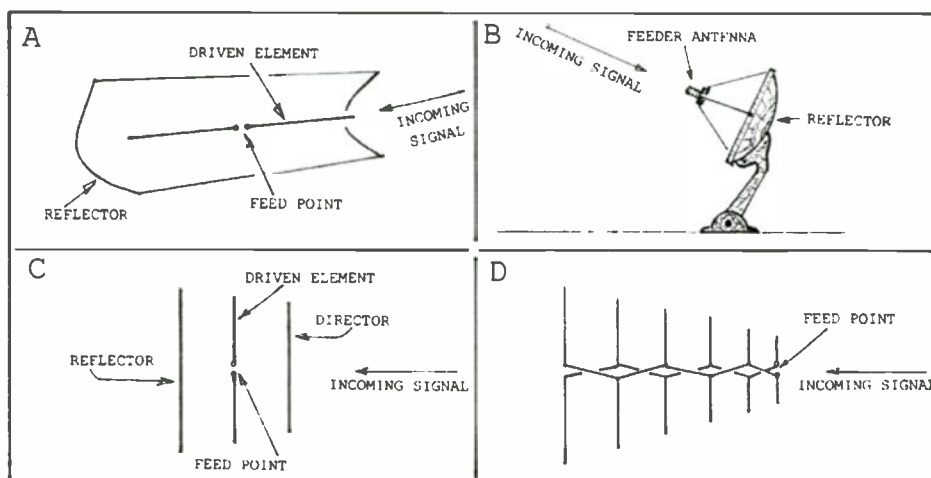


Fig. 1. Cylindrical, paraboloid-reflector antenna (A), Parabolic-shaped, dish-reflector antenna (B), Yagi-Uda, beam antenna (C), LPDA antenna (D).

This Month's Interesting Antenna-Related Web site:

How to make a parabolic reflector antenna for your wireless WiFi internet connection:

<http://www.freeantennas.com/prod01.htm>

A discussion of parabolic dish antennas:

http://www.radio-electronics.com/info/antennas/parabolic/parabolic_reflector.php

Calculating dimensions for parabolic-reflector antennas:

<http://www.csgnetwork.com/antennaparaboliccalc.html>

A tutorial on antennas: <http://www.electronics-tutorials.com/antennas/antenna-basics.htm>

A test of antenna knowledge; this site is intended as preparation for the FCC GMDSS license:

<http://members.aol.com/ab0di/el3c8.html>

Note that in the Yagi-Uda antenna (fig. 1C), the driven element, the reflecting elements, and the directing elements are all essentially Hertzian dipoles. Beam antennas frequently have more than one director, but usually only one reflector.

The log-periodic dipole array (LPDA) (fig. D) is a popular, wideband, beam antenna design. Basically, it is an array of Hertzian dipoles arranged such that, at any one frequency, the length of only a few of its many elements are close to resonance. These few elements

are adjacent to one another, and together they function as a directional antenna. This antenna is designed with an array of elements of progressively differing lengths, and can be made to cover a very wide band of frequencies. LPDAs are very useful where frequency of operation is frequently changed.

❖ Some Other Antennas with Reflectors

Reflectors are also utilized with many other antenna designs including the axial-mode helix (flat reflectors), the cubical-quad beam (tuned-loop reflectors), and others. Incidentally, the elements of the cubical-quad beam were developed by opening out the "squashed" or folded loop which constitutes the folded-dipole antenna. And yes, the folded dipole was derived from the Hertzian dipole.

producing highly-useful, practical-sized antennas. This was true even at wavelengths as long as those of the HF band. Does this antenna, discovered so long after Hertz's original work, owe any debt at all to any of Hertz's antennas?" As is obvious from the above discussion, the answer is "yes."

This Month:

The above discussion has been concerned with antennas receiving signals. Can the antennas discussed be used for transmitting as well? And if they can, will they have the same increased gain and directional performance for transmitting as they do for reception?

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.

RADIO RIDDLES

Last Month:

I asked: "The discovery of the principles of the Yagi-Uda beam antenna excited workers in radio technology. Its potential for high gain levels and sharp radiation-reception patterns gave antenna designers a much needed tool for

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Digging into the Signal Tracers

This is a subject I kind of backed into. Since I had a little extra room last month, I jumped into the topic before I had really intended to. So you already know that we'll be working with two models of signal tracer – the Heathkit IT-12 and the Eico 147-A – that are representative of the many variants you will see at antique radio meets and hamfests. And you've already had an overview of how these instruments can be used to troubleshoot problems in radio receivers.

This month we'll begin by taking a look at the circuitry of these helpful servicing devices. I'll use the schematic of the 147-A as an example. The IT-12 circuit is very similar; I'll explain the few differences later.

Basically, the 147-A is a high-gain, three-stage audio amplifier. The first two stages (V1A and V1B) are the two halves of a 12AX7 dual triode; the third stage (V2) is a 6AQ5 pentode. The level of the signal passing through the amplifier can be monitored by a 1629 magic eye tube (V4) connected to the grid of V3. If more precise comparative measurements of gain are required, a VTVM or scope can be connected to a jack (J10) provided for the purpose.

The output of V3 is connected, via output transformer T1, to loudspeaker SP1. Thus, the signal passing through the amplifier can be monitored aurally.



Front panel view of the Eico signal tracer shows the jacks and controls that give this instrument its great flexibility.

Thanks to a handy arrangement of jacks and switches, this audio amplifier circuit can be used as a utility amplifier for testing phonos, tape decks, etc.; to follow a signal through a radio receiver under test (as explained last month); or to substitute for various parts of a receiver thought to be defective.

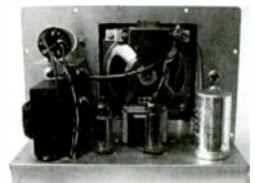
❖ Output Switching in the 147-A

Just for the heck of it, let's start at the end of the signal path and look at the amplifier's output stage. This is controlled by a four-position

switch (S2A and S2B) labeled AC OFF/TEST OUT. XFMR, TRACE, TEST AMPL./TEST SPKR, and WATTMETER. With the switch in TRACE position, signals pass through the unit as in a normal audio amplifier and are heard in the loudspeaker.

Now suppose you want to use the instrument as a test speaker. The speaker is available at jacks J7 and J8. To use it independently of the amplifier, move the switch to the TEST AMPL./TEST SPKR position, which disconnects the speaker from the built-in output transformer.

This switch position also disconnects the top of the output transformer secondary from the speaker and makes it available at jack J9. Thus, the output of the amplifier is now available, minus the speaker, between jacks J9 and ground (J8). Now the unit can be used as a test amplifier. With an appropriate input signal, the output could be fed (for example) into a suspect speaker to check its sound reproduction.



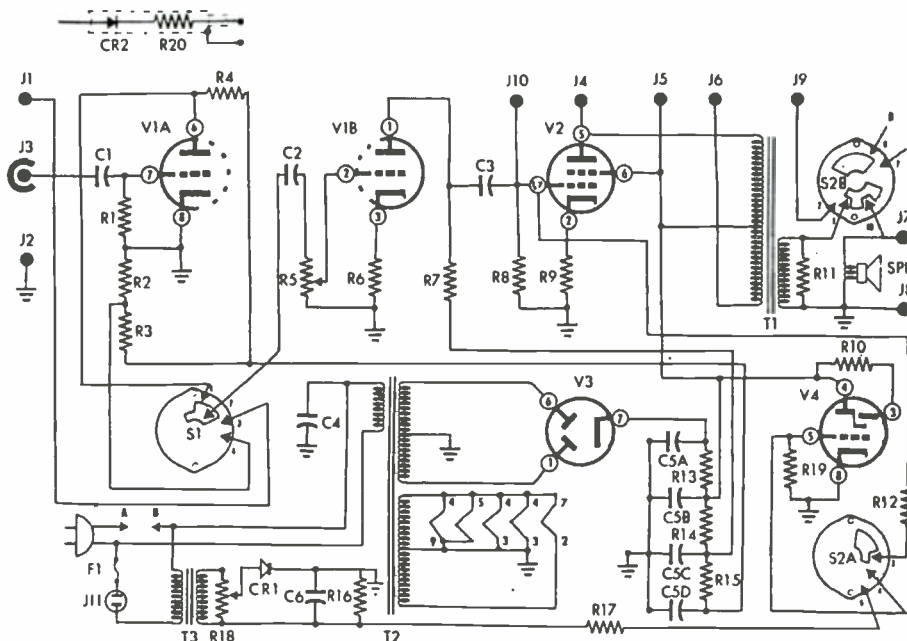
The Eico designers weren't exactly trying to conserve space when laying out the chassis of the 147A.

The switch marked AC OFF/TEST OUT. XFMR, is the on-off switch for the unit. In this position, the 147-A is shut off, which removes B-plus from the primary of the output transformer, making it safe to connect to a radio in place of an output transformer suspected of being defective. For a radio with a single-ended output, use jacks J4 and J5. But note that the transformer is center-tapped so that it can be used for radios with push-pull outputs. In such cases, use jacks J4, J5 and J6.

In the WATTMETER position, the eye tube is connected so that it can be used to find the power drain of a receiver plugged into the front panel of the signal tracer. Some people find that this is a useful diagnostic tool. We'll give it a try later.

❖ Input Circuitry

So now let's take a look at how to inject an r.f. test signal into the input of the 147A. An Amphenol-style mic connector on the front panel (J3), labeled RF INPUT, is wired to the grid of the first stage (V1A) via d.c. blocking capacitor C1. This connector accepts the output of a demodulator test probe.



Schematic diagram of the Eico 147A. See text for details.

I didn't receive the probe with the instrument (as is often the case with instrumentation purchased at flea markets) and will have to construct one. For the hookup of this probe, look just above V1A on the schematic. Note that it includes CR2, a 1N48 rectifier diode, to demodulate, or extract, the audio component of the r.f. signal from the radio under test.

With the input switch set at RF, the grid of V1B is connected to the plate of V1A via gain control R5 and blocking capacitor C2. The audio picked up at J3 is thus amplified by all three stages of the instrument and can be heard in the built-in speaker (if the output switch is set to TRACE). At the same time, its level can be estimated by the indication on the eye tube.

For evaluating an audio signal after it has been demodulated within the receiver under test (sampled at any point after the detector stage), a set of ordinary test leads is plugged into the AUDIO INPUT jacks (J1 and J2) and the input switch is set to AUDIO. With the switch in that position, blocking capacitor C2 is disconnected from the plate of V1A and connected to jack J1.

The reason for bypassing V1A in this way is that the demodulated audio signal does need as much amplification as the r.f. signal produced by earlier stages of the receiver. As before, the audio signal can be heard in the built-in speaker (if the output switch is set to TRACE) and its level can be estimated by the indication on the eye tube.

The input switch has a third position, NOISE. This activates a very useful function that will help isolate faulty components, cold solder joints, and other intermittent connections. With the switch in the NOISE position, approximately 130 volts of d.c. is applied to the AUDIO INPUT jack (J1). With the probe from jack J2 grounded to the chassis of the radio under test (which is unplugged for this procedure), the probe from J1 is touched to the suspected circuit point of the radio.

The d.c. on J1 will trigger otherwise intermittent noise that might be generated by a defective component or poor connection. Any noise picked up at the J1 probe will be amplified and heard in the speaker. If only a single sharp click is heard, then there is probably no noise source between the circuit point and the B plus line.

However, if a frying, hissing, or similar sound is heard, you have a noise problem to be investigated. Keep moving the probe, connection by connection, closer to the B plus line. When the noise stops, you have just passed the defective component or connection.

❖ How the IT-12 Compares

The Heathkit IT-12 Signal Tracer is built for compactness. It is an inch shorter and less than half the width of the Eico 147-A. Though, electronically, it is practically a clone of the Eico, its compactness is achieved by careful attention to physical design, the use of a much smaller speaker and elimination of some features. Through simplifying the switching circuits, a couple of miniature slide switches do the job of the rotary switches in the 147A.

Since my space is at a premium, I won't show the schematic of the IT-12. However, it is easy to describe the few ways in which it differs from the 147A. Both units are transformer-powered, but the IT-12's power supply uses a half-wave silicon rectifier instead of the full-wave vacuum tube rectifier in the 147A—and it is engineered to run on a much smaller plate voltage (130 VS 270-300). There is no wattmeter function.

The IT-12 is also minus the VTVM/scope jack that is available on the 147-A. And though jacks and switching are provided so that the internal speaker can be used as a test speaker, there is no provision for use of the IT-12 to be used, minus its speaker, as a test amplifier.

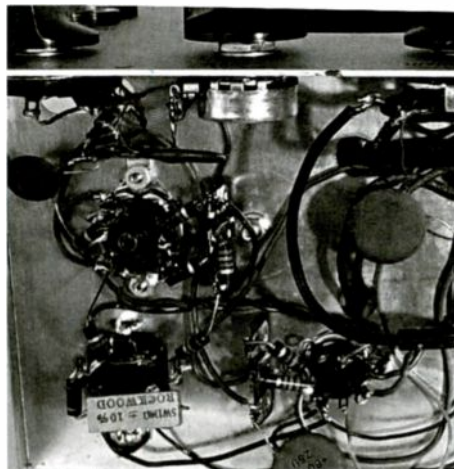
The output transformer, however, can be broken out of the circuit for use in substitution. And, as in the 147-A, it is center-tapped so that it can be used both with single- and double-ended receiver outputs. The IT-12 also has a noise test feature similar to that in the 147A.

As far as the input circuits are concerned, the instrument has only one probe connection instead of the two on the 147-A. A dual-purpose probe is used. It has a slide switch that cuts out the demodulator circuit used for r.f. when a "straight-through" probe for audio use is needed.

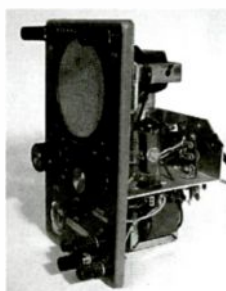
There is no provision for bypassing the first stage of amplification for audio testing. The level control is relied upon to reduce the audio gain so the amplifier won't "choke" on the signal.

❖ Looking inside the Instruments

When I opened up the cases of the two instruments, I realized that I would have little or



Under-chassis view of the Eico unit shows careful construction of the original kit builder. Note use of ceramic rather than paper capacitors.



A smaller speaker, careful mechanical design and concentration on basic features gives the Heath IT-12 a very diminutive footprint.

no restoration work to do. That is mainly because neither unit contained the paper capacitors that I always change out wholesale and on sight. Instead, both use the much more reliable disc ceramics.

Both units were much newer than any equipment worked on previously in this column (the IT-12 had a scratched-on 1972 date inside its case). They were very clean and seem to have suffered little from the ravages of time. Of course being Eico and Heath units, both were kit-built. But both had been built meticulously by owners who obviously really cared about doing a good job.

After checking all tubes and treating switches and pots with contact cleaner, I decided to power the units up. However, because both instruments still had their original power-supply electrolytics, I couldn't just plug in and switch on. Electrolytic capacitors that have been long disused need to be "reformed"—that, is powered-up slowly to give their chemical insulation layers a chance to build up again.

I have a little tapped-primary isolation transformer that I use for this. It produces secondary voltages of 70, 90 and 110. I used it to start up each of my two signal tracers, lingering for awhile on each tap while monitoring B plus to make sure that voltage was rising appropriately. Finally, I plugged each unit directly into the a.c. line. Both instruments responded very well, their eye tubes glowing brightly under full voltage.

See you next time, when we'll try out both instruments.

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“Bugs” 2 “Boards”

By Carl Herbert AA2JZ

Prior to the advent of circuit boards, products were hand wired and soldered. Circuit boards were the answer to lowering labor costs on the assembly line, and they work well for amateurs, too. Here's a project that will be an addition to your shop that won't cost a fortune and is easy to build.

Imitating the clean appearance of commercially manufactured radios is the goal of many builders. Building amateur radio “gear” has always been a great source of enjoyment for me. Creating equipment, whether of your own design or another's, can be a very rewarding experience. Sure, it may require gaining some new knowledge, but we are capable of learning more, I'm sure. I've yet to meet the builder who could resist assembling more gear.

Contrary to what you might think, circuit boards, with their gleaming copper lines etched to carry signals from place to place, aren't extremely difficult to create. There is more than one method of creating the circuit from a copper-coated board, but the most common involves exposing the board, covered by a negative image of your circuit, to ultraviolet light.

WARNING

Exposure to ultraviolet light can be harmful to your eyes and skin.

The manufacturer of the tube I used claimed “proprietary information” when I requested technical information about the wavelength of the ultraviolet light created. Treat the source as a potentially harmful ultraviolet source to be safe.

Wanting to have the capability to make my own circuit boards using this method, I read many articles about the process. One article, in which the author used a “germicidal” fluorescent tube for exposure, particularly interested me. This type of tube was available, but the cost was beyond what I wanted to spend. Another article told of using the fluorescent tube from a “bug zapper” for the same purpose! (It seems that insects have the capability to see ultraviolet light.) Now *that* appeared to be an easy answer to the problem!

❖ Shopping for Parts

At a local garage sale, I found a used “zapper” for a couple of dollars. The seller plugged it in for me to prove that it still worked, and I was off to my shop to begin the building process.

Disassembling the unit wasn't much of a chore. There were a few screws holding the exterior decorative work and four more holding the metal base plate to the top housing on the inside. I carefully cleaned the tube and its mounting plate containing a transformer, and put them away for safe storage. The tube measures 12 inches overall; therefore, I would need a suitable metal box for the project.

The enclosure I used was a “hamfest” find for a dollar, and it measures 12”W x 9”H x 10”D. Its original purpose in life was a housing for data networking devices. The rear panel was filled with holes for cable connections, and the top and bottom were perforated for ventilation. The first requirement then was to line the interior of the box with aluminum flashing. This will protect the operator (me!) from exposure to UV, and direct the UV towards the board to be exposed.

Now for the second problem – the length of the tube is almost exactly the same as the interior measurement of the box! This problem was easily solved by cutting a hole in the side of the box for the socket and wiring. Photograph A shows the location of the electrical end of the tube.

After some careful thought, the metal mounting plate for the tube was cut to about 3” by 4”, with the mounting hole for the tube socket in the middle. By so doing, I wouldn't be

required to create another mounting hole for the socket. (See Drawing A)

The rear surface of a single gang *solid* electrical box was drilled out to match the hole in the side of the box for the tube socket and wiring. *Don't overcut the hole in the box.* Make it large enough to allow the socket to clear the side metal of the box, but not so large as to be bigger than the rear surface of the electrical box.

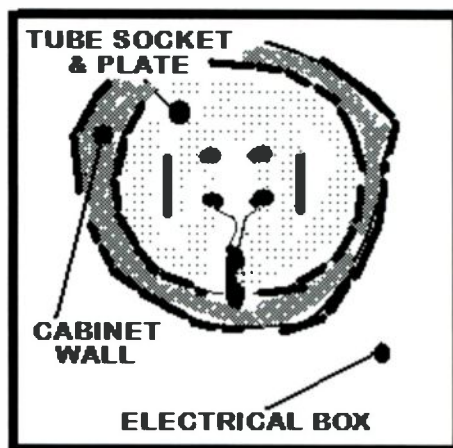
Don't forget to keep the *mounting holes* for the electrical box intact, or you'll be drilling new ones. I mounted the socket and plate to the interior of the box using the same screws and nuts for mounting the electrical box.

Be careful not to damage the wiring for the neon device attached to the socket. It is needed for the operation of the unit. The leads on my unit were welded to the socket – breaking them would have been a disaster!

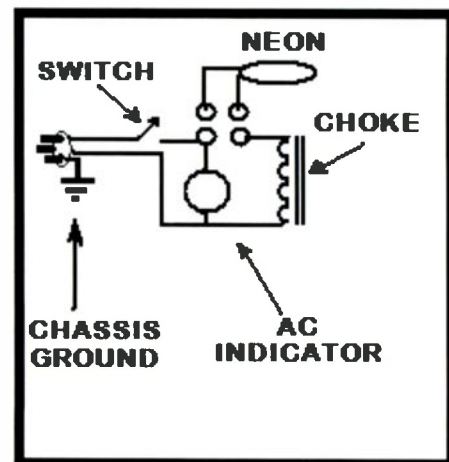
The choke (transformer) found its place in the rear uppermost corner of the box. Wiring from the choke to the electrical box is via another small hole adjacent to the socket. I used a rubber grommet to protect the choke wiring from the sharp metal edges of the cabinet and electrical box.

Photograph A also has “wire hanger” annotated on it. There is a screw with a wire attached to it. The wire supports the end of the tube. Perhaps the tube would never release from the socket, but the original device had the end of the tube forced into a foam pad for support. The wire (paperclip) provides just enough support to keep the tube in position.

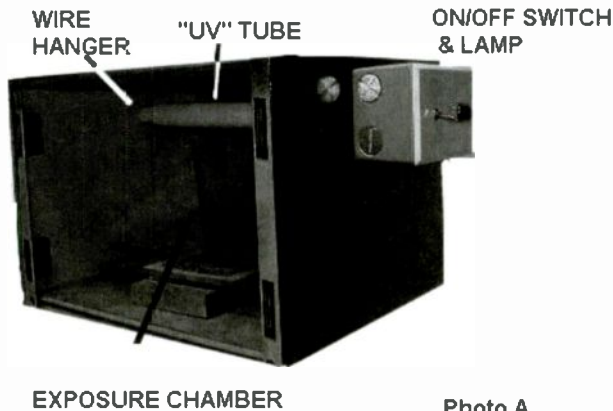
Wiring the unit is easy. The cover plate for the electrical box has an 115AC rated on/off switch and a 115 VAC neon indicator. When



Drawing A, hole arrangement thru cabinet, mounting bracket and electrical box rear wall.



Wiring Schematic



all is not well, unplug the unit and check your wiring again. If you think you've done well but it still doesn't work, reverse the leads from the tube.

The actual process of burning circuit boards and information on the required chemicals are described on the web at a number of sources, such as <http://www.thinktinker.com/stack/volumes/volvi/filmimag.htm> or <http://www.reprise.com/host/circuits/ecb.asp> and <http://www.el-exp.com> (Electronics Express catalog). Books such as the

ARRL Handbook (Chapter 8, 2005 edition) also describe the process in detail.

The rest of my set-up is also shown in the photograph – my "mounting table" (a block of wood), soft tipped small clamps, and two sheets of plain glass for holding the negative image and coated circuit board firmly together. It's important to use clamps or rubber bands to hold the glass assembly tight to prevent ultraviolet from "seeping" under the edges of the negative. The block of wood keeps the glass level and raises it closer to the light for greater penetration.

I used a wind-up kitchen timer for exposure times. The local home improvement store has spring wound timers with electrical contacts

which could easily be incorporated into this project. The cost, however, was in the twenty dollar range. The wimpy "ding" of my kitchen timer has been adequate for my purposes.

Making my own circuit boards has been a blast! Using an ultraviolet source and coated boards enables me to make circuit boards with fine traces that are close together. Other processes I've tried were adequate, but don't compare to the quality achieved using this process.

Total cost of this project was under twenty dollars:

| | |
|----------------------|----------|
| Garage sale "zapper" | \$2 |
| Hamfest enclosure | \$2 |
| Electrical box | \$4 |
| Switch and neon | Junk box |
| Aluminum flashing | \$6 |

Your costs could vary, depending upon availability of parts. Since I built mine, I've wondered if a discarded small microwave oven wouldn't have made a good case. It has a door with a safety switch, the "innards" could be stripped to fill the "junk box," and your initial investment would be "recycled" to another use!

This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

the switch is in the "on" position, the lamp glows; when in the off position, the lamp is extinguished. The wiring schematic shows how minimal the circuitry is for this project.

Just be careful that the socket and wiring have ample clearance from the switch and indicator, and that the hole for the socket isn't too small for safe clearance. Don't forget a chassis ground connection and a "strain relief" for the AC cord.

❖ Testing, Testing...

A second check of the wiring and it's time for the "smoke" test! If all is well, a soft blue flickering light from the tube will be apparent. If

Photo A

Herding Those Rechargeable Batteries

By Alan Bosch/KO4ALA

If you are a ham and/or SWL, you probably have accumulated a good number of rechargeable AAs – nicads, nickel metal hydrides, even some lithium ions – in capacities from 450 mAH up to over 2000. Not only do they just love to roll around your work-bench or fall off into awkward places, the older you get the harder it is to remember which ones are charged up.

Well, the revolution is at hand and the mechanism is quite simple: rifle cartridge loading blocks.

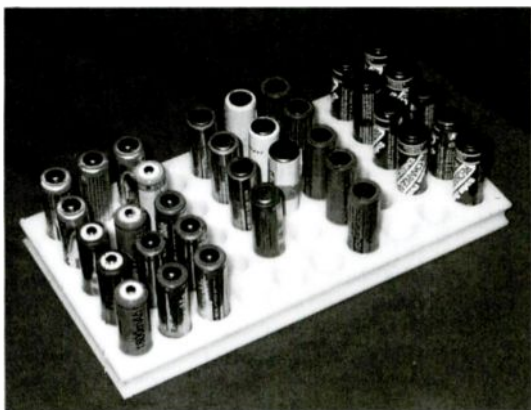
They are exactly what they sound like: 4x8x1-inch-thick blocks of wood or plastic, typically with 50 holes, which shooting hobbyists use when reloading ammunition. The trick is to get the block in a caliber with a head-diameter at that will accept the various AA cells, which vary a smidge at 1/2 inch and above.

Those for classic cartridges like the .30/30 Winchester, .30-06 Springfield, and .303 Enfield come out just right – neither snug nor sloppy.

With so many holes, you can easily sort the cells by type and capacity, charged (button up) and discharged (button down), and even usage.

Prices range between about five and fifteen dollars, depending on material and finish. Cabela's <http://www.cabelas.com> and Buffalo Arms <http://www.buffaloarms.com> are two sources.

So, go get a loading block (sometimes called a loading tray) and simplify your life.



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- ♦ SWL IR Remote for Lowe HF-150, HF-225. \$79.95
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AVCOM PSA-37XP Spectrum Analyzer

By Bob Grove W8JHD

Next to a good receiver, a spectrum analyzer is the most valuable piece of test equipment that a serious monitor of the radio spectrum can own. While a receiver or scanner can monitor a single frequency, and a spectrum display unit (SDU) can reveal activity within a limited band of frequencies, only a spectrum analyzer can simultaneously provide a visual display of a broad spectrum of frequencies, instantly alerting the user to activity anywhere within its set limits.

While it's true that some new, stand-alone, wide-frequency-coverage receivers also have a "band scope" to visually reveal signals within a small chunk of spectrum, they sweep so slowly through their span that many on-off signals are missed.

Over the years, many manufacturers have produced spectrum analyzers – Tektronix, HP, Rohde and Schwarz, Advantest, B&K, Marconi, IFR and many other brands are familiar to the electronics technician. AVCOM of Virginia occupies a niche of its own, specializing in high-performance, low cost spectrum analyzers, making them particularly attractive to both the hobby radio market as well as professional

businesses and agencies operating on a limited budget.

❖ Spectrum Analyzers and Oscilloscopes

So how is a spectrum analyzer different from an oscilloscope? The oscilloscope operates in the "time domain" – Simply put, the left hand side of the trace on an oscilloscope is the beginning of a time interval for a specific frequency, and the right hand side is the end of that interval. The display reveals what went on during the period.

A spectrum analyzer, on the other hand, operates in the "frequency domain" – as it paints its picture from left to right, it is sweeping from a designated lowest frequency to a designated highest frequency in a span of spectrum, revealing with its trace the activity it finds during its sweep.

By narrowing the span to zero, we can home in on a specific frequency, analyzing its contents like we would do with an oscilloscope. Thus, the spectrum analyzer can function in both the time domain and in the frequency domain.

But except for a limited number of top-end spectrum analyzers, they can't be used as receivers because they don't have multimode audio detection – you can see the signal as a spike on the screen, but you can't hear it. And even among those spectrum analyzers that have audio detection, you can't simultaneously see the wide spectrum and listen to a signal.

❖ So Who Needs One?

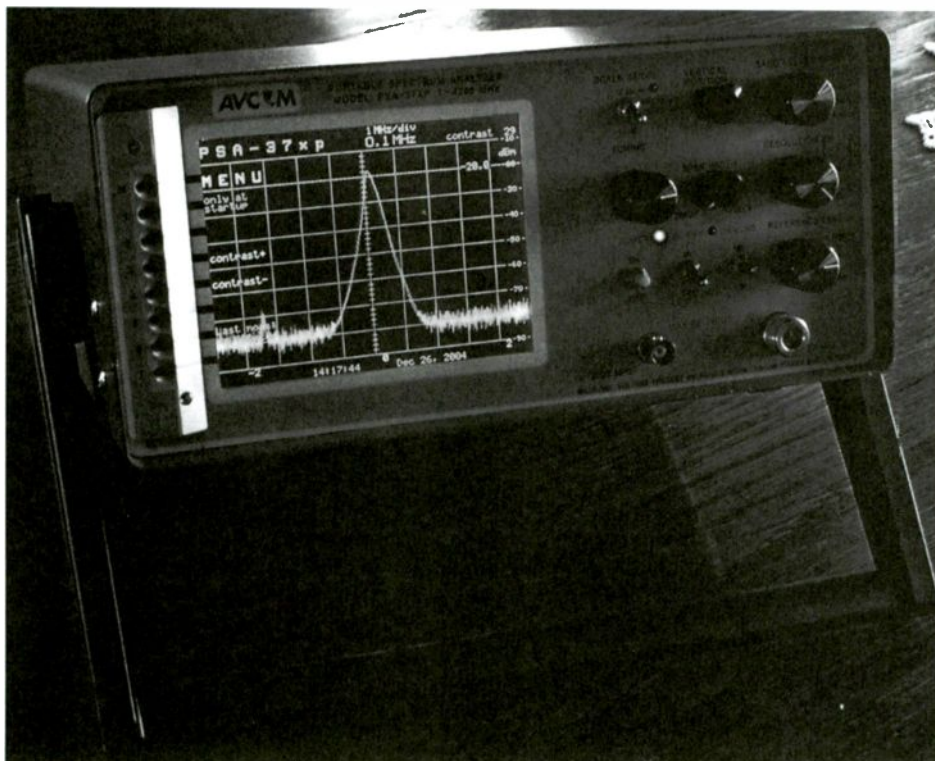
The spectrum analyzer proves itself invaluable to many sectors, to name a few: surveillance countermeasures detecting radio-frequency "bugs"; analyzing electronic prototypes for unwanted signal radiation; spectrum profiling for cell sites and communications complexes; antenna evaluation; calibrating and adjusting the radio-frequency circuitry; measuring signal levels and possible interference for wireless computer installations; aligning satellite earth station dishes; optimizing RF systems for signal-to-noise performance; viewing, locating, and identifying radio-frequency interference; and monitoring the radio spectrum for signal detection and propagation characteristics.

For wide-frequency-coverage applications, the user must select a spectrum analyzer that not only covers the amount of spectrum necessary, but which has the functions required to make necessary measurements. Let's take a look at one instrument that may qualify for the "Biggest Bang for the Buck" award.

❖ AVCOM's PSA-37XP

This recent release from AVCOM of Virginia has a lot going for it. As with most spectrum analyzers, it doesn't have audio recovery, but it does have everything else needed by the majority of technicians and frequency specialists, and it's perfectly suited for portable and mobile applications. The AVCOM PSA-37XP is compact (13.5"W x 5.25"H x 13"D), lightweight (10 lbs.), internal battery or externally powered, loaded with features, and has a high-definition, 5-1/4" diagonal, LCD screen for fast response and extended battery life.

Continuous frequency coverage from 1-4200 MHz (4.2 GHz) in four overlapping bands may be shown in spans of up to at least 500 MHz, or narrowed down to distinguish closely-spaced signals. Frequency range may be increased to 6000 MHz (6 GHz) with the use of an optional AVCOM MFC-4060-37



MHz microwave frequency extender.

Reference levels (sensitivity) of -40, -20 and 0 dBm are switch-selectable.

An amplitude accuracy of 2 dB is typical, with an on-screen dynamic range exceeding 65 dB.

The center, beginning and ending frequencies for any selected span are displayed on screen, with the center frequency accurate to within 100 kHz. Resolution band width (RBW - selectivity) is selectable from 75 kHz, 300 kHz, 1 MHz and 3 MHz.

While the sweep is fast enough to capture fast-burst transmissions, it's not fast enough, nor is the RBW narrow enough, to see the modulation on the skirts of the signal spike.

The agile, high-contrast, 1/4 VGA LCD is back-lit for night viewing, and shows brilliant contrast in full sunlight. The display offers user-selectable viewing choices like reverse video (white on black vs. black on white), contrast ratio, amplitude units (dBm or dBmV), sweep reversal (high/low frequencies right or left), persistence (display hold), signal peak indicator, graticules (latitude/longitude lines) on/off, signal marker, multiple trace memories, time/date display, signal alarm and more.

For satellite TV installers, toggle switches enable the BNC and N input connector to be "hot" with +13 or +18 VDC for use with an LNA or LNB; a switchable 22 kHz filter is included.

Approximately two hours of portable operation is supported by an internal lithium-ion battery; an optional second battery may be installed, extending the line-free operation. An AC power supply (included) acts

as a charger as well as powering the unit for test-bench applications.

The unit's rugged, aluminum enclosure and multi-functional bail-tilt handle invite carry-along trips where it might be needed. An optional Cordura nylon case with accessory pockets may be ordered for extra protection and convenience.

Computer Control

A standard DB-9 serial port is provided on the rear apron of the PSA-37XP accepts a simple serial command set to interface with a computer.

The Bottom Line

Our test unit performed flawlessly, provid-

ing reliable indications of local and shortwave broadcasters, two-way VHF and UHF transmitters, 2.4 GHz wireless computer links, and more. While a rudimentary instruction manual is provided, the simple layout of the control panel invites immediate, intuitive operation.

The wide frequency coverage, easy operation, versatility, portability and reasonable cost of the AVCOM PSA-37XP make it an excellent choice for the majority of technical applications requiring an RF spectrum analyzer.

The AVCOM PSA-37XP with 12V cigarette plug cord, universal 85-265 VAC power supply/charger, lithium-ion battery, and basic instruction manual are available from Grove Enterprises (1-800-438-8155; <http://www.grove-ent.com>) for \$3795 plus shipping.

News from Winterfest

Banquet speaker at the 2005 SWL Winter SWL Festival in March was Frans Vossen of Radio Vlaanderen Internationaal. Unfortunately Frans' voice will be disappearing from the airwaves as RVI itself loses languages and cuts services.

Sadly, it is a trend that is occurring throughout Europe. On March 4, Kim Andrew Elliott interviewed Wim Jansen, station manager of RVI Flemish World Radio and Juhani Niinistö, head of YLE Radio Finland, about reductions in European shortwave broadcasting. The interview gives further background information on Frans' subject. To close the evening on an up beat, the staff and management of the 'fest have announced the 19th 'fest is scheduled for March 3 and 4, 2006, and the big number 20 - two decades - will be on March 9 and 20, 2007! Check the Web site <http://swlfest.com/>

- Tom Sundstrom, W2XQ, Baudwalking



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The Icom IC-746PRO as a Communications Receiver?

By Jim Clarke, NR2G

In a recent telephone conversation, the gentleman I was talking with suggested that there are a number of people who have purchased amateur radios with no intention of using anything other than the receiver. My initial reaction was to disagree, but I guess I had just never thought about that possibility. I mean, why would you buy a transceiver – the contraction of transmitter and receiver – with no intention of transmitting?

His contention was that the transceivers today are providing generous feature-sets, excellent quality, and at such a relatively low price, that you might actually get receive-features on the amateur rig that you wouldn't on a comparatively priced dedicated receiver. In light of that conversation, this month I'll take a look at an amateur radio that may very well support his contention.

The Icom 746PRO is a tabletop HF/VHF all-mode transceiver and is, according to Icom, an improved version of the 746, incorporating many of the suggestions they received from its users. Its receiver covers 30 kHz to 60 MHz, and 108 MHz to 174 MHz. The transmitter covers all amateur bands from 160 through 2 meters and includes an internal antenna tuner. As it does not have a built-in power supply, some source of 12 Vdc, power supply, or adequately rated battery, is necessary to operate the radio.

❖ Ergonomics

At about 5"H x 11"W x 12"L, the 746PRO is not very large; I thought the front panel was a bit cramped for a tabletop radio. Perhaps that's just my history with "large real estate" vacuum tube radio front panels talking. The LCD display, on the other hand, at 2.5"H x 3.5"W, is very generous in size. All information on the display is easy to read and logically grouped. It has a lighted whitish background with the displayed information in black. Frequency display resolution is selectable at either 10 or 1 Hz; I personally like the 1 Hz position.

Many of the front-panel buttons are multi-function, and at first, this seemed to be a hassle. But, once I learned the methodology, I

found it a rather clever way to condense as many as four functions into one button. For instance, pressing a button will toggle between two predetermined settings, but, if you hold the button down for one second, you are given the opportunity to modify the setting that is currently selected. Once changed, that now becomes one of the toggled settings.

Most of the other functions not configured using the one-second-hold method, are covered by a series of function keys corresponding to a menu displayed at the bottom of the screen. The contents of that menu changes, depending on the operating mode you have selected. Even the menu button has a group of second functions accessed using the one-second-hold method. This second menu allows customization of the more static system-level settings, such as the display's backlight and contrast.

The tuning knob is large and has a front-panel-accessible brake adjustment to achieve whatever rotational resistance is desired. The tuning knob has an independent rotating fingertip cup that provides smooth rotation at fast or slow speeds. The volume and tuning knobs are located on opposite sides of the display, allowing two-handed operation while tuning your favorite portion of the receive range without arm contortion or visually obstructing the display.

One feature that I really appreciated is audio tone control. The 746PRO allows you to set the bass and treble of the receive audio, something I'm not used to. This gives you the ability to compensate, to a degree, for a wide range of speakers. Yet, even with the ability to contour the audio, I still consider the internal speaker to be strictly utilitarian. An external speaker is a must to realize the

full sound potential of virtually any communications receiver.

❖ Keypad Tuning

The 746's keypad entry system is definitely designed with the ham radio operator in mind. The keys are marked with an amateur band frequency on the left, in white, and a number from 0 to 9 on the right, in green. Each key's primary function is to immediately change the operating frequency to the corresponding amateur band.

To enter a frequency instead of an amateur band, a key, separate from the numeric pad, must be pressed first. While I'm sure this works well for hams, I found myself repeatedly hitting one of the numeric keys in an attempt to enter a frequency, only to end up in the 40 meter band.

❖ IF Filtering

Your first line of defense against adjacent channel interference is IF filtering. If the filters are too wide, transmissions adjacent to your listening frequency can virtually eliminate your ability hear the desired signal. If they are too narrow, the audio fidelity is so poor that, although you have eliminated adjacent channel interference, you cannot understand the desired signal. The IF of the 746PRO uses 32bit Digital Signal Processing (DSP), which has provisions for the operator to modify, at least somewhat, the configuration of the radio's IF. Out of the box, each mode has three preprogrammed bandwidths and an associated shape. The shape of the filter is a reference to how sharp the filter's skirts are. Typically, the steeper the skirts, the better the filter.

In CW, SSB, and RTTY, it is possible to modify not only each of the default widths and shifts, but also the shape. Width adjustments are 50 to 500 Hz in 50 Hz steps for CW, 600 to 3600 Hz in 100 Hz steps for SSB, and 50 to 500 Hz in 50 Hz steps, plus 600 to 2700 Hz in 100 Hz steps for RTTY. Filter shape is either sharp or narrow, and when selected, it applies to all three filter widths for that particular mode. At any time, while in receive, the



Photo Courtesy of www.RigPix.com

bandwidth and shift can be adjusted using the concentric Twin PBT knobs. Each of the two knobs, moved independently, can tailor the upper and/or lower cutoff frequency. If turned together, the entire passband is shifted up or down in frequency. As the IF is adjusted, there is a graphic on the LCD display to indicate the current configuration.

In FM, and unfortunately also in AM, it is not possible to modify these preprogrammed bandwidths, or shapes. The fixed widths for AM are 9, 6, and 3 kHz, with 15, 10 and 7 kHz for FM. Also, now only the inner Twin PBT knob is active, acting as an IF shift.

For all modes, returning to the preset default bandwidth and shift is as easy as the one-second-hold of a button.

❖ Auto-Tune/Manual-Tune Notch

Here's a feature I really like. I do a fair amount of shortwave broadcast listening, and even with the flexibility of the IF, it's sometimes necessary to eliminate a heterodyne or two. Not only can the 746PRO automatically notch out one signal, but it can do so to three or more signals, and actually track them if they move in frequency. Or, if you prefer, you can manually tune the notch for a single interfering signal. I've used the notch in both modes and found them to work beautifully.

❖ Multiple Antennas

If you're like me, you usually have at least two antennas for HF, one vertical and one horizontal. It's nice to be able to switch between the two depending on various conditions. The 746PRO has two antenna connections for HF and 6 meters, and one dedicated to 2 meters, all accessible on the back panel. Selection is made via a button on the front panel.

❖ Noise Reduction and Blanking

Icom includes two features to combat noise: a noise reducer, and noise blanker. The blanker is intended for pulse type noise, and the reducer is for hiss type noise. While these features would seem to be quite useful, I have to admit I never found a case where they really did anything. I don't think they are useless; I apparently just didn't have the type of noise they were designed for.

❖ Voice-Activated Squelch

Not only does the 746PRO come equipped with a signal-level squelch, but

Table 1. Receive Sensitivity (10 dB (S+N)/N)

| Freq. MHz | Pub NP | Meas NP | Pub P1 | Meas P1 | Pub P2 | Meas P2 |
|-----------|--------|--------------|--------------|--------------|--------------|--------------|
| 0.400 | ND | 1.2 μ V | NA | NA | NA | NA |
| 1.000 | ND | 2.0 μ V | NA | NA | NA | NA |
| 3.000 | ND | 0.36 μ V | 0.16 μ V | 0.13 μ V | NA | 0.09 μ V |
| 6.000 | ND | 0.31 μ V | 0.16 μ V | 0.13 μ V | NA | 0.09 μ V |
| 12.000 | ND | 0.33 μ V | 0.16 μ V | 0.15 μ V | NA | 0.10 μ V |
| 18.000 | ND | 0.33 μ V | 0.16 μ V | 0.15 μ V | NA | 0.10 μ V |
| 29.990 | ND | 0.36 μ V | 0.16 μ V | 0.18 μ V | NA | 0.10 μ V |
| 54.000 | ND | 0.56 μ V | ND | 0.22 μ V | 0.13 μ V | 0.14 μ V |
| 144.000 | ND | 0.24 μ V | ND | NA | 0.11 μ V | 0.12 μ V |

Pub = Published
 Meas = Measured
 P1 = PreAmp 1
 P2 = PreAmp 2
 NP = No PreAmp
 ND = No Data
 NA = Not Available

also a voice-activated squelch. I was first exposed to this type of squelch almost twenty years ago while working at a former employer. I would imagine it works the same today as it did yesterday, except today it's done in software instead of hardware.

When we did it in hardware, we split the receive audio into two separate bands using filters. If the receive audio is noise, the output from each filter will be about the same; however, if it is speech, the output from each will vary at a particular rate. Using those outputs, you open the squelch if the outputs vary, and close it if they are equal. That's a rather simplified explanation, but I think you get the idea.

Having that capability now allows you to not only squelch out background noise, but also block audio to the speaker unless it satisfies the previously explained requirements.

❖ Receiver Preamplifiers

There are three preamp settings in the 746PRO: two different levels of preamplification for 1.8 - 60 MHz, and one for the 108 - 174 MHz band. I found the sensitivity to be adequate without the preamp, but did find instances where the preamp was actually able to transform a marginal signal into a usable one. For sensitivity measurements, with and without the preamp, see Table 1.

❖ Other Features

Unfortunately, space limits me from highlighting all of the receive features, such as scanning, memories, computer-control, and display of decoded RTTY signals, among others.

❖ How Does It Play?

As we all know, "the proof is in the pudding," so I hooked up my 200-foot end-fed longwire and proceeded to make the rounds. I stopped just long enough in each shortwave broadcast band to see if I could find a receive situation that would require multiple features to render the desired signal readable. In one case - of which I didn't

note the frequency or station ID - the desired signal was completely unreadable and, at times, undetectable. With the combination of the notch and IF-shifted narrow filter, the 746PRO had no problem pulling the signal up out of the mud.

To me, that's the bottom line. A radio can have all kinds of bells and whistles, but if it doesn't deliver you a readable signal from one that is otherwise unreadable, it is a waste of time, money, and front-panel real estate.

❖ Final Thoughts

Suggested retail is \$2265.33, but the usual street price is around \$1750. With Icom's current \$200 coupon offer, that brings it down around \$1550.

Suffice it to say, the 746PRO certainly provides a number of features that are not common on many communications receivers. I thoroughly enjoyed operating it for this review, and, in fact, didn't really want to send it back. This is truly a fine radio for the money!

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

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Old DOS Radio Programs – Still Useful?

Having been in the business longer than I care to remember, I have been involved in many technology development projects – from full-blown communications systems to systems-on-chip – from software to run a product, to software that *is* the product. I have managed, witnessed and participated in the huge human effort and sacrifice required to bring a new technology product to market.

During my career I have also worked in other non-technical industries. Therefore, I can say factually that people who have not worked in technology cannot imagine the level of dedication, effort and sacrifice that goes into many revolutionary technical product developments. It would surprise most people if they knew the hundreds or thousands of “people hours” that goes into such a technical development. Many times this is at the expense of personal and family life. Yet, it is a sad fact that after all this personal effort and sacrifice, most technology products will be obsolete within eighteen months...if they make it at all!

Perhaps this is why it is so hard for me to throw out-dated tech products into the trash. But, lack of space and promoting domestic tranquility demands it. So, as I was emptying out boxes of software collected over the past twenty-five years, I had the feeling that I was discarding all the personal effort that had gone into these products. I looked at my hundreds of disks and CDs of all shapes and sizes, from many different computer systems, from many different PC operating systems, all heading for oblivion at the dump. What a waste of decades of human effort! Could there really be no value left in these vintage programs? These were the feelings that stimulated this month’s column.

Before pitching the 5.25 inch DOS radio program disks into the dumpster, I decided to give each of them one more try. Just reading the names brought back memories of another time when Scancat and SeanStar were the only receiver control and logging programs in the world! (As we walk down memory lane, please do me a favor: Hold your letters to MT telling them who really made the first logging program on their abacus or whose is the best. A product’s longevity and place in technology isn’t dependent upon who yells the loudest.)

The late 1980s/early 1990s was a time when very little hobby radio software was available. Military radio communications software was almost entering its third decade, but other markets did not see its usefulness. The early open-market radio software pioneers of this era had to have been visionaries, crazy, or both to develop products with

such little market demand.

These early programs were designed for operation on MS-DOS (Microsoft Disk Operating System). Let’s take a quick look at some and see if they still work on today’s Pentium computers running Windows 98.

Lots of Change

Computers and their operating systems have changed since many of these vintage radio programs were produced. In addition, the fragile storage 5.25-inch disk format has disappeared. My first task was finding and then installing a 5.25-inch disk drive in my 1GHz Pentium III running under Windows 98SE.

Finding the drive took a week. But installation via the BIOS screen was a few minutes. The drive had been idle for so long that the read head was stuck in one spot on its rails. After disassemble and a light application of petroleum jelly to the rails, the drive worked perfectly.

DOS in Windows?

Can a DOS program run under the Windows operating system? To answer this question a number of factors have to be considered. If the program was written using specific hardware address, say for an XT (remember those?), or a specific early DOS version, then it may be an insurmountable problem.

If, on the other hand, the problem is caused by the program not wanting to share resources with Windows or requiring specific entries in the *Autoexec.bat* or *Config.sys* files, then we may have a method to satisfy the program’s needs. The problems encountered may be simply solved or may be so complex that it’s not worth the effort. We will cover some of the simpler methods.

A useful key combo is “Alt” and “Enter” simultaneously. If a full screen DOS program freezes, you can sometimes bring Windows back by minimizing the DOS window with this keystroke.

Read! Read! READ!

First read the installation instructions that came with the program. You should also check the disk to see if there is a “Re-

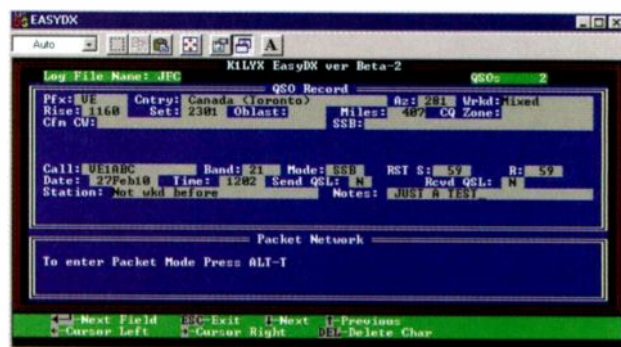


Figure 1 EasyDX circa 1988

adme” or “Read 1” file that might also give you installation and DOS requirement details. Carefully follow the installation instructions. If none are available, cross your fingers and try clicking on the main program file, usually ending in “exe”.

No luck? If this doesn’t work, copy all the files to a new folder on your hard drive and repeat the procedure. No joy? Then read on.

Approach 1 -KISS

Go to the Windows “Start” tab at the bottom left of your desktop screen. Choose “Programs” and then run “MS-DOS Prompt”. To make it quicker, I made a shortcut to the MS-DOS Prompt on my desktop. Once in DOS, if you can remember how, navigate to the folder and then type the program name.

Most of the radio programs we will look at later ran using this simple method. However, I found that following installation instructions exactly contributed greatly to success.

If this simple method does not work, then try Approach 2.

Approach 2 –Right Clicking

Start by finding the main program file in your installed or copied folder. Right click on

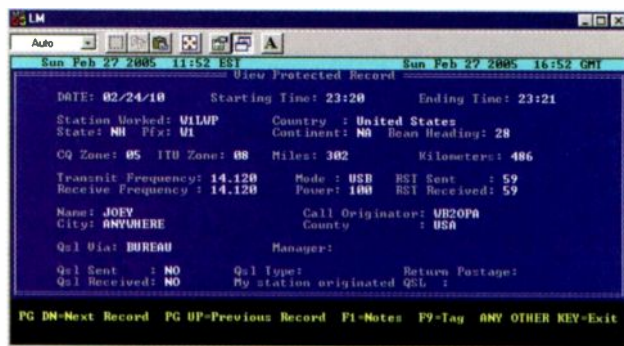


Figure 2 LogMaster – With lots of features and still very useful

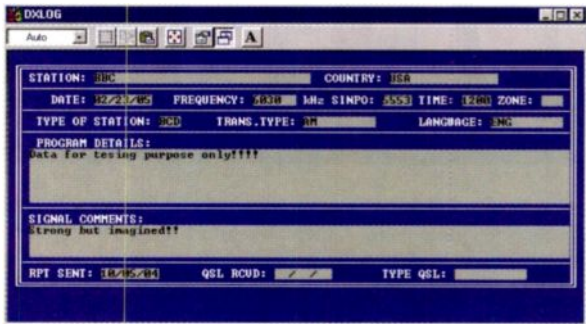


Figure 3 Shortwave DX Log – This one is a keeper for 21st century SWLers

this program to bring up a list. Then left click on "Properties" at the bottom of the list opening the program's properties window. Select the "Program" tab at the top left of the pop-up window.

Now left click on "Advanced" button near the bottom of the window. This will bring up yet another (now you know why it's called Windows) window, Advanced Program Settings.

The first two boxes at the top of this window can be selected together or separately. This yields three possible combinations (box 1 or box 2 or box 1 and 2). We will not use the third box for this approach. Select one of the three combinations. Then click "OK" then "Apply" on the next screen.

Now, try running the DOS program using the methods in Approach 1 (above). If the program does not work, repeat the procedure choosing the next box 1 and 2 combination until the program runs.

If no combination is successful, then go to the next approach below.

Approach 3 – Last Try

Using the method outlined in Approach 2, open the "Advance Programs Settings" window. However, this time click box 3, "MS-DOS mode". Choosing this box will force your system to reboot in the MS-DOS mode when you try running this DOS program.

Before you leave this window, take another look at the program's instructions. If the program requires special lines in the Autoexec.bat or Config.sys files, this is where we will enter them.

For example, the program may require that a line "Files=20" be added in the Config.sys file. After selecting MS-DOS Mode, select "Specify a new MS-DOS configuration". Then add the exact line requirements, as detailed in the program's instructions, into the appropriate box. Select-

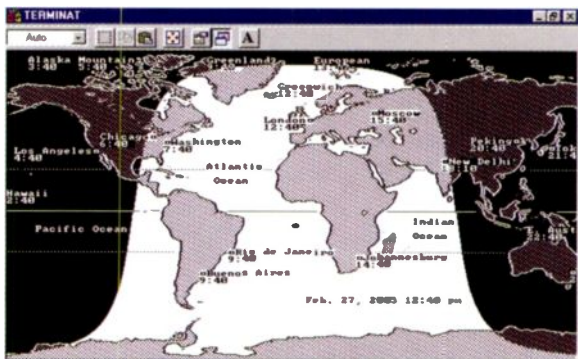


Figure 4 Terminat – A grey line program showing the terminator line separating the areas of the Earth in sunlight and darkness

ing "Configuration" will give you automatic choices that may fit the program's requirements. Check it against the program's instructions.

These new startup parameters will only be called on when a DOS program boots up your computer and should not effect the operation of your Windows-based programs. However, I can give you no guarantees. I do most of my radio work on a computer that is just for trying new programs. All of my important information is stored on another computer ...just in case.

When you are done, left click "OK" then "Apply". Now, with fingers crossed, try running the program.

Here are some of the programs, over twelve years old, that still worked and have value to radio monitors.

❖ DX-AID

Version 3.0 is dated 1991 and written by P. Oldfield. This is a simple but very useful propagation, distance, and bearing program. It provides simple maps and propagation forecasts. It even has a predicted sun spot number for the future. Of course, the chart starts in 1991 and ends in 1999! How quick the future becomes the past...

DX-AID runs best from the DOS prompt. The program is very well behaved and works just by left clicking *Dxaid.exe*. DX is good effort that still can be enjoyed and provides a useful function for SWLers.

❖ EasyDX

This logging program is dated 1988 by Glendon R. Whitehouse. Geared to hams, it automatically inserts country, bearing, and distance based on the "worked" ham call sign and the user's data. See Figure 1. It has TNC (terminal node controller) capabilities for interfacing to something like the AEA PK-232. It prints log sheets and labels for QSL cards. It's well behaved under Windows and easy to use.

❖ LogMaster

One of the brave, do-it-all radio originals dating from 1989 by WB2OPA. I tried Version 4.07 from 1991. Don't be fooled by its name – this program does a great job of logging but also does rig control of most ICOM radios, if you know the two-digit ICOM address. It also manages decoded data from a TNC. And the good news is that it operates flawlessly under Windows 98SE.

❖ Shortwave DX-LOG

It does just what it says. It is a great, simple shortwave logging program. The data can be presented on screen or to a printer in a number of different and useful formats. Shortwave DX-LOG was created in 1991, long before Windows 95 was released in its first bug-ridden form. However,

Shortwave DX-LOG runs smooth and fast under Windows 98SE just by clicking the *Dxlog.exe* file.

❖ SWL Logger

Here is another simple to use, but very useful program rescued from the trash! Written in 1991 by Charles A. Pitts, WB1CCF, version 1.1 does basic logging and data sorting. The log info is basic, including station, frequency, language, date, time and QSL info. As a member of the "one-click club," it works fast and is a pleasure to use under Windows 98SE.

❖ QSO Logging Facility

This 1991 logging program, written by Sanford R. Smith (WJ11) and Ross Rogers, has some nice features, such as automatic insertion of date and time. It has seventeen different fields of information in each record. The Comments section is a bit small with a maximum of 48 characters.

Beware. It has a problem if you input frequency data in megahertz or outside of the ham bands. A screen comes up to say that it must be in kHz and within certain ranges. But then the program crashes. I did not try to see if the problem existed under the boot-up DOS mode.

Except for this one problem, it runs well and gives an excellent screen presentation.

❖ Terminat

A fitting name to our last program this time, which dates back eighteen years to 1987. Just think of the changes that have taken place in the world and technology since this program was written! One thing that is still constant is the rotation and revolution of the earth. Good thing for Terminat, which gives an accurate, real-time, full screen monochrome display of the Earth showing the areas in sunlight and darkness.

Terminat gets its name from the line that divides the light from the dark regions. Only problem is that it thinks that the time on your computer clock is GMT. A quick change of the computer clock with a right click on the date at the lower right of your screen does the trick. Don't forget to reset it to local time or your file saved times will be off. Terminat is also a member of the "one click club."

❖ Next Time

As we have seen, of the hundreds of vintage program that I had, some deserve to live on in the software collection. The efforts of their creators was not wasted.

Next time, we'll try a few more vintage DOS programs, including some of the early big names. Many were rightfully grabbed from the teeth of destruction, and others deserved the big dumpster.

Try "Google-ing" some of the programs we looked at this month. You may find a newer Windows version now exists. Email me with your favorite radio oldie programs that still work under Windows (98 or XP). The program must be at least twelve years old to qualify for the title of "vintage"! Remember, *old* is not synonymous with *useless*. Till next time.

What's NEW

Tell them you saw it in *Monitoring Times*

Easy PSK

Joining in the fun on PSK is easier than ever using Saratoga Amateur Radio's new EZ-PSK USB transceiver to sound card interface, which puts rig control and digital mode operation into one box. The EZ-PSK USB utilizes the computer's USB port for the Push-to-Talk (PTT) function and to provide rig control.



The EZ-PSK works with all sound card applications and all digital modes. The EZ-PSK has no jumpers to set; simply plug it in, load your favorite software and begin to operate on digital modes. Using no external power makes it ideal for portable operation.

Versions are available for Icom, Yaesu and Kenwood transceivers. Ten-Tec is available on request. The EZ-PSK ships with a CD containing a selection of software.

The EZ-PSK USB has suggested retail price of \$75.95 and is widely available at ham radio stores including Ham Radio Outlet. For a dealer near you visit <http://www.saratogaham.com> or call 888-676-4426.

South Florida Guide

When I got my first programmable scanner (a Bearcat BC-210), I could punch in any frequency the scanner covered, instead of buying a crystal. When some hobbyists published a local scanner guide to the San Diego area, I had to have that book at any price. In my experience, scanners and local frequency guides always go hand in hand, and I've owned a lot of both since then!

Recently, we received the new 9th edition of the *South Florida Frequency and Trunking Guide* and the quality exceeds any of the old guides that I used many years ago. Published by noted scanner hobbyist Brian "Scanner Dude" Cathcart

KE4PMJ, this book contains just about anything you need to know about public safety radio systems in four southern Florida counties.

The *Guide's* primary coverage area includes all county and city agencies in Miami-Dade, Broward, Palm Beach and Martin counties. There are additional chapters detailing the current status of the State of Florida trunk system (including frequencies and trunk system IDs), the Florida Power and Light 900 MHz trunk system, and the three major airports in the area.

Detailed information on each of the agencies covered in this book includes receive and transmit frequencies, complete channel descriptions, CTCSS codes, FCC call signs, unit numbers, station locations, coverage maps and much more.

Chapter Seven is particularly useful with two cross-reference lists: a by-frequency list of all frequencies in the book and a useful list of all the trunk system identifications (talk-group IDs) organized by ID. The book wraps up with a chapter on Florida scanner law and a glossary of radio terms, lingo and acronyms commonly heard on the South Florida public safety airwaves.

Whether you are a resident of Southeast Florida or just a visitor, this book is what you need to completely monitor public safety systems in the area. The *Guide* is available in either printed or CD-ROM format. The printed format is a 212-page, comb-bound book with black and white pages. The CD-ROM format includes the entire book in Adobe Acrobat PDF format with most of the maps and graphics in color.

The cost is \$25.00 for each book or CD-ROM, shipping included. Or, buy the book and the CD together for only \$35.00 (including shipping). Checks and money orders should be made out to Brian Cathcart and sent to: 4050 Edgewood Drive, Coconut Creek, FL 33066-1835. Brian also

accepts payment via PayPal to his user ID: scannerdude@juno.com. Additional information is available at <http://www.scannerdude.com>

— Larry Van Horn, N5FPW

Southern California Directory

"We pick up where others left off," is the mantra of a new scanner frequency directory published by Scannerstuff and editor Dan Rollman. The *Southern California Frequency Directory (SCFD)* is a massive 448-page, 8-1/2-inch by 5-1/2-inch scanner guide to California's Southland.

The opening sections of the book includes several scanner user guides that go beyond "where to tune" to provide information about what you are hearing. In addition to listeners' guides to scanners, trunking and aircraft monitoring, there are sections on terms and abbreviations, fire, Sky Warn, NOAA weather radio, wildland fires, public safety aircraft, and California State and the federal government.

The rest of the book is organized alphabetically by county. The *SCFD* includes information on amateur radio, police, fire, medical, aircraft, schools, hotels, utilities, malls, media, government (local, county, state and federal), recreation and much more, with frequencies, channel numbers and usage, PL (CTCSS) tones, call signs and more.

Also included are trunked radio frequencies, talkgroups and system information, maps of police precincts, fire station locations, and other agency background information.

Counties featured in the book include: Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties. There is even a special section at the end of the book devoted to railroad systems in the Southland area. Whether you are

new to scanning or an oldtimer, there is a lot of meat here to chew on.

In addition to this new southern California book, Scannerstuff has also published scanner guides for Arizona (*Southwest Frequency Guide*); the Atlanta, Georgia area; and the *Northwest Frequency Guide* (Oregon/Washington).

The *Southern California Frequency Guide* is priced at \$24.99 plus shipping and can be ordered on their website: <http://www.scannerstuff.com/>. The book is also available at Ham Radio Outlet stores in Burbank, Anaheim and San Diego. The *Southern California Frequency Directory* truly picks up where the others leave off.

— Larry Van Horn, N5FPW

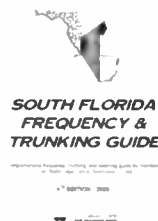
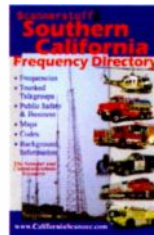
The Australasian Shortwave Guide

The *Australasian Shortwave Guide* is a non-commercial publication, issued twice a year for over ten years. With many international broadcasters no longer providing schedules to their listeners, the *ASWG* is more essential than ever.

Edition 19 covers the period March 27 to October 31, 2005 (A05), and includes over 1400 entries in 40 pages. Comprehensive schedules are provided for: broadcasts in English to Australia, Asia, the Far East, the Indian sub-continent and the Pacific, and broadcasts in ALL languages to Australia and the Pacific.

The data is arranged in two main sections: by studio country and starting time. Each entry shows broadcasting organization, frequency, starting time, finishing time, language, target area, transmitter site, transmitter country, studio country, and days of operation.

For mailing to countries outside Australia, send US\$10 / 10 Euro / 5 British Pounds / A\$15 in the form of cash, 10 international reply coupons, Australian mint stamps to the value of A\$15, international bank draft, or PayPal. Orders and payments should be sent to: Robert J. Padula, 404 Mont Albert Road, Mont Albert, Victoria 3127, Australia, or visit <http://edxp.org> for details.



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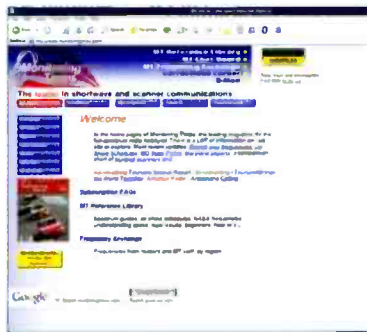
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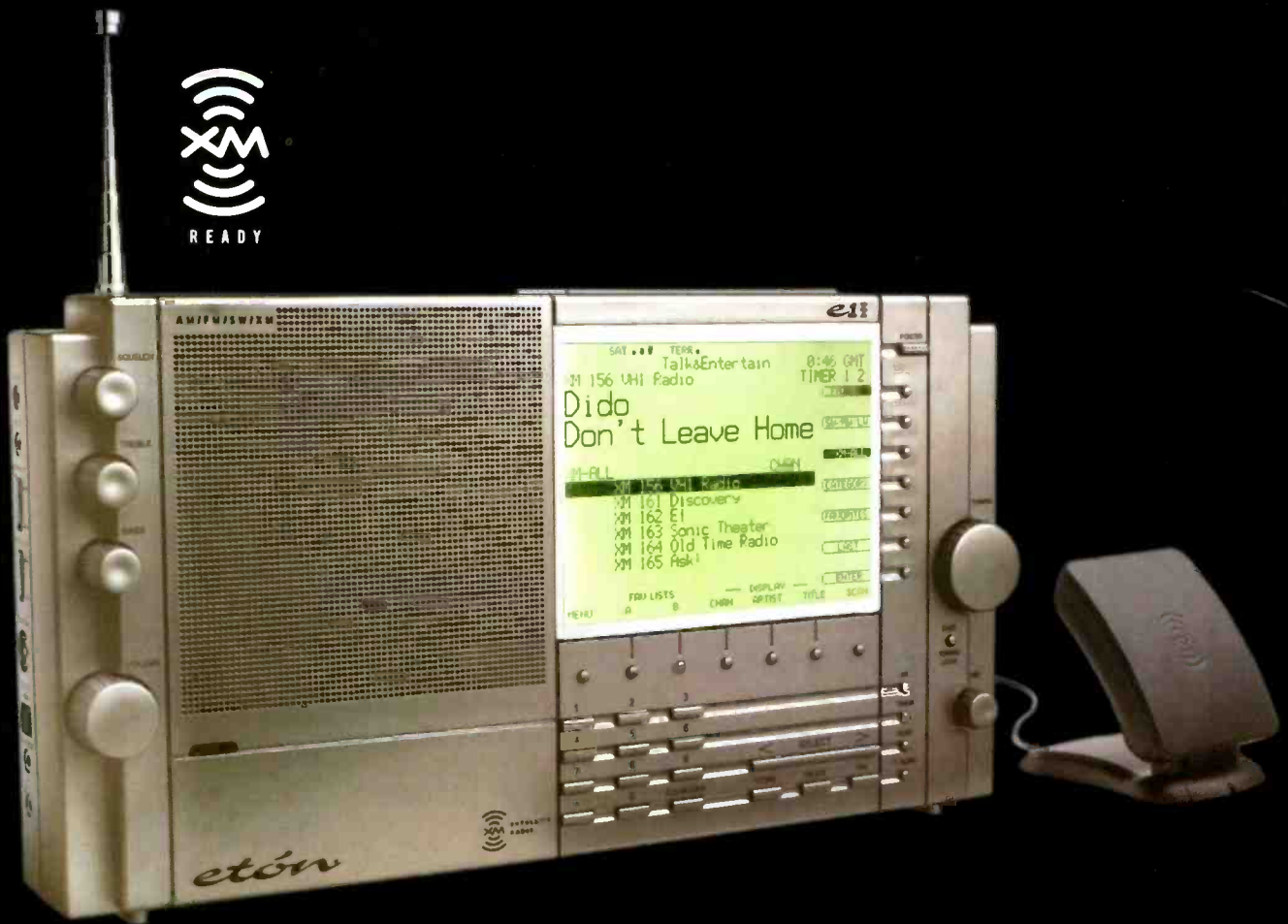
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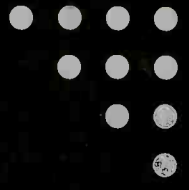
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