

A Complete Guide to Marine Frequencies

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May 2001

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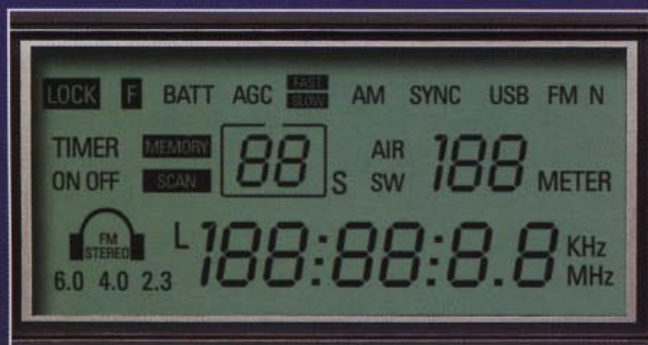
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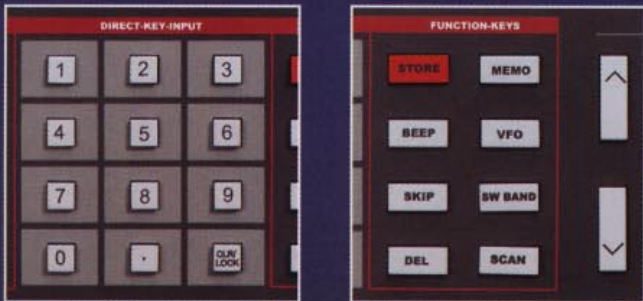
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Monitoring Times

Vol. 20, No. 5

May 2001



On our Cover

A Guide to the Marine Bands

By Jon Van Allen

You don't have to live near a major body of water to hear activity on the marine bands, but if you do, then you probably already know marine monitoring is a never-failing source of surprises. Search and rescues have to be launched, whether a distress call proves to be a hoax or the real thing; changing weather is of constant concern to seafaring craft; and maritime channels from HF to satellites are kept busy by everything from pleasure boats to commercial freighters.

Ship to shore communications have changed a great deal in the past ten years, but almost all of it is still accessible to hobbyists. The author of this comprehensive guide to marine monitoring is radio communications officer aboard the *APL Singapore*, as well as a radio hobbyist. Story begins on page 10.

On our cover: The *SS Guadelupe* as photographed by C. Brown, Radio Operator.

Identifying DGPS Beacon Stations..... 16

By Dave Pritchard

Low frequency beacons are a challenge to hear, but once you catch the signal, identification is never difficult because beacons continuously transmit a Morse code identifier. Until recently, that is. Many navigational beacons are being converted to a digital signal carrying Differential Global Positioning System information. Is this the end of beacon chasing? Not by a long shot!

Hawaii DXpedition 19

By Hans Johnson

Why would a person want to lug along a shortwave radio on a trip to Hawaii? But, supposing one did – would it be that different from reception at home? Here's some insight from a DXer who found the trip worth making more than once.

Generating Power 22

By Haskell Moore

Whether you are planning a DX camp for Field Day, putting together a kit for emergency monitoring, or planning whole house wiring for power outages, you may find there are more factors to be considered than you at first thought. And sure enough: the author put the finishing touches on this article by generator power after a spring storm downed some trees!





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Reviews:

For a lot of fun on shortwave for very little money, you can't beat MFJ's **8100 World Band Shortwave Radio** ays Ken Reitz. Buy it as a kit and get an education, too (p.82).

Yaesu's sophisticated **VR-5000** got the going-over on HF last month; this month Bob Parnass found looks at its VHF/UHF performance and checks the specs (p.84).

Does the world need yet another FRS radio? Coleman seems to think so with its **CR-411** model, and Jock Elliott finds it an excellent value (p.86).

Par Electronics recently responded to their customers with a couple of new products – **broad-cast band filters** and their **MON-3 VHF/UHF antenna** – which Bob Grove happily put to the test (p.87).

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HAARP: Ionospheric Research (...Or Is It?)

The High-frequency Active Auroral Research Program (HAARP) is a congressionally-initiated program jointly managed by the U.S. Air Force and Navy. The project features a powerful HF radio transmitter 200 miles southeast of Fairbanks, Alaska, which directs a narrowly focused radio beam up into the ionosphere. The \$30 million experiment involves the world's largest "ionospheric heater," a device designed to zap the skies hundreds of miles above the earth with high-frequency radio waves.

The government's official line is that HAARP technology is being developed to enhance communications capabilities and has a few other benign applications. On paper, the program's goal is to provide a state-of-the-art ionospheric research facility readily accessible to U.S. scientists from universities, the private sector and government...thereby allowing them to study the properties and behavior of the upper atmosphere including global warming and ozone depletion.

HAARP is being built by the military on a Department of Defense-owned site 8 miles north of Gakona, Alaska. Prior to the beginning of the HAARP program, the Gakona site was planned by the Air Force to be an Over-The-Horizon-Backscatter (OTH-B) radar installation.

Civilian applications from the program's research could lead to improved local and world-wide communications...even satellite communications using HF spectrum. Driving this research is the fact that all of the radio spectrum used for communications has been allocated and more frequencies are badly needed. Researchers are now looking at using lower frequencies.

A potential DoD application of the research is to provide communications to submerged submarines, thereby replacing the current Extremely Low Frequency (ELF) submarine communication system. Other applications may be to wipe out communications over an extremely large area, while keeping the U.S. military's own communications systems working...or creating harmful biological and mental effects upon a specifically targeted population. Reportedly, HAARP can also be utilized as an earth-penetrating system to locate hidden underground bunkers in enemy territory.

HAARP's high power 2.8 to 10 MHz HF transmitter (known as the Ionospheric Research Instrument, or IRI) is actually a bank of many

transmitters. Together they temporarily excite (heat) well-defined volumes of the ionosphere for scientific study. When construction is completed, the IRI will consist of 360 ten kilowatt transmitters...a total of 3600 kW with an effective radiated power (ERP) substantially above one gigawatt. A massive electron gun indeed!

HAARP's huge phased antenna system will contain 180 towers, each 72-feet in height spaced over 33 acres. Its crossed dipole antennas are arranged as a rectangular planar array. At present, 48 antenna elements are functional and the HF transmitter at HAARP is now capable of operating at the 960 kW level.

It will take some ten million watts of electrical power – obtained from on-site diesel generators – to operate the facility. Aircraft alert radar automatically turns off HAARP's transmissions when aircraft are detected nearby.

While the HF transmitter at the HAARP facility is used infrequently, the Air Force admits that HAARP's transmissions have the potential to interfere with ham radio and other HF spectrum users. A typical research period may last two or three weeks and up to four such campaigns may occur in a given year.

Supposedly, the Air Force's 440-page environmental impact statement about HAARP states that the IRI transmissions can raise the internal body temperature of nearby people, ignite road flares in the trunks of cars, detonate aerial munitions that use electronic fuses, and scramble aircraft communications, navigation, and flight-control systems.

HAARP is required by the NTIA to operate on a "Not-to-Interfere-Basis" (NIB). This means that the operating frequency must be selected carefully so as not to disrupt on-going communications. HAARP is not authorized to operate in the ham bands at all and the transmitter has been "locked out" of those frequencies.

All undesired signals above 45 MHz are attenuated by at least 120 dB (one million, million times) and all harmonics and spurious signals in the frequency range 88 - 200 MHz, are attenuated by 150 dB or more (one thousand, million, million times).

The program has a radio frequency interference (RFI) resolution advisory committee and the American Radio Relay League is listed as the Amateur Radio Service representative. A local "RFI Reporting Hot Line" phone number (907) 822-5497 has been set up to permit anyone be-

lieving they have interference from HAARP to contact the Gakona site operations center.

Science fact or science fiction....

But there has been much speculation that the real purpose of HAARP may not be ionospheric research at all. Some have expressed fears that the site may be controlling or modifying the weather...somehow "amplifying" energy, and possibly injuring the ionosphere, causing earthquakes or volcanos. The most outlandish charges say HAARP will interfere with wildlife migration, disrupt the human brain and harm people's health.

Some of the worries seem to be based on "Star Wars" defense theories and fears that the program may somehow be "a decoy" or a "secret weapons project." HAARP has also been featured on Art Bell's (W6OBB) nationally syndicated "Coast to Coast" radio show, where the discussion often turns to flying saucers and human abductions by aliens.

The Sept. 1995 issue of Popular Science magazine carried a front-page headline about HAARP entitled: "Exclusive: The Secret Agenda of a Military Project in Alaska." The author asserts "HAARP will dump enormous amounts of energy into the upper atmosphere. We don't know what will happen. My concern is its effect on a global scale – you can't localize the effects. With experiments on this scale, irreparable damage could be done in a short time."

And another published report says HAARP is a "particle injector" that protects the United States from invasion over the North Pole. Supposedly, its beam can produce a blanket of fast particles that can knock out electronic controls, or completely destroy, any ICBM missile flying through it. The US government built HAARP in 1990 at a time when the main nuclear threat was the USSR. And any missile from Russia aimed at the U.S. would pass over this region. The U.S. can turn on and off the HAARP shield at will. And by changing the polarization, HAARP could also provide defense against Chinese nuclear weapons. Some have dubbed it the "Pentagon's doomsday death ray."

All of these theories have been emphatically denied. Proponents of HAARP insist that the danger has been grossly exaggerated. In fact, the project is listed as totally unclassified by the Department of Defense. Check the HAARP website at: <http://server5550.itd.nrl.navy.mil/projects/haarp/>.



LETTERS TO THE EDITOR

Kloss: No DXing Machine

Steve Thomas, Los Angeles, CA, shared his communications with Peter Skiera of Tivoli Audio regarding the Kloss Model One's strengths and shortcomings. On the strength of his experience with the radio he felt Ken Reitz's review of the Model One in the March *Monitoring Times* misrepresented its performance on AM. "Since, like all Kloss radios, the Model 1 really shines on FM and audio, I was expecting from the AM band at least average performance in comparison ... I've used two Model 1's now, and AM performance comes nowhere near the FM performance of the radio ... It's a great little radio, but frankly, I can get better performance on a number of far less expensive radios for the AM band.

"Let me quote from Mr. Peter Skiera of Tivoli Audio: 'I agree with you regarding improving the AM and have recommended this time and again, but to no avail. I used to work in broadcasting. I think we would have an even more 'killer' product if we had superb AM reception. I do not know the reasons behind not beefing up the AM. I assure you, you are not the only one who has suggested this.'

"This leaves me a bit confused as to why Ken Reitz would still tout this radio as the 'perfect radio listener's radio.'"

Ken Reitz made these comments: "I was surprised to see my review of the Model One under the Mediumwave Equipment banner. (*Editor's snafu - it replaced the usual shortwave review - rb*) I came to the Kloss Model One with only the expectation (based on a previous encounter with the Model 88) that the audio would be superb. It was. I didn't expect it would be a DX machine. It's not and I've said so. On the FM band it performed as well as the \$250 Model 88 and the \$350 Bose Wave. On AM it performed exactly as it should: it provided the sensitivity, selectivity and much needed high fidelity to make listening to AM fun. To my eyes and ears, the Model One is a perfect radio listener's radio, not a DXers radio."

Steve Thomas asked Tivoli about a service manual so he could try peaking AM performance on his own, but Kloss does not provide service manuals. He also enquired about using an external antenna, and was assured there should be no problem with overloading. Steve told Peter Skiera: "Well, I probably have about as good AM performance on my Model 1 as I'm going to get. At least until I can take the 'plunge' after my warranty period is over and see if I can peak the AM alignment. ... Yes, the 'killer' product it could have been. How many times have I wished for that!"

More MT Anthology?!

"Are you planning on making past years available as part of your *MT* anthology collection on CD?"

— Lane Griswold N1LAG

Publisher Bob Grove answered this one as follows: "Unfortunately, due to our previous copyright agreements, we can't. Not only that, but early issues were on a different format."

Correct Answers Only

"I did want to comment on Bright Idea # 1b of the Jan 2001 issue, 'a modified list of the questions in the ham radio exam pool showing only correct answers.' This is an excellent Bright Idea. In fact it is such a good idea that I used this method myself to study for my ham radio exam when Skip Arey-N2EI dragged me down to a VE session at the Virginia Beach Hamfest in the fall of 1996.

"Actually, the folks at MFJ think this is such a good idea that they publish a study guide printed in this manner. ... I am not so sure it is the best way to learn radio theory, but it sure will get you through the no-code tech exam. I would assume MFJ has sold quite a few of these books over the years."

— Eddie Muro, K2EPM, Cedarhurst, New York

Central Florida - a lot has changed

Tom Hirsch wrote: "As a longtime subscriber who has a lot of respect for your publication and the people who write for it, I was surprised to see the numerous errors in your March 2001 issue on scanning the I-4 corridor in Florida. I've lived here for 13 years, and have done extensive monitoring of most of the agencies listed in your article.

"Here are the errors or omissions I can find (I did not take the time to check the frequency and talkgroup lists, because that would be very time consuming):

1. The 5 channel EDACS system you identify as Daytona Beach system is Volusia County's, not the city of Daytona Beach's.

2. On the Volusia County EDACS systems, the countywide agencies (Sheriff, County FD & Beach Patrol) are simulcast on the A & B systems, using the same talkgroup numbers on both systems. The cities are on either A or B, as follows:

A	B
Ormond Beach	Daytona Beach
DeLand	Daytona Beach Shores
Orange City	South Daytona
Deltona	Ponce Inlet
New Smyrna Beach	Holly Hill
Edgewater	Daytona Beach International Airport
Oak Hill	Port Orange

3. The fleetmap for the Seminole Co. Motorola trunking system you published is incorrect. Correct fleet map is: B0-S0; B1-S4; B2-S4; B3-S4; B4-S4; B5-S4; B6-S12

4. Talkgroup numbers you published for Altamonte Springs, Casselberry, Lake Mary & Sanford are incorrect, apparently due to incorrect fleet map. Correct talkgroups are:

Altamonte Springs PD	1424; 1456; 1488, etc
Casselberry PD	1936; 1968; 2000; etc
Sanford PD	6032; 6064; 6096; etc
Lake Mary PD	3984; 4016; 4048; etc

5. Winter Springs PD was omitted from your list: 7056; 7088; 7120; etc

6. On the Orange Co. & Maitland system, in the last few months Eatonville PD has moved from the Maitland system onto the Apopka Astro digital system, and has not been heard on 12048 for some time.

7. Universal Studios is within the Orlando City limits, but Sea World is not. Sea World is in unincorporated Orange Co.

8. Surprisingly, you omitted Osceola County's Motorola type 2 trunking system; and the Walt Disney World-Reedy Creek system. These are easily monitorable in the tourist corridor. (*Some of these had to be cut for space; they appear in the March issue - ed*)

9. I haven't been close enough to Hillsborough County to monitor its EDACS system, but the latest information I had on it was that it has an A & B system.

"For information on these systems, the widely used trunking information websites can be used; however, some of them have errors in them as well. Probably more than 30 million people a year come to the I-4 corridor for business or recreation, and I recommend the website of the hobby group here, the Central Florida Listeners' Group <http://www.qsl.net/cflg>."

We very much appreciate these updates, Tom. John Mayson admits, "Since it had been over a year since I had actually been in central Florida, I was afraid some things had changed and it looks like they had."

Ensuring accuracy is one of the pitfalls of scanning articles, since only local hobbyists can test the accuracy of a frequency list. However, there are too few folks like John willing to stick their necks out in print to write this kind of frequency-intensive feature. So if you're a stickler for details and you've built a hot list from a high-traffic area, we urge you to share it. Without the frequencies to tune in, advice on technique is virtually worthless!

Good luck, Rich

Speaking of frequencies, the entire hobby owes a round of thanks to Rich Barnett, whose career at Scanner Master, *Police Call*, and advisory capacity to Uniden has given him a rare position of influence on behalf of hobbyists. We initially had to cajole him into writing the *Scanning Report* column for *Monitoring Times*, and the fact that he has done so faithfully for five years has been a bonus to readers. We give you our thanks, Rich, and hearty best wishes for a future that continues to look very bright.

Robert Wyman (*My Most Enjoyable Scanning: Milcom*, April 2001) will be Rich Barnett's successor in the column. Since each writer brings a different experience to the column, no doubt *Scanning Report* will take on a slightly different flavor, but one fact remains the same: He will rely on good input from *MT* readers to make *MT* the high quality product readers like Tom Hirsch expect of it. Start today to organize your list of loggings and then send them in to *Monitoring Times*!

— Rachel Baughn, KE4OPD, *MT* Editor, PO Box 98, Brasstown, NC 28902; mteditor@grove-ent.com

Top Secret U.S. Space Codes Hacked

The Reuters news service reported that on Christmas Eve, top secret U.S. computer system codes for guiding space ships, rockets and satellites were accessed and stolen remotely over the Internet from the U.S. Naval Research Laboratory in Washington D.C. Among other critical applications, the OS/COMET software program is used on the NAVSTAR Global Positioning System (GPS).

The theft was detected December 27th. It was traced to a Swedish Web server, where a copy of the source codes for the software program was found. However, the hacker, known only by the username "LEEIF," had hidden his identity by breaking into a legitimate client's account.

Reportedly, the FBI was unable to determine if the information had been sent elsewhere. The OS/COMET source code could be used by terrorists to disturb computer systems guiding various space programs or it could have been stolen in industrial espionage for commercial advantage, the Swedish tabloid *Expressen* reported.

Swiss Radio International Abandons Shortwave

Swiss Radio International plans to cease all transmissions on shortwave by the end of 2004. They will also severely cut back other radio services including satellite, in the belief that the Internet is the only way to go to get their message across, according to hobbyists from the National Radio Club. Glenn Hauser says we'll feel the effects even sooner: SRI is quitting shortwave to western North America on March 24, 2001, and the rest of North America Oct 27, 2001. "Only a few other SW targets may last until 2004," he said.

The BBC – still the best

Early in the month of March, the windows at the British Broadcasting Corporation television center in London were shattered when a car bomb exploded while police were attempting to disable it by remote control. Though they haven't claimed responsibility, the bomb is blamed on an IRA splinter group.

In mid-March, the ruling Taliban expelled the BBC from Afghanistan for transmitting criticism of the group's destruction of all ancient statues. The Taliban were angered by an interview with a US professor in which the destruction was described as barbaric. The Taliban ordered the BBC to close its Kabul office and withdraw its correspondent within 24 hours.

New Neighbor Gets Cold Shoulder

The nation's most powerful FM station, country music B-93 on 93.7 MHz out of Grand Rapids, Michigan, is upset that one of the handful of low power FM stations to win a license is going to operate in their city on 93.1. The only license winner out of 15 applicants in the Grand Rapids area, Resurreccion y Vida Iglesia Hispana, will broadcast weather, news, guidance, gospel music, and scripture readings to the Hispanic community.

B-93 is one of 900 stations owned by Clear Channel Radio, which owns six in the Grand Rapids Area. A vice president of Clear Channel said they will watch closely for any signs of interference and will "at all costs protect our property."

Low power advocates suggest powerful interests wanted to keep the guard frequencies vacant because they could have great value for transmitting paging, cellular, and other digital applications.

Win this Station

In a unique promotion, York, Nebraska, station KAWL is holding a radio trivia contest that costs \$1,000 to enter. Participants must answer 30 trivia questions about radio. Assuming 1,000 participants send in the \$1,000 fee by March 31st, the winning contestant will be the station's proud new owner! That is, after he also passes the FCC's scrutiny. Fees will be returned if 1,000 entrants are not found.

FCC Rules on Antenna Case

The Federal Communications Commission recently delivered a victory to satellite TV consumers and their ability to install satellite dishes in the case of Victor Frankfurt and the Satellite Broadcasting and Communications Association versus New Century (the town home owner's association).

In its order, the FCC upheld guidelines requiring installed antennas to be able to withstand high winds, saying wind speeds created a legitimate safety concern. However, the Commission ruled against New Century on its prior approval requirement, UL sticker placement, the hidden placement of outdoor wiring, specific locations for antennas, and its complex filing procedure.

FCC Bureau Chiefs Warn of Impending Brain Drain

The Federal Communications Commission faces a major brain drain as many of its engineers become eligible for retirement during the next few years and it must compete with the private sector to hire from the same pool of skilled labor, bureau chiefs from the FCC warned the agency's commissioners.

Bruce Franca, chief of the Office of Engineering and Technology, urged the agency to find ways to retain and attract talent, including offering more competitive salaries and educational incentives.

FAA and FCC look for ATC interference

The Federal Aviation Agency and Federal Communications Commission officials have been using direction-finding techniques over central Florida to locate three transmitters that have caused interference with air traffic control communications. A Beech King Air operated by the FAA, which is primarily used for checking navigation devices, pinpointed one of the transmitters, using moving maps and computers. Specially equipped ground vehicles operated by the Federal Communications Commission could then lo-

cate the address of the transmissions. All three sources of interference were described as voice communications, and may not be intentional. One of the sources appeared to be a malfunctioning radio used by a truck driving school.

NIST Plans Survey

The National Institute of Standards and Technology plans to survey users of WWV and WWVH this year. The time and frequency-standard stations have been airing occasional announcements about the upcoming poll in order to start building a mailing list of survey recipients. The announcements state that NIST "is seeking information on how listeners use the broadcast services offered on the WWV broadcast."

WWV Station Manager John Lowe says the last WWV-WWVH user survey was done in 1985. "We just don't know who our user base is anymore," he said. The data collected ultimately could be used to determine whether WWV and WWVH remain on the air – especially given the popularity of NIST's other outlets, including its Web-based time server that gets in excess of 3 million hits a day. The survey will likely extend through summer.

If you're a user of WWV or WWVH's time signal, solar weather reports, marine weather advisories or GPS position reports, make your voice heard.

For What It's Worth Dept...

- "Epidemics are four times as likely during solar maxima," says Ken Tapping, a solar physicist with the Canadian National Research Council, pointing to the striking correlation between



May 5: Cedarburg, WI

Ozaukee Radio Club 23rd Cedarburg Swapfest at Circle-B Rec Center (Hwy 60 and Co 1, 20 mi N of Milwaukee), talk-in 146.377/97, 146.52; 8a.m.-1p.m.; adm \$4. License exams 9a.m. SASE to Gene Szudrowitz KB9VJP, W55 N865 Cedar Ridge Drive, Cedarburg, WI 53012; 262-377-6792.

May 12: Cincinnati, OH

Amateur radio license examinations by the OH-KY-IN ARS at Salem Presbyterian Church in Western Hills, intersection Mozart and Higbee, 12 noon. All levels; walk-ins accepted. Contact Carol Hugentober WA8YL at 513-661-5323, email wa8yl@juno.com or visit <http://www.qsl.net/k8sch>.

May 18-20: Dayton OH Hamvention

Vacation Listening Contest 2001

Contest sponsored by Club Amittie Radio. Tune in to Asia and Oceania from June 1 to September 30, 2001, and log one licensed broadcast station per country on 3200 kHz to 25,820 kHz AM. Contest open to shortwave listeners, broadcast listeners worldwide. Send list before Oct. 31 to: Franck Parisot, P.O. Box 6, 92173 Vanves Cedex, France - Europe; Email : frankparisot@hotmail.com, <http://www.chez.com/swlcontest>

flu pandemics and the peaks of the 11-year sunspot cycle.

The sun is also brighter at the peak of the sunspot cycle, and the amount of ultraviolet radiation hitting Earth increases, Mr. Tapping says. He also noted that tree and plankton growth is enhanced at the height of the solar cycle, which could contribute to suggestions that fish are more plentiful in the sea and crops grow better during that time.

Mr. Tapping and his colleagues offer no explanation for the connection between sun and flu in their research paper. "We just don't know," he said.

• Scientists say the Sun's magnetic north pole, which was in the northern hemisphere just a few months ago, now points south. "This always happens around the time of solar maximum," says David Hathaway, a solar physicist at the Marshall Space Flight Center. "The magnetic poles exchange places at the peak of the sunspot cycle. In fact, it's a good indication that Solar Max is really here."

Earth's magnetic field also flips, but with less regularity. Consecutive reversals are spaced 5 thousand years to 50 million years apart. The last reversal happened 740,000 years ago. Some researchers think our planet is overdue for another one, but nobody knows exactly when the next reversal might occur.

Cellular Towers versus Public Safety Communications

In an informative article entitled "Cell phones drowning out police radios" from *USA Today*, Paul Davidson summarized the basic dilemmas faced by public safety communications systems nationwide. Agencies have shifted from VHF networks to take advantage of the flexibility and increased channels in the 800 MHz band.

However, many communities did not anticipate the limitations inherent in using the higher frequencies. Beset by tight budgets or poor planning, many communities have been unable or unwilling to build sufficient infrastructure to support the new, but more terrain-sensitive systems, and to compete with the stronger, better-funded cellular signals.

"This is a very big problem, and it's going to get worse," says Ron Haraseth of the Association of Public-Safety Communications Officials.

The service causing the most problems is Nextel, which, unlike most cellphone companies, uses frequencies interlaced with those of public safety and other mobile services. Other cellular providers interfere primarily at those frequencies which abut those of public safety.

To help alleviate the interference, the FCC set aside 36 MHz out of the 700 MHz spectrum for public safety use. Six megahertz of space was allowed as guard channels to protect

public safety from interference by neighboring services.

However, the FCC reversed this decision, and recently concluded its second auction of these frequencies to "Guard Band Managers." These are commercial licensees whose sole business is to lease this spectrum to system operators or fixed or mobile services, and to ensure that these services do not interfere with public safety communications. To its credit, the FCC did exclude cellular services from the band.

Not all problems with the new systems can be blamed on competition for spectrum space: many agencies simply find their new, feature-rich radios tougher to use and more prone to breakdown. With a lot of features, there's just a lot more to go wrong.

"Communications" is compiled by editor Rachel Baughn from news and information submitted by our readers. Thanks to this month's reporters: Anonymous, Albany, NY; Doug Robertson, Oxnard, CA; James Stella, Fruitport, MI; Robert Thomas, Bridgeport, CT; Herman Waterman, Winthrop, WA. and Via e-mail: Mark Bajek, Trevor Brook, Robert Felton, Glenn Hauser, Gregory Lay, Larry Magne, John Mayson, Ken Reitz, Larry Van Horn, Dan Veeneman, Robert Wyman. Special thanks to the *ARRL Bulletin*.

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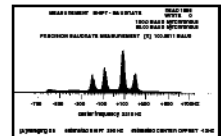
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Monitoring the Marine Bands — a Complete Guide

Story and photography by Jon Van Allen, KF7YN
kf7yn@uswest.net

Last year's movie hit, *Perfect Storm*, captured on film for the big screen some of the most exciting and frightening moments at sea — a Coast Guard rescue. And, while the stormy scenario depicted in the movie doesn't happen every day, search and rescues at sea are quite common as most radio enthusiasts who listen to the marine bands would testify.

Even if you don't live near the ocean, major lake or river, there is plenty of interesting activity you can hear on the MF, HF, VHF and UHF Maritime Bands. You probably know about the HF and VHF marine bands, but did you know there are also 72 MHz, 220 MHz and 460 MHz marine frequencies? We will discuss more about this later in this article, but first, what do you need to get started listening to marine radio communications?

What kind of equipment do I need?

With the equipment you probably already have — a scanner, a portable or desktop short-wave receiver and a simple antenna — you have the basic tools. If you want to decode ship to shore digital messages or satellite communications, you will need a little more elaborate equipment, which we will cover later on.

You will be able to monitor ships of all sizes and types, coast stations, tug boats, barges, private boats, Coast Guard shore stations and vessels, Coast Guard Auxiliary units, commercial fishing boats, Vessel Traffic Service (VTS) and Marine Operators handling phone calls to and from offshore vessels.

You can also hear ferry operators, offshore drilling platforms, barges and riverboats. Just about anything you see in the water can be a source of marine scanning. Aircraft are authorized to communicate with marine and coast stations on certain channels for search and rescue, distress, safety and ice breaking operations. (See Table 4 for frequencies)

The U.S. Coast Guard (USCG) operates auxiliary units on many inland lakes and rivers. These units often use VHF marine channels 81, 82 and 83. USCG Auxiliary patrols many lakes within State and National Parks. They advise boaters of problems, weather warnings and respond to calls for help and answer questions for boaters. VHF channel 22A is officially a USCG liaison frequency. USCG most often talks to boats and ships on 22A. The National Park Service (NPS) also uses 22A for coast and vessel communications. In national parks with navigable water, the NPS operates patrol boats that operate on VHF channels 16 and 68.

In and around harbors and ports, you will hear non-stop VHF marine traffic. If you monitor VTS, you can plot a ship's position, course

and speed, where it's coming from and what type of ship it is. VTS regulates ship navigation and speed in a safe and orderly manner. VTS operators track ships by radar, and plot their course, speed and position in and out of port. Vessel Traffic Service VHF marine channels are 5A, 11, 12, 14, 65 and 66.

Most calls originate on VHF channel 16, the international marine calling and distress frequency. Once contact is made, the vessels will move to a working VHF marine channel. The type of vessel (private non-commercial, or commercial) determines what channel or frequency the conversation moves to. See Table 1 for channels/frequencies.

Ships contact each other on VHF channel 13 bridge-to-bridge channel to advise their in-



Cape Bon, Saudi Arabia, during Operation Desert Storm



Navigation consoles, APL Singapore

tentions for safe navigation. Tug boats and ship pilots are commonly heard on VHF channels 10, 12, 13, 16, 17, 65A and 77.

There are differences between the United States and international marine band allocations. The U.S. band plan as outlined by the U.S. Coast Guard appears in Table 1. Channel usage may differ somewhat in various areas of the country: For full details and exceptions, consult the U.S. Federal Communication Commission (FCC) Rules Part 80.

Channels with an "A" designation after the channel number are simplex channels. Corresponding international channels are duplex (offset transmit and receive). Since your scanner's preprogrammed marine search range does not show A-suffix channels, knowing these differences makes it easy to find them! When scanning, always listen to the ship transmit frequency on channels with the A-suffix.

You can hear onboard conversations from ships if you are within a few miles. Table 2 lists these UHF frequencies which are especially busy during docking and undocking and maneuvering with conversations between the Captain, crew and ship terminal.

Marine communications since February 1999

The new Global Maritime Distress and Safety System (GMDSS) was fully implemented worldwide in February 1999. This has resulted in some changes in the way maritime traffic communicates worldwide.

Morse code (CW) has ceased to be a required mode on sea-going ships, and U.S. and European coast stations no longer work CW. 2182 kHz, an international distress and calling frequency, is no longer required to be monitored, but is still widely used. DSC (Digital Selective Calling) has replaced SSB (Single Side Band) for distress calling, but once a distress or other priority call is made, 2182 may still be used for voice communications. The DSC distress and safety equiva-

lent for 2182 is 2187.5 as outlined with other DSC distress frequencies in Table 3.

DSC uses 100 baud ASCII, 7 bits, 3 bits parity, 170 Hz shift. You should be able to set this up from popular ham TNC modems or dedicated terminals made by HAL and Universal or software-driven demodulators like the Hoka Code-3 and Wavecom. Even the inexpensive little BayPac Multi-mode modem does a respectable job decoding many of these maritime digital modes. A newer approach to digital mode decoding is to use software and your computer's sound card to demodulate received audio.

With DSC in use worldwide, it can be an interesting mode to monitor, especially if a ship is in distress. Most DSC traffic consists of false distress calls and relays. This is caused by inexperience, unfamiliarity with GMDSS equipment, and malicious intent. Over 90% of distress calls are false alarms. The remainder of DSC calls are from shore station broadcasts, ships calling other ships to set up for SSB, or calls to shore stations for required periodic GMDSS link tests.

Table 1 - U.S. VHF Marine Radio Channels and Frequencies

Courtesy of the United States Coast Guard
Frequencies MHz, narrowband FM

Ch	Ship Transmit	Ship Receive	Use
01A	156.050	156.050	Port Operations and Commercial. VTS in selected areas.
05A	156.250	156.250	Port Operations. VTS in Seattle
06	156.300	156.300	Intership Safety
07A	156.350	156.350	Commercial
08	156.400	156.400	Commercial (Intership only)
09	156.450	156.450	Boater Calling. Commercial and Non-Commercial.
10	156.500	156.500	Commercial
11	156.550	156.550	Commercial. VTS in selected areas.
12	156.600	156.600	Port Operations. VTS in selected areas.
13	156.650	156.650	Intership Navigation Safety (Bridge-to-bridge). Ships > 20m length maintain a listening watch on this channel in US waters.
14	156.700	156.700	Port Operations. VTS in selected areas.
15	—	156.750	Environmental (Receive only). Used by Class C EPIRBs.
16	156.800	156.800	International Distress, Safety and Calling. Ships required to carry radio, USCG, and most coast stations maintain a listening watch on this channel.
17	156.850	156.850	State Control
18A	156.900	156.900	Commercial
19A	156.950	156.950	Commercial
20	157.000	161.600	Port Operations (duplex)
20A	157.000	157.000	Port Operations
21A	157.050	157.050	U.S. Coast Guard only
22A	157.100	157.100	Coast Guard Liaison and Maritime Safety Information Broadcasts. Broadcasts announced on channel 16.
23A	157.150	157.150	U.S. Coast Guard only
24	157.200	161.800	Public Correspondence (Marine Operator)

25	157.250	161.850	Public Correspondence (Marine Operator)
26	157.300	161.900	Public Correspondence (Marine Operator)
27	157.350	161.950	Public Correspondence (Marine Operator)
28	157.400	162.000	Public Correspondence (Marine Operator)
63A	156.175	156.175	Port Operations and Commercial. VTS in selected areas.
65A	156.275	156.275	Port Operations
66A	156.325	156.325	Port Operations
67	156.375	156.375	Commercial. Bridge-to-bridge communications in lower Mississippi River. Intership only.
68	156.425	156.425	Non-Commercial
69	156.475	156.475	Non-Commercial
70	156.525	156.525	Digital Selective Calling only
71	156.575	156.575	Non-Commercial
72	156.625	156.625	Non-Commercial (Intership only)
73	156.675	156.675	Port Operations
74	156.725	156.725	Port Operations
77	156.875	156.875	Port Operations (Intership only)
78A	156.925	156.925	Non-Commercial
79A	156.975	156.975	Commercial
80A	157.025	157.025	Commercial
81A	157.075	157.075	U.S. Government only - Environmental protection operations.
82A	157.125	157.125	U.S. Government only
83A	157.175	157.175	U.S. Coast Guard only
84	157.225	161.825	Public Correspondence (Marine Operator)
85	157.275	161.875	Public Correspondence (Marine Operator)
86	157.325	161.925	Public Correspondence (Marine Operator)
87	157.375	161.975	Public Correspondence (Marine Operator)
88	157.425	162.025	Public Correspondence only near Canadian border.
88A	157.425	157.425	Commercial, Intership only.

A-suffix channels are simplex only in U.S. on ship transmit channel

Table 2 - Simplex frequencies used aboard ships

Ch	Frequency
1	457.550
2	457.600
3	457.525
4	457.575

The following four frequencies are for shipboard repeaters used in conjunction with the four channels listed above (in any combination). For example, the repeater on our ship on uses 457.525/467.750, PL= 141.3 Hz.

1	467.750
2	467.775
3	467.800
4	467.825

SSB Voice Frequencies

You don't need an expensive receiver to hear SSB voice marine traffic; a good portable like the Sony 7600G or Grundig YB-400 will do. My portable is a Grundig Satellit 700. It goes with me everywhere and it gets plenty of use! Sure, it would be nice to have a Drake R8B and a Create log-periodic High Frequency (HF) beam, but top shelf equipment is not necessary to enjoy maritime listening. The same goes for the antenna: I am impressed with simple antenna designs such as the Grove off-center fed dipole which does a great job (see the "Beginner's Corner" in the Oct 2000 issue). I use an active antenna, too, although at times it can be a bit noisy. You don't have to be elaborate or spend a lot of money to get good results!

And now a brief word about Medium Frequency (MF) and HF radio propagation. To fully discuss propagation would take dozens of pages so we will just cover the basics so you have an idea when and where to tune.

MF frequencies just above the broadcast band at 2 MHz reliably cover out to 500 miles (800 km) daytime and up to 2000 miles (3,200 km) at night. 4, 6 and 8 MHz are best at night but can be heard over 1000 miles (1,600 km) during the day. 12, 16, 18, 22 and 25 MHz are better daytime bands and can be heard thousands of miles away. Of course, these are general guidelines and actual conditions can vary considerably. I routinely work Globe Wireless station KEJ in Hawaii from as far away as Singapore! Generally speaking, the rule of thumb is – lower frequencies at night, higher frequencies for daytime.

Maritime sideband communications always use the Upper Sideband (USB) mode. The SSB frequencies in the International Telecommunications Union (ITU) channel series in Table 3 are where you can hear phone calls and other public correspondence. American Telephone and Telegraph (AT&T) High Seas stations KMI, WOM and WOO provided SSB phone service and weather forecasts to ships at sea for many years, but these stations went off the air in 1999. The only remaining US station handling SSB phone service is WLO in Mobile, AL. Of course, you need to tune both ship and coast frequencies to hear both sides of a conversation.

In addition to these Public Correspondence

(PC) channels there are simplex distress and calling frequencies. Here is where the "good stuff" can be found: conversations between shipping companies and their fleets, fishing boats, research vessels, tugs etc. This sort of traffic can be quite informal. It's not unusual to hear, shall we say, "colorful" language here.

One U.S. west coast shipping company uses HF marine channels 852 or 1252 weekday mornings at 11:00 a.m. Pacific. Ships call the office in San Francisco with position reports, weather, schedule delays, engineering and casualty reports, requests for repairs and other company business. These simplex channels are always a good source of high seas action!

Listed below are 50 SSB channels shared by the fixed and maritime mobile services. The FCC shows these as being available for simplex, duplex and cross-band operations for intership and coastal stations where special conditions apply. Monitoring these oddball frequencies could prove to be interesting.

Shared Maritime Mobile Channels

4000 to 4057 kHz, 3 kHz spacing, 20 channels
8101 to 8191 kHz, 3 kHz spacing, 30 channels

2 MHz Working SSB Frequencies

Ship Transmit	Coast Transmit
2031.5 to 2458.0	2490.0 to 2598.0 kHz

These 2 MHz frequencies are generally used within a few hundred miles from shore and inland such as the Great Lakes and Mississippi River. These frequencies can be simplex or duplex.

NAVTEX

One of the more recent services in the MF marine band is called NAVTEX and is used to transmit navigation and meteorological warnings and urgent information to ships.

NAVTEX is broadcast on 518 kHz in most

Table 3: Public Correspondence (PC) duplex channels, 3 kHz spacing

Band	Ship TX	Coast TX
4 MHz	4065 to 4143	4357 to 4435
6 MHz	6200 to 6215	6501 to 6516
8 MHz	8195 to 8288	8719 to 8812
12 MHz	12230 to 12323	13077 to 13170
16 MHz	16360 to 16480	17242 to 17363
18 MHz	18780 to 18801	19755 to 19776
22 MHz	22000 to 22117	22696 to 22813
25 MHz	25070 to 25079	26145 to 26154

parts of the world. 490 kHz is also used in Europe and possibly elsewhere. Radio propagation is similar to the AM broadcast band, good for about 500 miles (800 km) during the day and 2,000 (3,200 km) miles at night. Reception mode is Forward Error Correcting (FEC) and SITOR-B. Your TNC or software driven demodulator will easily decode Navtex. The world is divided up into navigation areas called NAVAREAS. North America is in NAVAREA 12. In each NAVAREA, a single letter defines the NAVTEX station.

W (NMW)	Astoria, OR	0130, 0530, 0930, 1330, 1730, 2130 UTC
C (NMC)	Point Reyes, CA	0005, 0400, 0800, 1200, 1600, 2000 UTC
Q (NMQ)	Long Beach, CA	0045, 0445, 0845, 1245, 1645, 2045 UTC
J (NOJ)	Kodiak, AK	0300, 0700, 1100, 1500, 1900, 2300 UTC
O (NMO)	Honolulu, HI	0040, 0440, 0840, 1240, 1640, 2040 UTC
A (NMA)	Miami, FL	0000, 0600, 1200, 1800 UTC
N (NMN)	Portsmouth, VA	0130, 0730, 1330, 1930 UTC
F (NMF)	Boston, MA	0500, 1100, 1700, 2300 UTC
G (NMG)	New Orleans, LA	0300, 0900, 1500, 2100 UTC
V (NVR)	Apra Harbor, Guam	0100, 0700, 1300, 1900 UTC

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Total Order	Shipping Charges
\$1-\$99	\$5.95
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*price includes shipping within the US
Prices subject to change without notice.

ACCESSORIES

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Computer interface cable for BC895	ACC 15	\$29.95
Scanner Master Reaction Tuner	ACC 22	\$69.95
BP-180 Uniden battery pack	BAT 5	\$19.95
BP120 spare battery & charger	BAT 24	\$25.95
BC235/245 hard leather case	CAS 3	\$29.95
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EBP-34N Longlife NiCd battery	BAT 21	\$79.95
EBP-37N Standard battery	BAT 21A	\$39.95
EDH-16 battery case, 4 "AA"	BAT 22	\$9.95
DJ-X10T soft case	CAS 19	\$12.95
EDC-36 car lighter cable w/filter	DCC 14	\$23.95

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AR8200II leather case	CAS 21	\$29.95
AR8200II soft case	CAS 25	\$12.95
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Computer control lead for AR8200II	CBL 8	\$109.00
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AC adaptor for AR8200II	PWR 24	\$21.95

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R3 Cigarette Adaptor	DCC 18	\$24.95
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R2 CS-R2 cloning software	SFT 7	\$12.50
R3 software for Windows 95/98	SFT 14	\$19.95

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100' of RG-6U cable	CBL 100	\$24.95*
Universal Cigarette Adaptor	DCC 3	\$12.95
GRE Super Amplifier	PRE 1	\$49.95
Scancat Gold for Windows	SFT 2W	\$99.95
Scancat Gold for Windows SE Upgrade	SFT 2SE	\$59.95
2001 Police Call CD-ROM	SFT 22-01	\$34.95
Professional antenna switch	SWC 1	\$25.95

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Author Jon Van Allen in the radio room of SS Buyer during the Gulf War

General Distress and Safety Calling

Table 5 contains frequencies used by ship and coast stations for distress and safety and general purpose calling. There are three series of paired frequencies. Series A includes coast stations along, and ships in, the Atlantic, Gulf of Mexico and Caribbean. Series B includes stations in all other areas. The third series, Worldwide, is for international calling.

It is on these frequencies that you will monitor FEC broadcasts from shore stations. These broadcasts are much the same format as NAVTEX and begin with ZCZC in the message

Table 4: Simplex Distress and Calling Frequencies

ITU Ch	Freq. (kHz)	Use
450	4125	Distress/calling
451	4146	Calling
452	4149	Calling
453	4417	Calling
650	6215	Distress/calling
651	6224	Calling
652	6227	Calling
653	6230	Calling
654	6516	Calling
850	8291	Distress/calling
851	8294	Calling
852	8297	Calling
1250	12290	Distress/calling
1251	12353	Calling
1252	12356	Calling
1253	12359	Calling
1650	16420	Distress/calling
1651	16528	Calling
1652	16531	Calling
1653	16534	Calling
2251	22159	Calling
2252	22162	Calling
2253	22165	Calling
2254	22168	Calling
2252	22171	Calling

header. Marine safety Information (MSI), meteorological and navigation warnings, and weather forecasts are the most common messages transmitted. These bulletins are often identical to those transmitted on NAVTEX for local areas. These High Seas broadcasts are transmitted on HF only.

Here is a sample of an FEC broadcast received 15 October 2000 on 8428.0 kHz:

ZCZC
KEELUNGRADIO/XSX 2019
METEO TAIPEI 170430Z

MET WARNING FOR TAIWAN NAVTEX AREA
SYNOPTIC ANALYSIS 170000Z
HIGH 1024 HPA AT 34N 124E MOVING EAST 10 KTS
(Remainder of text)

BROADCASTING AT 171030UTC NEXT TIME ON 8428 kHz

NNNN

Narrow Band Direct Printing

ITU Duplex frequencies for NBDP* and data transmissions (in kHz)
500 Hz spacing

Ship TX	Coast TX	Channels
4172.5 to 4181.0	4210.5 to 4218.5	18 channels
6263.0 to 6282.0	6314.5 to 6328.0	29 channels
8377.0 to 8394.0	8417.0 to 8434.0	36 channels
12477.0 to 12530.0	12579.5 to 12632.0	107 channels
16683.5 to 16754.0	16807.0 to 16872.0	132 channels
18870.5 to 18881.0	19681.0 to 19691.5	22 channels
22284.5 to 22334.5	22376.5 to 22426.5	101 channels
25173.0 to 25182.5	26101.0 to 26110.5	20 channels

*NBDP is more commonly known as SITOR-A

These paired frequencies are where ships and coast stations communicate: Ships send and receive all kinds of messages from company business to personal email. The mode used most often is standard 170 Hz 100 baud ARQ SITOR-A. PACTOR-2. G-TOR and Clover (modified) are also used.

I wouldn't be surprised if the popular radio amateur mode PSK-31 is eventually adopted for maritime communications because of its super-narrow bandwidth. You can monitor most ship and coast station NBDP traffic with your Terminal Node Controller (TNC), software driven demodulator or your computer sound card and inexpensive or free software.

Simplex NBDP channels 500 Hz spacing

4205.5 to 4207.0	10 channels
6300.5 to 6311.5	23 channels
8396.5 to 8414.0	36 channels
12560.0 to 12576.5	34 channels
16785.0 to 16804.0	38 channels
18893.0 to 18898.0	11 channels
22352.0 to 22374.0	45 channels
25193.0 to 25208.0	31 channels

Here you will most likely find ships in contact with each other. Depending on what part of the world you are in, you might monitor shipping companies and ships exchanging messages directly without the assistance of a coast station. In the "good old days" before GMDSS and satellite email, Radio Officers kept in regular touch using SITOR and PACTOR on these frequencies. The conversations are usually informal here.

Facsimile (Fax)

Ship frequencies for Fax transmissions (kHz)

2070.5 2072.5 2074.5 2076.5 4154.5 4169.5 6235.5 6259.5
8302.5 8338.5 12370.5 12814.5 16551.5 16614.5 18847.5
18868.5 22181.5 22238.5 25123.5 25159.5

Coast frequencies for Fax transmissions (kHz)

4221.0 to 4351.0
6332.5 to 6501.0
8438.0 to 8707.0
12658.5 to 13077.0
16904.5 to 17242.0
19705.0 to 19755.0
22445.0 to 22696.0
26122.5 to 26145.0

On these HF Fax frequencies, you may hear a company sending a fax to a ship or vice-versa. Not too much activity here, but it's worth checking these out now and then.

Notice the 25 and 26 MHz frequencies allocated for data and voice. "Freebanders" operating on these frequencies assume that because they don't hear anything nobody uses the frequency. I can attest from personal experience that ships and shore stations do use 25/26 MHz marine bands. Usually these freebanders are unaware they are interfering with a shore station because they are too close to hear them and ships transmit on a different frequency. But the ship often can often hear the interfering station.

Satellite Frequencies

There was an excellent article on monitoring INMARSATs by Dave Cawley in the November 1998 *Monitoring Times* (now available via a link from the *MT* home page), so I will not rehash that information here. If anyone is inter-



Radar mast, APL Singapore

ested, here are the particulars for Satcom C INMARSAT service (data only, no voice, store-and-forward).

Transmit: 1626.5 to 1646.5 MHz
 Receive: 1530.0 to 1545.0 MHz
 Channel spacing: 5 kHz
 Modulation: Binary Phase Shift Keying (BPSK)
 Coding: R 1/2 K=7 Convolution Code
 Baud Rate: 600 bps
 PSDN X.25

The protocol is 600 baud X.25 packet. I don't know how hard it is to decode, but you need the ability to select 600 baud and understand the coding technique. You don't need a big antenna; Sat C service ship stations use a non-directional antenna about the size of a coffee can.

Miscellaneous frequencies

Aircraft Use

Aircraft can use the following marine frequencies for search and rescue, scene of action coordination, distress and safety - 2738 2830 3023 4125 and 5680 kHz

VHF Air band - 121.500 and 123.100
 VHF Marine band - Channels 6, 8, 9, 16, 18A, 22A, 67, 68, 72 and 88A.

72.02 - 72.98 and 75.42 to 75.98 MHz (20 kHz spacing, 68 channels)

These frequencies are available to fixed station operation provided there is no interference to TV channels 4 and 5 and are shared with Land Mobile and Aviation Radio Services. I've never heard anything maritime-related on these frequencies, so if you live where TV Ch 4 and/or 5 aren't active, have a listen and let us know what you hear.

Automated Maritime Telecommunications System (AMTS):

Voice, fax and data are allowed on the following frequencies: 216.000 to 218.000 and 219.000 to 220.000 MHz (25 kHz spacing, 80 channels).

So armed with our frequency lists from this article and your radios, give marine band listening a try. Who knows? You might have a ring-side seat for the next big emergency or Coast Guard search and rescue when the "perfect storm" comes along.

Table 5 - Distress and Safety

Distress and Safety Calling Frequencies (kHz unless otherwise noted)
 2187.5, 4207.5, 6312.0, 8414.5, 12577.0, 16804.5 kHz
 156.525 MHz (VHF Ch 70)

General Purpose Distress and Safety calling

Worldwide		Series A		Series B	
Ship TX	Coast TX	Ship TX	Coast TX	Ship TX	Coast TX
458.5	455.5				
2189.5	2177.0				
4208.0	4219.5	4208.5	4220.0	4209.0	4220.5
6312.5	6331.0	6313.0	6331.5	6315.5	6332.0
8415.0	8436.5	8415.5	8437.0	8416.0	8437.5
12577.5	12657.0	12578.0	12567.5	12578.5	12658.0
16805.0	16903.0	16805.5	12657.5	12578.5	12658.0
18898.5	19703.5	18999.0	19704.0	18999.5	19704.5
22374.5	22444.0	22375.0	22444.5	22375.5	22445.0
25208.5	26121.0	25209.0	26121.5	25209.5	26122.0
156.525	156.525 MHz (VHF Ch 70)				

Abbreviations and Terminology

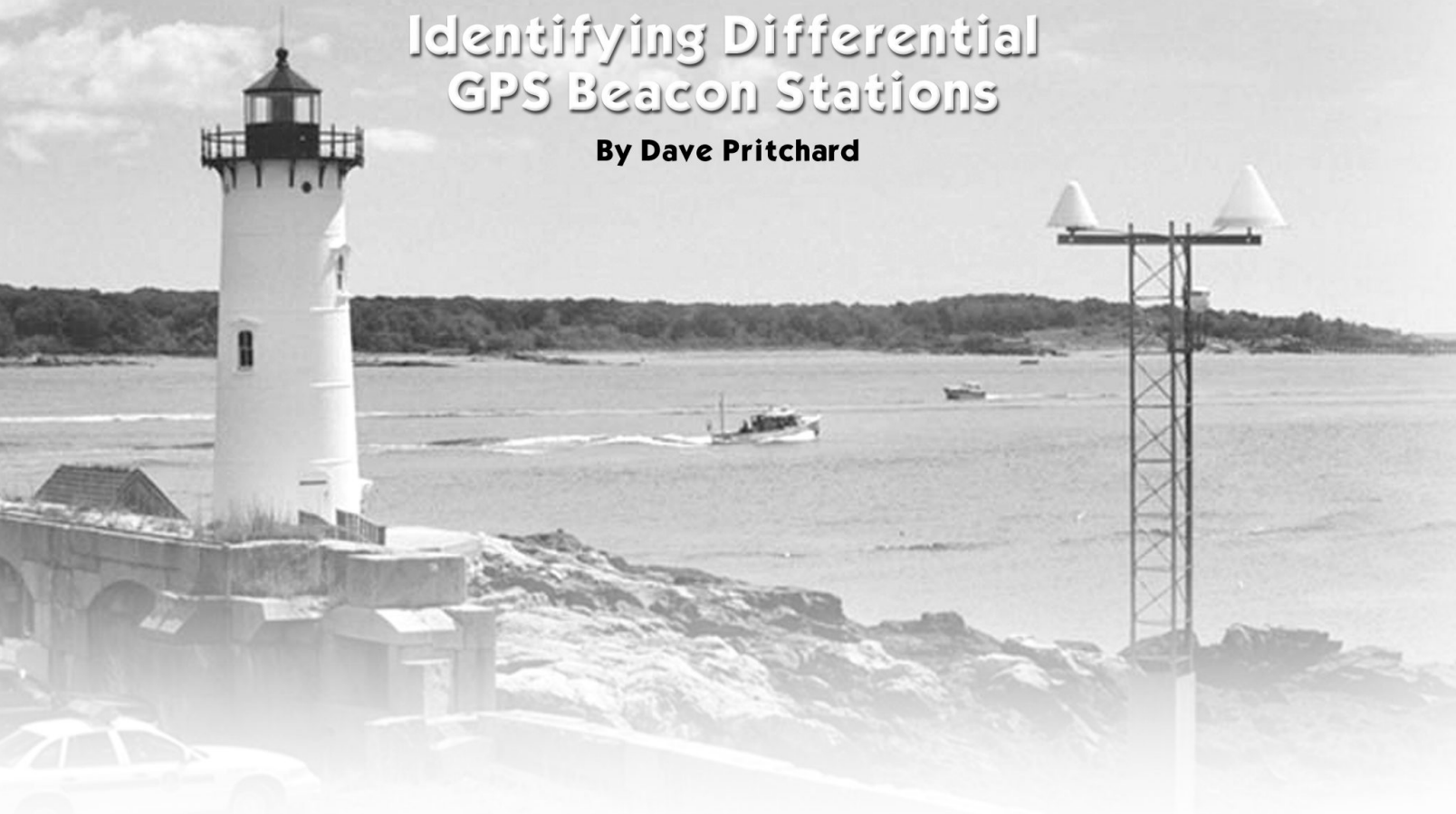
ARQ	Automatic Request to Repeat (SITOR-B)
BPSK	Bi-Phase Shift Keying
Ch	Channel
DSC	Digital Selective Calling/also distress and safety calling
Duplex	Transmit and receive on separate frequencies
FEC	Forward Error Correction (SITOR-A)
NAVTEX	Navigational Text
NBDP	Narrow Band Direct Printing
NPS	National Park Service
PC	Public Correspondence
QSO	Conversation
Simplex	Transmit and receive on the same frequency
SITOR	Simplex Telex Over Radio
SSB	Single Side Band
TX	Transmit Frequency
USCG	US Coast Guard
USB	Upper Side Band
VTS	Vessel Traffic Safety



Alpha-1 pulls the APL Singapore from the dock in Singapore

Identifying Differential GPS Beacon Stations

By Dave Pritchard



Many of us enjoy the challenge of receiving and identifying low-frequency (LF) navigational beacons. Navigational beacons operate between the frequencies of 190 and 535 kilohertz (kHz). They are used primarily to identify the location of airports but they also aid with marine navigation.

Beacons range in power from as little as 25 watts to as much as several thousand watts depending on their location and intended use. Beacon signals, especially during nighttime hours, can travel hundreds, even thousands, of miles making an exciting DX catch. During the winter months atmospheric noise caused by thunderstorms is at a minimum, which greatly enhances reception. Many a winter night I will set the alarm for 2:00 a.m. and try and score a new catch for the log.

Until recently, all navigational beacons were easily identified because they continuously transmitted a unique Morse code identifier. I guess that's one of the reasons I enjoy beacon monitoring so much: you never have to wait for a station break to get a positive identification (ID) on the station you're listening to. Over the past several years, I have logged over 150 different beacons from my home in northeastern Illinois. However, a couple of years ago, I began to notice strange sounding digital signals in the middle of the LF beacon frequency band. What happened to the beacons I used to hear on these frequencies?

Beacons and the Global Positioning System (GPS)

The Global Positioning Satellite System (GPS) is an aid to navigation that was designed by the Department of Defense. GPS uses a constellation of 24 orbiting satellites that transmit signals back to Earth in the L-band frequency range (1,500 MHz). GPS receivers are designed to receive signals from a minimum of four satellites simultaneously and they use the information to accurately calculate where you are, virtually anywhere on Earth.

Most of you have probably experimented with a GPS receiver at one time or another. You may have used a portable receiver while hiking or boating. Or, you may have rented a car with a built-in GPS receiver and display. So, many of you have seen, first hand, how well the GPS system works. Unless the Department of Defense purposely limits the accuracy of the GPS system during a military crisis, GPS accuracy is about 15 feet. But what if you need accuracy down to a few feet while navigating a vessel through a narrow harbor entrance? The Differential Global Positioning System (DGPS) is a relatively new enhancement to the GPS system that can provide the additional accuracy required for specialized applications. Here's where beacons become involved.

DGPS Basics

Since the GPS satellites orbit the Earth at a height of 10,898 nautical miles, propagation delays and atmospheric conditions can cause the

satellite signals to arrive at the receiver at slightly different times. This will produce small errors in the receiver circuitry, which will translate directly to errors on the displayed position. To increase the accuracy of the system, DGPS works on the theory that if you know exactly where you are on Earth to begin with, you can place a GPS receiver at that exact spot and compare the known position reference against the information being received from the satellite.

At DGPS beacon sites, GPS receive antennas are mounted on masts that are placed on a precisely surveyed latitude and longitude. Sophisticated electronics at the site constantly compare the received data from the GPS satellites to the site's known reference position and then send correction information to the LF beacon transmitter that previously only broadcast a Morse code ID.

That is the reason why many marine navigational beacons in the 285 – 325 kHz range began transmitting the strange sounding digital signal. Specially equipped GPS receivers can decode the digital signal that contains the position correction information. Mariners navigating in the Great Lakes region, Alaska, Hawaii and Puerto Rico are the intended users of the DGPS service, but coverage is being expanded to include many inland areas as part of the Federal Aviation Authorities Wide Area Augmentation system and the proposed Railway Collision Avoidance System. Many additional LF beacons will be converted for DGPS operation in the coming years.

Figure 1 (above photo) shows a picture of

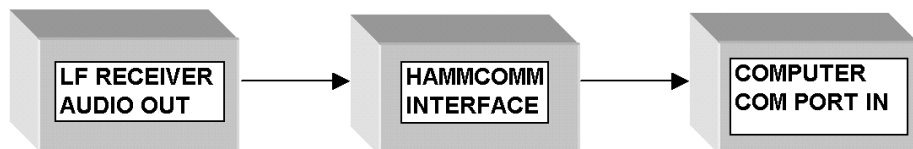


Figure 2 - "Connection Diagram"

the satellite receive antennas at the Portsmouth Harbor, New Hampshire, DGPS transmitter site.

The Identity Crisis

So, how can you identify these new beacons that no longer transmit a Morse code ID? DGPS transmitters use MSK (minimum shift keying) modulation at speeds of either 50, 100 or 200

bauds per second. Once decoded, the digital data stream contains the transmitter ID along with the GPS correction information. A fairly inexpensive computer program called RadioRaft can decode the DGPS data stream and provide a positive ID of the station. Since each DGPS transmitter is assigned a unique numeric ID called a Reference Station ID, there is no guesswork involved.

RadioRaft is available directly from the program's author, François Guillet. Along with DGPS signals, RadioRaft decodes a wealth of other digital modes that will be of interest to both shortwave listeners and hams alike. The program costs about \$30.00 and can be ordered on the author's WEB site at <http://perso.wanadoo.fr/radioraft/>

The program is DOS based and is not recommended to run under Windows™. It uses the popular Hamcomm interface to decode the audio signal audio directly from your receiver (Figure 2).

You do not need to use a discriminator output from your receiver for the program to work. An external speaker or headphone output works

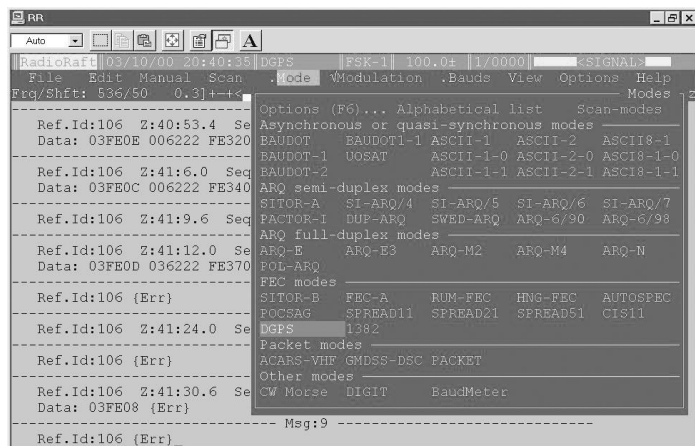


Figure 3 - "RadioRaft Mode Selection Menu"

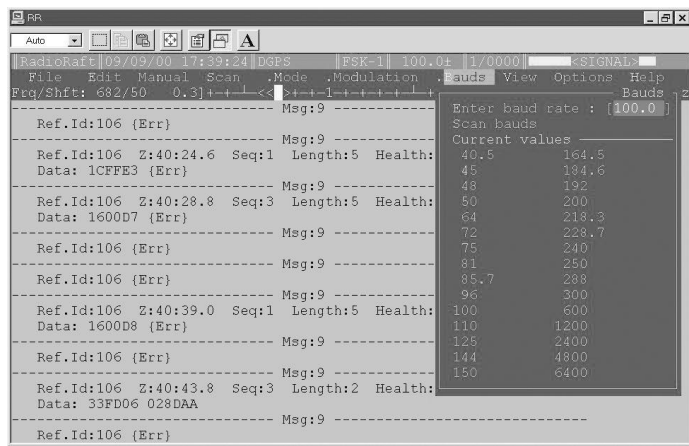


Figure 4 - "RadioRaft Baud Selection Menu"

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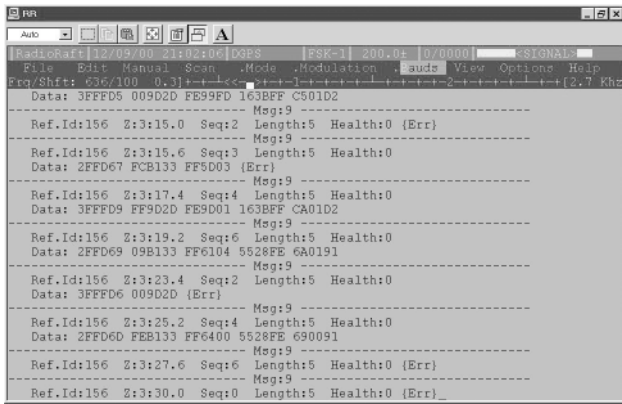


Figure 5 - "Decoded Data From DGPS Beacon In Rock Island, Illinois"

best. Most line or tape outputs will not have enough level to drive the Hamcomm interface. You will need a free Com port on your computer to connect to the output of the Hamcomm interface.

Documentation included with the RadioRaft software provides detailed information on how to install, set up and run the program. The author even includes a schematic for constructing a Hamcomm interface in case you don't already have one. I have used the program with both an Icom R71A receiver and a Sony SW100 portable with good results. As is true with any LF signal, a good antenna and ground system are essential.

After starting the program you need to tell RadioRaft which Com port your computer is using. After selecting the proper Com port, select the DGPS mode under the MODE menu (Figure 3) and then select correct baud rate using the BAUD menu (Figure 4).

The program is capable of automatically scanning the different modes and baud rates until it finds and locks onto the correct combination. I found it easier to manually select the DGPS mode and baud rate of the station I was attempting to receive. Because the DGPS system uses minimum shift keying (MSK) modulation, your receiver should be set for Single Sideband (SSB) operation. Tuning is somewhat critical, since the program does not perform a true MSK demodulation routine. MSK demodulation would require the receiver to pass audio frequencies below 100 Hz., which many receivers won't be able to do. So, the program uses an FSK demodulation routine. Signal strength and tuning meters are included on the main display and it does not take too long to get the hang of setting up your receiver. With careful tuning, the program was able to decode received signals that were just above the noise floor.

Once you have properly tuned in a DGPS beacon, the program will begin displaying the received data in the main display window. Figure 5 shows decoded data received from the DGPS beacon located in Rock Island, Illinois (Reference I.D. 156).

The first part of each displayed message shows the Reference I.D. This is number of most interest, since it represents the transmitter ID for the beacon you are receiving. The display also shows all of the other data being transmitted by the beacon. The Z number shown represents the

time in Universal Coordinated Time (UTC) at which each correction was computed. The sequence and length fields refer to the format of the data in each message and the health number represents the status of the beacon transmitter.

You will note that each DGPS message is assigned a message header number. The most common message number will be 9 for messages containing the DGPS correction data. Messages labeled with header 7 or 16 are sent in plain text and usually contain special information pertaining to the beacon's operation, including the site's exact latitude and longitude. These messages are sent fairly infrequently.

A current list of operating DGPS beacons including their location, baud rate and reference ID is provided in Figure 6.

This information can be obtained directly from the U.S. Coast Guard Web site at <http://www.navcen.uscg.mil>. Here you will find the most up-to-date information on the location, frequency, power, baud rate and reference ID for every U.S. DGPS beacon. Stations that are temporarily off the air for maintenance, or operating with reduced power are also noted in the list. This site also contains additional information on DGPS theory and operation.

(Editor's Note: At presstime the primary NAVCEN web site was down due to technical difficulties until further notice. They are cur-

rently using a NAVCEN secondary web site at: <http://www.nis-mirror.com/default.html>.)

Keeping the Beacon Hobby Alive

The ability to be able to decode and identify the DGPS a beacon has added a new dimension to the DX hobby. As with other forms of professional and amateur radio communications, digital is becoming a preferred mode for operation. Thus, it is becoming more of a challenge for the listener to accurately keep track of what he or she is hearing on all the bands.

For me, personally, beacons remain one of my favorite DX targets and I was disappointed when some of the familiar Morse code IDs disappeared. This program helps keep new technology from interfering with what I believe is one of the most challenging forms of the DX hobby.

More and more beacons are scheduled to begin transmitting DGPS signals in the next few years, as coverage of the system is expanded inland across the United States. Using the RadioRaft program is a fairly easy way to help keep your beacon log accurate and eliminate the frustration of not being able to tell how far your latest beacon catch traveled.

About the Author:

Dave Pritchard holds Amateur Radio callsign W9QL and has been active in the radio monitoring hobby for over 30 years. He is a member of the Institute of Electrical and Electronic Engineers (IEEE) and the Society of Broadcast Engineers (SBE).

CITY	STATE	FREQ (Khz.)	BAUD (BPS.)	REF. I.D.	CITY	STATE	FREQ (Khz.)	BAUD (BPS.)	REF. I.D.
ALEXANDRIA	VA	305	100	40	MEMPHIS	TN	310	200	152
ANNETTE ISLAND	AK	323	100	278	MIAMI	FL	322	100	20
APPLETON	WA	300	100	172	MILLERS FERRY	AL	320	200	160
ARANSAS PASS	TX	304	100	32	MILWAUKEE	WI	297	100	106
BIORKA ISLAND	AK	305	100	280	MOBILE POINT	AL	300	100	26
BRUNSWICK	ME	316	100	42	MORICHES	NY	293	100	6
PORTSMOUTH	VA	313	200	42	OMAHA	NE	298	200	166
CAPE CANAVERAL	FL	289	100	18	PENOBSCOT	ME	290	200	44
CAPE HENLOPEN	DE	298	200	10	PICKFORD	MI	309	200	110
CAPE HINCHINBROOK	AK	292	100	288	PIGEON POINT	CA	287	100	266
CAPE MENDOCINO	CA	292	100	270	POINT BLUNT	CA	310	200	268
CHARLESTON	SC	298	100	16	POINT LOMA	CA	302	100	262
CHATHAM	MA	325	200	4	PORTSMOUTH	NH	288	100	2
CHEBOYGAN	MI	292	200	112	POTATO POINT	AK	298	100	290
CHICO	CA	318	100	256	REEDY POINT	DE	309	200	170
CLARK	SD	309	100	146	ROBINSON POINT	VA	323	200	274
COLD BAY	AK	289	100	296	ROCK ISLAND	IL	311	200	156
DETROIT	MI	319	200	116	SAGINAW BAY	MI	301	100	114
DRIVER	VA	289	100	12	SALLISAW	OK	299	200	162
EGMONT KEY	FL	312	200	24	SANDY HOOK	NJ	286	200	8
ENGLISH TURN	LA	293	200	28	SAVANNAH	GA	319	100	36
FORT MACON	NC	294	100	14	ST LOUIS	MO	322	200	154
FORT STEVENS	OR	287	100	272	ST PAUL	MN	317	200	158
GALVESTON	TX	296	100	30	STURGEON BAY	WI	322	100	104
GUSTAVUS	AK	288	100	284	UPOLU POINT	HI	286	100	258
HARTSVILLE	TN	317	100	144	UPPER KEWEENAW	MI	298	100	102
ISABELA	PR	295	100	34	VANDENBERG AFB	CA	321	100	264
KANSAS CITY	MO	305	200	164	VICKSBURG	MS	313	200	150
KENAI	AK	310	100	292	WHIDBEY ISLAND	WA	302	100	276
KEY WEST	FL	286	100	22	WHITEFISH POINT	MI	318	100	108
KODIAK	AK	313	100	294	WHITNEY	NE	310	100	148
KOKOLE POINT	HI	300	200	260	WISCONSIN POINT	WI	296	100	100
LOUISVILLE	KY	290	200	168	YOUNGSTOWN	NY	322	100	118
MACON	GA	301	200	48					

Figure 6 - "Currently Operating DGPS Beacons"



Hawaii DXpedition

By Hans Johnson

Over the years, I have been fortunate enough to make a half dozen trips to Hawaii. Most were vacations in which I brought along a portable and listened to shortwave broadcast stations when not at the beach or rain forest. I have also made two full-fledged DXpeditions to Hawaii.

Now why on earth would anyone do such a thing? Remember when you first started DXing – how exciting the bands were and how it seemed almost overwhelming? That's what DXing in Hawaii is like, it is that much fun. There are also some very practical reasons to DX from Hawaii.

It is Easy

There are excellent flight connections to Hawaii from North America. Nor is the flight anywhere near as long as trying to fly to Europe, Africa, or Asia proper.

You've transported yourself to an exotic location (a little like Asia, I would argue), yet just about everything in Hawaii works the way it does at home. Renting a car or getting a hotel is the same. Just plug in your equipment and it will work just fine; no need to lug along bulky converters or operate on batteries if you don't want to.

Speaking of equipment, most communications receivers will fit in an overhead bin and no one will raise an eyebrow as you get off of the plane with it.

It is Cheap

At least compared to other exotic locations, getting to and staying in Hawaii is cheap. Shop around and you will find deals that will essentially throw in your hotel and rental car for free with your air fare.

The Choices are Plentiful

Now that I have convinced you to go, how should one go about DXing in Hawaii?

Chances are that you will be staying in a hotel. Check conditions from your room, especially from your lanai (Hawaiian for porch). I have been pleasantly surprised at times at how quiet conditions have been right from the lanai. If this doesn't work, then scout around the hotel grounds for a picnic bench. Most of the places I have stayed have them, and weather conditions will be quite pleasant for listening outside. In either situation, you'll be able to at least string a short wire. Personally, I have never gone with anything fancy – just about 20 feet of whatever scrap wire I had around the house.

If you do decide to go on a full-fledged DXpedition, let me suggest the following as places to stay. One, check out the state parks system in Hawaii. On a few islands, they have cabins you can stay in. The cabins offer basic accommodations and are an excellent value for the money. A bonus is that they are in re-

mote areas offering quiet radio conditions and room for antennas. For a bit more money, bed & breakfasts will give you more upscale surroundings. Concentrate on the ones away from the beach for quiet conditions and room for antennas. If you are in the military, be sure to check out the various military recreation camps.

Because of the time change, you'll find yourself waking up quite early. Here's a chance to squeeze in some DXing before the rest of the family wakes up. If you are on a DXpedition, this is the time to concentrate your efforts. The below guide focuses on shortwave broadcast stations that are difficult to hear in North America. All times are in universal time (UTC) and all frequencies are in kilohertz (kHz).

Good luck on your listening vacation! Don't forget to report your results to *MT*.

Good Listening from the Islands

AFRICA

Stations from the eastern and southern part of the continent come in best. I have never had much luck with the west or the north from Hawaii.

Somalia The radio country of British Somaliland can be heard via Radio Hargeisa on 7530 upper side band (USB)

around 1700. From the rest of Somalia (Italian Somaliland) at the same time, try for Radio Mogadishu on 6750 USB, Radio Baidoa 6806, Radio Gaalkacyo 6985, and Radio Banaadir on 7020. All programming is in Somali. Somali stations come and go and they often change frequency. Have a look at the Somali station guide at <http://www.cumbredx.org> for the latest information.

Zimbabwe The Zimbabwe Broadcasting Corporation's Radio Two can be heard in vernaculars and English at 0350 and 1600 on 6045.

Zambia's Radio Two is on 6165 at 0500 and Christian Vision is on 6065 in English at the same time.

Namibia NBC is strong on 3270 and 3290 at around 0330.

Madagascar The 90 meter band outlet of RTV Malagasy is heard on 3287 between 1500-1700.

Mozambique's domestic service programming in Portuguese on 15293 at 1400 and at 1630 on 3210.

Tanzania can be heard at 1500 on 5050. 5985 is also a frequency to check for at this time.

Kenya The Kenya Broadcasting Corporation outlets are quite irregular these days, but are well heard when active. 4885, 4915, and 4935 are all worth checking at 1700.

Congo Rebels operate the former Radio CANDIP on 6828 around 0400. 5066 and 3390 are alternate frequencies. If active, Radio Tele Liberte should be active on 15725 after 1800.

Rwanda Radio Rwanda is quite easy on 6055 at 1600.

Burundi Radio Burundi If they ever reactivate 6140, this will be the place to hear it. Try around 1700.

Central African Republic Radio Ndeke Luka might be active by the time you read this. Try 9900 or 5900 at 1800 or 0500.



ASIA

Since you are now anywhere from 2,500 to 5,000 miles closer to these stations, reception is much better.

India The All India Radio (AIR) domestic stations on 60 and 90 meter bands are heard daily for several hours prior to their sign off. Now is the time to focus on some of the harder ones. Try for these between 1500 and 1730: Shimla 3223, Bhopal 3315, Leh 4760 (not to be confused with co-channel Port Blair.), Srinagar 4950, Itanagar 4990, and Aizawl 5050. Most of the AIR stations carry English news at 1530.

Indonesia As with India, concentrate on the harder outlets of the domestic service: 2899 Ngada, 2960 Manggarai, 3231 Bukittinggi, 3542 Sumba Timur, and 3630 Bul at 1200.

Japan NHK operates a network of small transmitters that relay the NHK domestic services. Try for these daily at 1200 in USB: Tokyo on 3607.5 and Osaka on 3373.5. Fukuoka is irregular but is found on 3259. Sapporo is daily on 3970 after 1300.

Malaysia is difficult from the East Coast. Start with their English domestic service on 7295 at 1400. After that, pick up the radio country of Sarawak via 7270 and Sabah on irregular 5979.

Laos On 4662.2 is the regional station at Houa Phan. Try at 1200 when they are parallel to 6130 with news in Laotian. Try for the station at Luang Prabang on variable 6970 at the same time.

Vietnam's regional stations are much easier from Hawaii. The most accurate guide is on the Cumbre DX website, but here are a few to try for. All programming is in Vietnamese and the stations are heard from 1200 to 1400: Son La 4796, Lao Cai 5597 and 6684, Lai Chau 6381, and Cao Bang on 6501.

Philippines Although inactive at present, it is worth checking for DZRM in the vicinity of 9580 around 0800.

Korea North 2624 and 3025 Front-line Soldiers' Radio is irregular, but try around 1630.

Sri Lanka Their tropical band services are tough even from here, but try 4870, 4902, and 5020 around 1500.

PACIFIC

Papua New Guinea Just prior to 1200, try for Radio Enga 2410, Radio Central 3290, Radio Western 3305, and Radio Northern on 3345.

New Zealand I find the Radio Reading Service increasingly difficult to hear, but I still would take a shot at it around 1300 on 3935.

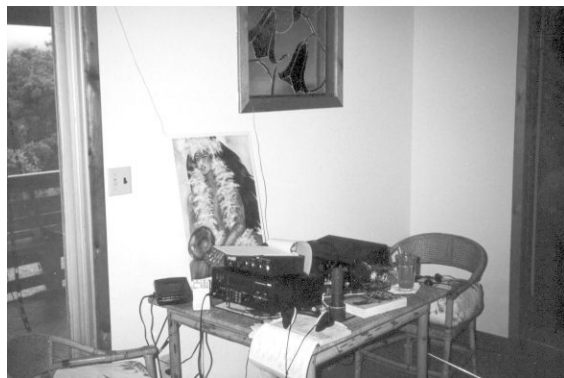
Kiribati Radio Kiribati is long inactive on 9810. In spite of their vows to return, I don't think they are coming back. I'd still check this frequency all the same between 0530 and 0930.

MIDDLE EAST

Afghanistan English news from the Voice of Shari'ah on variable 7083 is heard at 1530.

Pakistan The Azad Kashmir Radio service is much easier here. Have a listen to 4790.4 at 1600.

Turkey Listen for Turkish music coming from the weather station in Ankara on 6900 at 1600.



LATIN AMERICA

Although Hawaii is distant, it gives you a different look at the region, allowing for reception of some stations that are much more difficult from the mainland.

Ecuador Radio El Buen Pastor on 4815 at 1000.

Honduras Radio Litoral signs on after 1300 on 4832.

Peru Radio Radio Chincheros on 4763 at 1030.

CLANDESTINE

The Zimbabwe opposition station Voice of the People at 1700-1755 on 7120 from Madagascar.

The Kashmiri separatists' Voice of Jammu and Kashmir Freedom with English at 1400 on 5101. This one is believed to be via Pakistan.

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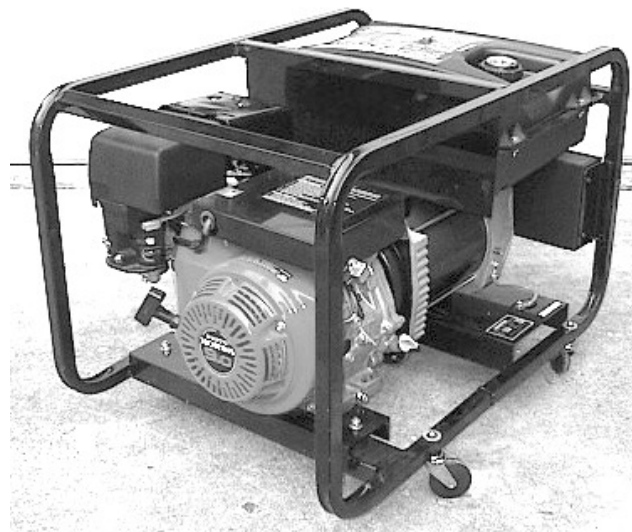
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Generating Power

By Haskell Moore, W5HLM
Email: w5hlm@aol.com



It's a normal morning around our home as the family prepares for work and school. The house is warm and cozy, my wife is running the hair dryer, the TV is on in the background, and all the lights burn brightly. So what's so unusual about this situation? Because the rest of the neighbors are sitting in their cold, dark homes due to a power outage!

In the year and a half that I've owned a generator, we've survived furious Texas storms and close calls from hurricanes, yet not once did we lose electrical service at our home. But it only took one rotten tree branch across a local distribution line to knock out the power on one of the coldest days of the year!

In the United States, electrical service is so reliable that we tend to take it for granted. Rarely do we ever flip the wall switch and the lights fail to come on. But when the power does go out, it can wreak all sorts of havoc. Everything from minor conveniences, such as hair dryers, to life-sustaining necessities (anything from the coffee maker to life support), can be rendered inoperative!

So what can a person do to minimize the impact of an electrical disruption? Well, obviously generators are one solution that can provide power to a household or small business when the lights go out. Many are reluctant to consider a generator because of the perception that they are expensive or complicated to own and operate. But as you will see, backup power can be as simple and economical or as complicated and expensive as you make it.

Customized Current

In order to determine the size of generator for your needs, you must first determine the amount of power (measured in watts) that you will require. A "watt" is a basic measure of power derived by multiplying voltage times amperage. To determine the load that will be placed on your generator, you must add up the combined wattage of all devices you intend to run simultaneously. All electrical de-

vices in your home should have either the wattage or amperage stated somewhere on a tag affixed to the device. If the current consumption is stated in amps, it can be converted to watts by multiplying amps by 120 (where 120 is the average voltage for homes in the United States). For example, for an electrical device that draws 1.5 amps, multiply 1.5 amps times 120 volts to determine a load of 180 watts.



Some items are easy to determine, such as a 100-watt light bulb, which obviously, draws 100 watts. However, anything using an electric motor, such as a refrigerator, is a bit more complicated. The power required to start the motor can be as much as three times the current it takes to run the motor. So when calculating the load for motors, or devices which use motors, you must use the "starting" wattage, not the "running" wattage. Special attention should be given these calculations for those who plan to use a generator to run a well pump, since it also may affect your ability to get water into the home.

As you choose a generator, there are a couple of important details regarding specifications. First, make sure that you select a generator based on its "rated" capacity as

opposed to its "maximum" capacity. As a rule of thumb, rated capacity is approximately 90% of the maximum capacity. For example, a generator advertised as 1,000 watts may only have a rated capacity for 900 watts, and only be able to sustain the 1,000-watt load for a short period – perhaps only a few minutes. Another detail to consider is the fuel usage. Very often, the fuel consumption is based on a 50% load. In actual service where the load is higher, your true run time may be as little as half as the advertised run time.

For the purposes of this article, I will divide the generators into three broad categories: 500 – 1000 watts, 3000 – 6000 watts and 10,000 – 15,000 watts.

Generators in the 500 – 1000 watt category are limited to relatively light-duty tasks, such as powering a few ham radios or scanners, charging batteries, and supplying power for emergency lighting. But keep in mind that they cannot power any significant electrical devices, like a portable electric heater or perhaps not even a regular coffee maker! On a positive note, generators in this category are typically more affordable and portable, and are easier to move around the home or transport. This may be a consideration if you wish to take your generator with you when camping, or perhaps to power the rigs on your next ham radio field day outing (see *On the Ham Bands*, p.74) or other DXpedition.

The 3000 – 6000 watt units are capable of handling most of the necessities and many of the luxuries of an average household. This may include the blower to the furnace (but not a central electric heater), many home appliances, normal household lighting, as well as the full gamut of communications gear. On the other hand, they may weigh over two hundred pounds and require wheels to allow one person to move them about.

Top of the line models in the 10,000 – 15,000 range provide the power to run all electrical devices and appliances, including electric heat and central air systems, in a typical home. With a generator of this size, the occu-

pants of the home may go about their business as if the external power had never been interrupted. Generators in this class are usually permanently mounted and wired directly into the home's electrical system.

Getting Wired

If you don't have your generator wired into your home electrical system, then you will need one or more heavy extension cords. Be sure to calculate the total load that will be carried by the cord, then choose one which will safely handle the load. It's also a good idea to get a cord rated for about 30% more than required to give you some margin of safety.

As with your home electrical system, your generator should be properly grounded for safety. The size of the ground rod and wire will vary according to the size of the generator and your unique wiring configuration. You should check with an electrician for further information on grounding requirements for your particular situation.

For those who want the ultimate in safety and convenience, having the generator wired into the home electrical system is perhaps the best option. Though this is not a simple or cheap undertaking, the benefits usually make it well worth the effort and expense.

In my case, I chose to hook the generator into the home's electrical system with the EmerGen manual transfer switch from Connecticut Electric. This solution allows me to safely route electricity to six of the most critical circuits in my home. The transfer switch completely isolates the incoming line voltage from the generator, and vice-versa. The two built-in meters allow me to balance the load and monitor the total wattage to ensure that I don't overload the generator.

If you do choose to connect your generator into your home electrical system, I strongly recommend that you have this done by a licensed electrician. The potential for electrocution, fire or damage to your equipment is just too great to treat this as a do-it-yourself project.

Regardless of whether you use extension cords or hardwire the generator into your home, you should start the generator and allow it to warm up for a few minutes before applying a load. Then, the devices should be added progressively if possible. One of the advantages of the EmerGen switch is that each circuit can be switched on or off individually, allowing you to increase the load on the generator one circuit at a time.

Like all emergency equipment, the generator should be carefully maintained and checked periodically. I start my generator up on a weekly basis, apply an electrical load, and let it run for about fifteen minutes. All maintenance, including oil changes, should be done according to manufacturer's speci-

cations. And since Murphy's Law never takes a holiday, you should have extra oil, fuel filters and spark plugs on hand.

One option that you should strongly consider for your generator is an electric starter. Depending on the generator, this can add \$200 or more to the cost of the unit. However, a strained back in the middle of a blizzard can render all of your expense and planning useless. Due to the large engine required, this is especially true for generators of 5,000 watts and up. If you choose not to purchase a generator with an electric starter, then you may wish to consider a generator with a Honda engine that employs Automatic Compress Release (ACR). My generator, a Master model MGH5000, is equipped with a large Honda nine-horsepower engine with ACR. Yet it starts on the first pull every time with a short, easy tug of the rope.

Safety Tips

Safe storage of gasoline for your generator should be one of your primary concerns. Since gasoline vapors can escape the storage can and linger until ignited, I strongly suggest that only UL approved safety cans be used. To further reduce the chance of fire or explosion, gasoline should be stored in a separate storage shed as far away from the home as possible. Never try to add fuel to a running or hot generator. It's also a good idea to have a fire extinguisher in the proximity of the generator (though not directly over it, since if a fire erupted, you'd be unable to access the extinguisher!)

When storing gasoline, either in separate cans or in the generator's tank, the fuel can begin to degrade in as little as two months. Bad gas can leave a gummy residue in the carburetor, preventing the generator from starting, and may require overhaul of the fuel system. To prevent this problem, I use an additive called STA-BIL in both my generator's gas tank and my gas storage cans. The manufacturer claims that this product extends the storage life of your fuel for as long as 15 months. I've used it continuously in my generator since it was new, and I've never had a problem with the fuel going bad. However, just to be on the safe side, I swap out the gas every six months and put the old gas in my car. To keep track of the age of the fuel, I write the date on a label and affix it to the side of the generator and on each gas can.

Since internal combustion engines emit carbon monoxide – a deadly colorless, odorless gas, you should NEVER run your generator in enclosed area where people or animals are present! Also, you should be cautious that the exhaust is not being allowed to enter the dwelling through an open window or vent inlet. Carbon monoxide is deadly, and should be treated as a serious threat!

Conclusion

Whether you choose to go with the 1,000 watt "minimalist" approach, or a large, fully redundant system, a generator can make life a lot more tolerable in the aftermath of a hurricane, blizzard or other natural disaster. For most of us, this is a fairly sizeable investment, so it would be wise to take time to do your research first. Then when the lights flicker and the house goes dark, well, at least you can make a cup of coffee and listen to your scanner!

Disclaimer: The author has no affiliation with any of the companies or products mentioned in this article.

Internet Links

Useful generator selection guide from **Mayberry's Sales & Service**: <http://www.mayberrys.com/honda/generator/html/selection.htm>
STA-BIL gasoline stabilizer: <http://www.goldeagle.com/sta-bil/>
Safety Gas Storage Cans: <http://www.securallproducts.com/safetycans.htm>
Transfer Switches: <http://www.connecticut-electric.com/>
Master Generators: <http://www.internationaltool.com/master.htm>
Honda Generators: <http://www.hondapowerequipment.com/gen.htm>
Generac Generators: <http://www.generac.com/guardian/index.cfm>
Onan Generators: <http://www.onan.com/na/pages/en/products/powergeneration/portablegenset/index.cfm>

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Getting Started in 2 Meters

One of the most exciting amateur radio bands is also the easiest with which to start your amateur radio hobby. The 2 Meter ham band (144.00-148.00 MHz) brings a full spectrum of radio opportunities for the ham and scanner enthusiast alike. What's more, equipment for operating or listening in this band is small, inexpensive and easy to operate. It's also a band which has more to offer than just local chit-chat on repeaters.

◆ 2 Meter Band Plan

The first thing to do when you want to scope out all the possibilities of any one band in the Amateur Radio Service is to visit the Band Plan (see Chart #1). This is a systematic layout of frequencies for each band which is broken down into categories of use. Band plans are developed by the American Radio Relay League with the input of thousands of hams from all across America, incorporated into FCC rules and widely published. You can find band plans for all the amateur radio bands in the FCC Rule Book, published by the ARRL or on their website [see Chart #3].

Having a band plan in the first place helps make coherent use of our limited amateur radio spectrum and allows enthusiasts of every mode to practice their art without unwitting interference from fellow hams. Still, you may be surprised at the number of "old timers" who have little idea of what the various band plans are except for a general awareness of where the CW and Phone sub-bands are. I once heard two Extra Class operators cheerfully rag-chewing on what they thought was a good simplex FM frequency which, in fact, was the U.S. Space Shuttle downlink frequency. Needless to say, those of us standing by for an oft-dreamed contact with the Shuttle as it flew over were disappointed.

The 2 Meter band plan is particularly interesting because not only are the frequencies used for reliable local communications, but they're also used for space communications including Earth-Moon-Earth (EME) transmissions, communications from the new International Space Station (ISS), and several more amateur satellites

delivering voice, data or CW (see chart #2). Believe it or not, the 2-1/2 to 5 watts most HTs put out is more than enough to travel the 200 miles above the Earth at which the Shuttle orbits. It just goes to show that if you have a completely uninterrupted line-of-sight to your target station, low power FM on 2 meters can do the job.

◆ It's OK Just to Listen

Many current hams got their start by using their scanners to monitor the action on their local repeater or listening to Space Shuttle traffic. But, there's plenty more to tune in. During weather emergencies most local ham clubs activate emergency operations taking over designated repeaters and making them their headquarters for the duration of the emergency. Monitoring these repeaters will afford a much more in-depth and up-to-the-minute picture of the unfolding emergency than listening to commercial radio.

Most local ham clubs have regularly scheduled on-air meetings where local issues are discussed, instructional presentations are made and often end with buy/sell nets where local hams deal their old gear or shop for used equipment. These on-air meetings also serve as billboards for up-coming related events such as local ham fests and in-person club meetings. Times, dates and locations of such club meetings are given and non-club members are almost always welcomed. This is a great opportunity to meet some of the regular voices you hear on the repeater as well as a chance to get a close-up feel for the folks who may share your radio enthusiasm in your particular area.

Another great service offered on many repeaters is the retransmission of Amateur Radio Newline, a well produced weekly radio news program which features current news about hams and their activities from around the U.S. and the world. Actual interviews are aired as well as updates on FCC actions, League happenings and anything else pertinent to the tens of thousands of hams who tune in each week. You can find out which repeater carries Newline by checking out their website (see Chart #3). If you missed this week's show the web site also has texts of previous shows available for reading as well as archives of the audio.

◆ Traditional 2 Meter FM

The 2 meter band has become synonymous with FM transmissions and the widespread use of handi-talkies (HTs) working through repeaters. In

the '80s and early '90s it was the best way for hams to communicate with each other locally. With a sprawling network of well maintained repeaters, 2 meters offered easy mobile communications, often with access to numerous features including phone patches, digital voice mail, signal reports as well as time and weather information at the touch of a few buttons on the HT's keypad. Bringing up one of these repeaters was always an easy way to impress prospective hams.

Despite the availability of more low-priced UHF gear and their associated repeaters, 2 meters remains the dominant mode for the bulk of American hams. It's also the first gate of entry into the world of amateur radio for the hundreds of thousands of Technician Class licensees. These numbers increased dramatically following the creation of the "No-Code Tech" license. As predicted by many, numbers drive numbers and prices for 2 meter HTs plummeted as the number of hams increased. Even so, the more dramatic rise in the use of cell phones has taken the sheen off amateur radio's star attraction. The privacy and easy availability of the cell phone has made 2 meters a less attractive option for personal communications.

Another big attraction on 2 meter FM is the use of digital repeaters which use traditional FM repeaters for the collection and distribution of packet e-mail. Years before the Internet became popular, hams were busy sending each other e-mail via these "digipeaters." Many of these repeaters also feature Bulletin Board Systems (BBS) which are continually updated and keep hams abreast of DX openings and local happenings. Using your scanner and a computer with an interface such as the TigerTronics BayPac MultiMode converter you can tune in to your local digipeater and "read the mail."

Not all 2 meter FM activity is done with repeaters. Operating with both parties on one frequency is known as "simplex." The band plan provides for several simplex sub-bands (see chart). Hams generally use simplex when they don't



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want to tie up a repeater with a normal "rag chew" contact. The problem with FM simplex is that signals don't tend to go far especially when both parties are using low powered HTs. However, higher powered mobile 2 meter rigs (40-50 watts) when used with a multi-element boom on a mast-mounted rotor will get a considerably larger use radius extending to 10-30 miles depending on antenna height and terrain.

◆ The Sideband Side of 2 Meters

Another unpublicized feature of 2 meters is that Single Sideband (SSB) and Morse Code (CW) are used at several places in the band plan. Until recently these sub-bands have seen little action. But, the introduction of all-band, all-mode, high-end transceivers may bring this part of the band to life. Those not willing to spring for the \$3,400 price tag may want to check out MFJ's 9402X 2 meter SSB 7 watt transceiver. Capable of linking up with low cost linear amplifiers, this \$300 "SSB Adventure Radio" may also help boost 2 meter sideband activity.

A few things to keep in mind when thinking about getting into 2 meter SSB is that there are no SSB repeaters and that multi-element beam antennas are needed. In fact, the typical antenna for 2 meter SSB includes a pair of 10 or 13 element Yagis side-by-side on a mast. These antennas must also be mounted horizontally as 2 meter SSB is not vertically polarized as is 2 meter FM. EME or "moonbounce" enthusiasts will use a dozen or more of these antennas mounted on a dual axle boom for SSB or CW communications via the Moon.

2 meter CW could be a great way for a couple of Technician Class friends to work on their code speed in order to take the General Class exam. It provides the real on-air experience of HF CW without having to be on HF and without the unrealistic flavor of using code practice oscillators in the same room.

◆ Make Your Next Step 2 Meters

OK, now it's your turn. If anything you've read here has interested you, consider aiming for your first amateur radio license. Stop by your local Radio Shack store and check out their line of study aids or consult the W5YI ad in this magazine. The ARRL web site is another great place to shop for license manuals. For just \$23 you will get all the information you need to pass the 35 question Technician Class test.

Just to make sure, there are a number of web sites which offer practice exams. Just log on, take the exam and in seconds your score will be shown.

You'll find out if you would have passed or failed and where your weaknesses are for additional study. When you can consistently pass the practice exam you're ready for the real thing. The best part is that even if you fail the real test, you can take it again at a later time.

If you have trouble reading



the material (the license manual has been known to be a great sleep aid) there is also a video course available. I know for a fact that these programs, while considerably more expensive, really work. Two members of our family passed their Technician Class exams just by watching the videos a couple of times. It could really be worth the extra bucks.

So, there it is. There's simply no excuse for not taking the 2 meter plunge. If you do decide to go for it, keep me posted. I want to hear from you. Good luck, and remember, you can do it!

The Band Plan for 2 Meters

Courtesy: ARRL and FCC Rule Book

144.00-144.05	EME (CW)
144.05-144.10	General CW and weak signals
144.10-144.20	EME and weak-signal SSB
144.200	National calling frequency
144.200-144.275	General SSB operation
144.275-144.300	Propagation beacons
144.30-144.50	New OSCAR subband
144.50-144.60	Linear translator inputs
144.60-144.90	FM repeater inputs
144.90-145.10	Weak signal and FM simplex (145.01,03,05,07,09 are widely used for packet)
145.10-145.20	Linear translator outputs
145.20-145.50	FM repeater outputs
145.50-145.80	Miscellaneous and experimental modes
145.80-146.00	OSCAR subband
146.01-146.37	Repeater inputs
146.40-146.58	Simplex
146.61-146.97	Repeater outputs
147.00-147.39	Repeater outputs
147.42-147.57	Simplex
147.60-147.99	Repeater inputs

2 Meters in the Sky

145.800	International Space Station World Wide downlink
145.825-975	AO-10 (CW/USB)

145.810 Beacon (Unmodulated Carrier)
145.825 AO-11 (1200 Baud AFSK Data)

Mir and the Space Shuttle no longer engage in amateur radio activities.

More 2 Meter Information

ARRL	http://www.arrl.org
AMSAT	http://www.amsat.org
MFJ	http://www.mfjenterprises.com
Amateur Radio NewsLine	http://www.arnewsline.org
Practice Exams	http://www.aa9pw.com
TigerTronics, Inc.	http://www.tigertronics.com

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More on the Police Car Antennas

In our January column, a reader was puzzled by the appearance of a triangular pattern of whips on local police car roofs. Apparently, the officers were unwilling to discuss it. *MT* reader Steve Rhoades says that the same system is in use in his area.

"It's a system similar to LoJac, but is used to track hidden transmitters placed inside money packets in banks and supermarkets. Here in Pasadena, I've heard the system referred to as "Code Echo" and also as an "ETS" activation. It is trackable by air units, as our local "PD-1" (one of Pasadena's airships) was involved in the operation I was listening to.

"I don't know what frequency these operate on, but I would agree with the reader that they're probably somewhere around 450+ MHz, given the antenna size."

Thanks, Steve; we always get good answers – as well as questions – from our readers!

More on Call Boxes

In a previous column, a reader asked about the call boxes on Florida interstate highways. Additional information from another reader this month fills in a few gaps. Here's what he says.

The 72 MHz boxes do not carry voice traffic, only telemetry. The motorist has a selection of four buttons to push: SERVICE, POLICE, MEDICAL, and CANCEL. The receiver console at the Florida Highway Patrol communications center displays the choice and the location of the signal.

There are some voice call boxes on the Skyway bridge, and a pilot program on State Road 528 using cell phone call boxes.

As always, it is a pleasure to share knowledge contributed by our pool of informed *MT* readers.

Q. I would like to run my scanner antenna coax to two BNC receptacles in different rooms. Do I have to use a splitter, or can I simply run the coax line to both outlets in parallel? (Dean, New Jersey)

A. There's no reason why you can't tap the line in two places for your choice of listening positions. Just be sure to make the interconnect with the shortest leads possible, otherwise the leads become inductive and actually reduce signal strengths. This is particularly critical the higher in frequency you go.

Solder the center conductor first with no more than about 1/8" exposed, then solder the shielding to the connector. You might even want to consider wrapping some shielding around the exposed junction to fully shield-enclose it – just don't let it touch the center conductor, or you'll wonder where the signals went!

Q. I have a hand-held Uniden BC3000XLT and would like to operate it from an external 12-volt battery. Uniden advised me to use only their cigarette lighter adaptor and said not to leave it connected, but just to charge it. Are all these precautions really necessary? Can I use a resistor or something in line to protect the battery from overcharging? (Anthony Zic, e-mail)

A. I currently use exactly the same scanner in my car and frequently leave it plugged into the cigarette lighter outlet for days at a time. The battery never gets warm, and the radio operates well. I use a generic cigarette lighter cord which puts the vehicle's full 13.8 volts on the scanner battery.

Although the battery pack does have a built-in regulator, it's possible that Uniden is concerned about heat dissipation from the regulator combined with voltage suppression of the battery if it isn't discharged regularly. It's also possible that they just want you to buy their adaptor.

Yes, you can put a resistor in series with the positive lead to keep the current low enough to trickle-charge the battery over time. I'd recommend experimenting with resistors until the current stays in the 50-100 mA range. A 1-watt rating for the resistor is more than adequate.

You might even experiment with a small 6-12 volt panel lamp which would be self-regulating; it would prevent heavy surges by lighting up, thus increasing its resistance, then taper off as it cools down with lower currents. Just put a milliammeter in series with the lead to check the current.

Feel the battery pack occasionally, making sure that it never gets hot, just noticeably warm at most. Above all, "exercise" the battery by running the radio so that the battery cycles between charge/discharge.

But all said, I see nothing whatsoever wrong with simply connecting the 12 volts directly to the battery.

Q. I'm having an argument with a friend who is a slot car enthusiast. He says he is going to use heavier-gauge wire than factory-supplied for less resistance to make the car go faster. It think the extra weight could slow it down. Who's right? (Mark Burns, Terre Haute, IN)

A. I've heard this argument before, but there are too many variables:

1. Present resistance due to composition, gauge, length of the wire
2. Present weight of wire including insulation
3. Electrical current required (amps)
6. Weight and resistance of new wiring

In any case, it would be impossible to predict the outcome, so the only thing that can be done is to do several timed runs with the present wiring, then change it to the next gauge and see what happens!

The argument reminds me of the type of dialogue that was used centuries ago by the clerics of the Church. They would sit around debating rather than testing their hypotheses. They were the same bunch who tried to figure out how many angels could dance on the head of a pin.

Galileo had a run-in with them when he correctly asserted that a falling object would accelerate at the same rate regardless of its weight and composition (disregarding air friction, like on a feather). The Church officials said no, that it depended upon the composition of the object falling; that a small stone would always fall more slowly than a large stone. Galileo, not to be outdone, blew their minds by asking, "What would happen if you tied a small stone and a large stone together?!"

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

bgrove@grove-ent.com. (Please include your name and address.) The current Ask Bob is now online at our website: www.grove-ent.com

This month we reveal some bright ideas about maximizing the value of *Police Call (PC) Second Edition 2001* and other CD ROMs.

29 I recently upgraded the CD ROM player in my computer. My old one was only 8X speed. My new one is 56X. Plus the new CD drive came with software utilizing my hard drive as a storage buffer to further speed up the process. New CD drives are \$40-100 and well worth the upgrade. I also kept my old CD drive and use it as an alternate drive. (The software also speeds up the old CD drive!)

I dedicated the new, faster drive full time to the *Police Call 2001* CD. Thus I do not need to be constantly removing and re-inserting the CD. This avoids scratches and other accidents. If you spend money for a new CD, you can afford a new CD drive!

30 When you first fire up the new *Police Call Second Edition (2001* version, priced around \$35), the window opens at about 90% of the entire screen. Click on the upper right ? box to open it up to the entire screen. This enables you to see the very bottom of the screen, where it indicates the total number of matching records.

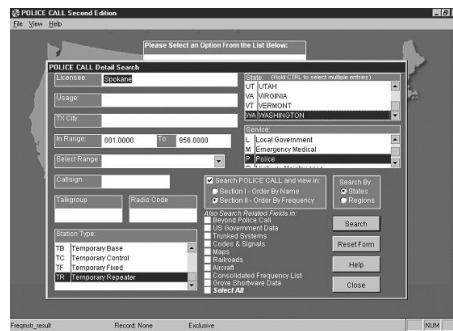
31 If you select "Browse" from the main menu, you can view but **not print** the listings. I clicked on File, View, and Help, but these functions were not available. The exception is Maps and those selections in HTML format. There is a way around this programming lapse.

From the main menu, click on "Search the Police Call CD." This brings you to the main search page. Look in the page center near the bottom of the screen. The magic section is entitled, "Also Search Related Fields In." Click the box for your interest, say "Railroads" or "Codes and Signals." Do a search and you will be prompted to select Railroads, or Codes and Signals. Select your choice and this viewable list is now printable. Next time, perhaps the programmers will simplify this step. Another bug is the feature to download frequencies to the Pro 2052. I could not get it work.

32 On the Search page, you can use many criteria to widen or restrict your search. I like to use "States" and "View in Section II, Order by Frequency" as my defaults. Indeed there are 13 different variables to determine your search mode. Be sure to experiment with them all.

If you wish to use a very limited search, be certain there are no other criteria checked, such as Licensee. If you do, the search will probably end up with the "No Matching Records" box. In my example, I selected Spokane, Washington, and Police. There should be many hits. But, I forgot that I had checked Temporary Repeaters (TR) for a previous search. Since there were no Police TRs in Spokane there were "No Matching Records."

33 After doing a search function, look at the bottom of the screen. It will show you how many "records" there are in the query. If it is over 200, think twice about printing this long list. Is there a way to narrow your search? Perhaps include a county or type of Service or Station? Do you really need the Parks & Forestry, or trunked listings? On the other hand, perhaps all you want is the Trunked frequency list. Take close look at the search screen.



There are many possible variables, select only the ones you need.

34 I enjoy the detective aspect of monitoring. To find repeater pairs or other linked frequencies, I often search for a specific callsign. Frequencies that share the same callsign are often linked as repeater pairs or similar use, i.e. fire department, even if the listing shows another use as "L" or "P."

35 The new version includes the *Listeners Guide*, and *Grove's Top 1000 Shortwave Listings*. Both are worthy of your time. Check'em out.

36 Last year's *PC 2000* first edition (RS#620-2501) is a closeout item at RS for \$16 (or less). If money is an issue, this one probably has 98% of the new database.

37 If you are a regular reader of this column, you know I am a fanatic about being organized. Using *PC Second Edition*, I searched all the nearby cities and counties and printed out the lists. I use a binder where the front and back covers have a clear vinyl cover. I customize the binder by making a cover sheet and inserting it in the clear plastic pocket of the binder. I simply use my word processor with big fonts and a couple of graphics. You can even go to the PC website and download their logo by clicking on <http://www.policecall.com/story.html>

38 Percon offers a free online FCC look-up service. This is to entice you to purchase their Percon Frequency database CDs issued quarterly for the US, Canada, and aircraft. On line search & order information is at <http://www.perconcorp.com/datafinder/index.html>.

39 If you join the Bearcat Radio Club, you get many services and products including their magazine (six issues per year), a radio spectrum chart, bumper sticker, ID card and most importantly, the *Betty Bearcat* CD ROM of all 50 states and Canada. Cost is \$30 per year (the CD is worth that!) The Bearcat Radio club is at 1-800 423-1331 or <http://www.bearcat1.com/>

Next month, an eclectic list of ideas sent in by readers.

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Five Wishes for Scanning

It's been five years since I began writing the scanner column for *Monitoring Times* and what a period of change in the scanner industry this half-decade has been. While web-surfing and other new pastimes have dealt a blow to many hobbies, the scanner industry has fought back with some amazing new equipment. The leap in the capabilities and features of scanners has been exponential, especially when compared to the previous decade (from the mid 80s to the mid 90s).

Scanner manufacturers have not only brought us some incredible models over the last few years – most notably the Trunktracker series, of course – but they have also fought for us on another front: the battle against the anti-scanning crowd in Washington.

In 1996 and '97 the Cellular Telephone Industry Association, seizing upon the recording of a Newt Gingrich cell phone call, tried to blindside the business by wiping out the hobby with overbroad and unnecessary legislation. The scanner manufacturers and distributors, their customers, racing fans, volunteer firefighters, the ARRL, news photographers and others rallied against the legislation and had it fundamentally changed. Up until this date the reworked legislation still has not become law as, perhaps, our representatives realized that they have far more important business to attend to.

Being a part of the trunking revolution with Uniden and my engineering partners, working with Gene Hughes on *Police Call*, and lobbying Congress as part of the team that fought H.R. 2369, have been (other than the birth of two sons), some of my most gratifying experiences. I've been lucky to have had other terrific opportunities, including writing this column for *Monitoring Times*.

With ever-increasing family and business responsibilities, it is time to retire my post as scanner columnist at *MT*. It's also time for some fresh blood. It has been a privilege writing for this magazine. The staff, most notably editor Rachel Baughn and publisher Bob Grove, have made the process both enjoyable and energizing. Grove Enterprises and *Monitoring Times* have provided an unmatched forum for scanner hobbyists to exchange ideas, learn about new product, and

improve their radio monitoring experience. It's been great being a part of it.

◆ Five Wishes

I would like to leave with my "Five Wishes for the Future of Scanning."

1. A digital receiver board is developed and marketed as an aftermarket product and/or is included as a feature of a scanner and hobbyists can once again monitor their local agencies on APCO-25 digital systems. Concurrently, agencies which are using non-standard digital switch to APCO-25.

2. While many, if not most, public safety agencies recognize that there is a legitimate need and purpose for scanners in the community, those agencies that do not share this belief only encrypt their most sensitive communications and not their entire systems. This is said not just to allow us to continue to listen, but for the sake of maintaining our pride in the professionalism and openness of our local departments.

3. There is an end to all the sniping and petty jealousy that goes on in this hobby, particularly on the Internet. It's so easy to post something, especially when it's done anonymously or without forethought, that slams a fellow hobbyist or a manufacturer for little or no cause. (This of course is not a problem that's unique to scanning but to just about everything.) We've got to remember that this is a small, niche industry and hobby. There are people who earn their living and support their families through scanning. Tearing people or companies down, especially when they are not given a chance to first respond, will only encourage them to leave the marketplace to everyone's detriment. Let's use the Web to help fellow hobbyists who are new to the hobby or perhaps confused by the new technology.

4. We support the scanner and accessory manufacturers, distributors, books, magazines, and web sites that service this hobby. We encourage them to produce new and better products and services, and we provide information, suggestions and constructive (not destructive) criticism when necessary.

5. We encourage more people to try scanning and have more join our ranks. With more

customers for manufacturers and software developers there will be newer and more interesting product available and perhaps even more manufacturers entering the market. We also encourage retailers to add scanners to their product mix. Let's work to make scanners as common a household appliance as an AM/FM clock radio.

Kentucky Trunking

From Richard Wooten, a Paducah resident:

Paducah / McCracken County Motorola SmartNet Type II TRS

Paducah Fire Department

19216 Fire #1 Dispatch
19248 Fire #2
19280 Fire Information
19312 Prevention / Investigations
19344 Administration
19376 Warning System Sirens Data

Paducah Police Department

17616 Patrol #1
17648 "PDI" Information
17680 Car to Car
17712 Detective
17776 "SIU" Special Investigations Unit
17808 Administration
18320 Patrol #2
18352 "ERT" Emergency Response Team

McCracken County Sheriff

17744 PD / SO (Used to communicate between the two agencies)
17904 Patrol
17936 "SOI" Sheriffs Office Information
17968 Operations
18000 Detective #1
18032 Detective #2
18064 Supervisor #1
18096 Supervisor #2
18192 Command
18224 Administration

Coroner

18256 Coroner #1
18288 Coroner #2

Miscellaneous

17840 Department of Energy Facility #1
17872 Department of Energy Facility #2
20816 Paducah General Channel

20848 Paducah 911 Center
 20880 Paducah Supervisor
 20912 Paducah City Inspection
 20944 Paducah City Parks and Recreation
 20976 Paducah Department of Public Works Administration
 22416 Paducah Area Transit System
 22448 Paducah Power System #1
 22480 Paducah Power System #2
 24016 Paducah City Manager
 25616 Paducah City Administration
 27216 Paducah Radio Service Shop
 28816 Emergency Operations Center
 29008 Paducah City Engineering "A"
 29040 Paducah City Engineering "B"
 29072 Paducah City Fleet Maintenance
 29104 Paducah Department of Public Works Supervisor
 29136 Paducah City Facility Management
 29168 Paducah Street Maintenance
 29200 Paducah Sanitation Department
 29232 Utilities Maintenance (Water / Sewage) "A"
 29264 Utilities Maintenance (Water / Sewage) "B"
 29296 Utilities Supervisor (Water / Sewage)
 29702 Paducah Department of Public Works

Baltimore Trunking

Jeff Hunter was kind enough to submit some excellent, first-hand information on the Baltimore County trunked radio system. The city of Baltimore is using an APCO-25 digital system. Luckily there is still some excellent monitoring to be had around Ravens country by monitoring the county analog Motorola Type II trunking system. Jeff writes, "These are the official listings that I got from my Volunteer Fire Company."

Baltimore County Fire Department

16 MAIN 1 Fire/EMS/Rescue Dispatch—MAIN DISPATCH (46.460 MHz rebroadcast)
 48 CENTRAL 2 Central Response
 80 EAST 3 Eastern Response
 112 WEST 4 Western Response
 144 EM OPS 5 Emergency Operations Chiefs
 176 ADMIN 6 Emergency Ops Admin
 208 FM/SUPPLY 7 Maintenance/Supply
 240 EMS 8 EMS Admin
 272 FI-FP 9 Investigation/prevention
 336 B1 FGC 11 Battalion 1 fireground command
 368 B1 TAC 12 Batt. 1 Tactical Channel 12 (Fire/Rescue Ops.)
 400 B1 TAC 13 Batt. 1 Tactical Channel 13
 432 B1 TAC 14 Batt. 1 Tactical Channel 14
 2864 B1 TAC 15 Batt. 1 Tactical Channel 15
 2896 B1 TAC 16 Batt. 1 Tactical Channel 16
 2928 B1 TAC 17 Batt. 1 Tactical Channel 17
 2960 B1 TAC 18 Batt. 1 Tactical Channel 18 (fire scene EMS Ops.)
 2992 B1 TAC 19 Batt. 1 Tactical Channel 19 (HazMat Ops.)

464 B2 FGC 21 Battalion 2 fireground command
 496 B2 TAC 22 Batt. 2 Channel 22 (Fire/Rescue Ops)
 528 B2 TAC 23
 560 B2 TAC 24
 3024 B2 TAC 25
 3056 B2 TAC 26
 3088 B2 TAC 27
 3120 B2 TAC 28
 3152 B2 TAC 29

592 B3 FGC 31 Battalion 3 fireground command

624 B3 TAC 32 (Fire/Rescue Ops)
 656 B3 TAC 33
 688 B3 TAC 34
 3184 B3 TAC 35
 3216 B3 TAC 36
 3248 B3 TAC 37
 3280 B3 TAC 38
 3312 B3 TAC 39

720 B4 FGC 41 Battalion 4 fireground command
 752 B4 TAC 42 (Fire/Rescue Ops)
 784 B4 TAC 43
 816 B4 TAC 44
 3344 B4 TAC 45
 3376 B4 TAC 46
 3408 B4 TAC 47
 3440 B4 TAC 48
 3472 B4 TAC 49

848 B5 FGC 51 Battalion 5 fireground command
 880 B5 TAC 52 (Fire/Rescue Ops)
 912 B5 TAC 53
 944 B5 TAC 54
 3504 B5 TAC 55
 3536 B5 TAC 56
 3568 B5 TAC 57
 3600 B5 TAC 58
 3632 B5 TAC 59

976 B6 FGC 61 Battalion 6 (spare) fireground command
 1008 B6 TAC 62 (Fire/Rescue Ops)
 1040 B6 TAC 63
 1072 B6 TAC 64
 3664 B6 TAC 65
 3696 B6 TAC 66
 3728 B6 TAC 67
 3760 B6 TAC 68
 3792 B6 TAC 69

1004 B7 FGC 71 Battalion 7 (spare) fireground command
 1136 B7 TAC 72 (***)MOST OFTEN USED FOR LARGE DETAILS(***)
 1368 B7 TAC 73
 1200 B7 TAC 74
 3824 B7 TAC 75
 3856 B7 TAC 76
 3888 B7 TAC 77
 3920 B7 TAC 78
 3952 B7 TAC 79

1232 B8 FGC 81 Battalion 8 (spare) fireground command
 1264 B8 TAC 82
 1296 B8 TAC 83
 1328 B8 TAC 84
 3984 B8 TAC 85
 4016 B8 TAC 86
 4048 B8 TAC 87
 4080 B8 TAC 88
 4112 B8 TAC 89

1360 Training-1 91
 1392 Training-2 92
 1424 Training-3 93
 1456 Training-4 94
 1488 Academy 95
 1520 Mutual Aid 96
 1552 Mutual Aid 97
 1584 Mutual Aid 98
 1616 Police-Fire 99
 4144 ISC 1 191 Battalion 1 car to car
 4176 ISC 2 192 Battalion 2 car to car

4208 ISC 3 193 Battalion 3 car to car
 4240 ISC 4 194 Battalion 4 car to car
 4270 ISC 5 195 Battalion 5 car to car
 4304 ISC 6 196 Battalion 6 car to car
 4336 ISC 7 197 Battalion 7 car to car
 4368 ISC 8 198 Battalion 8 car to car
 440 Volunteer-199
 4528 FID-200 Investigation car to car
 2416 Call-1 221 Emergency Medical Resource Center
 2448 Med-4 224 EMRC Command to Hospital Patch (Amb, to hospital)
 2480 Med-8 228 EMRC Command to Hospital Patch (Amb, to hospital)

Note: Normal fireground operations will be on the x2 channel; the others are generally only used in the event of a major incident

Unique Trunking Formats

Following a trip to the Miami Tropical Hamvention in early February, we drove up north of the Miami-Palm Beach metroplex to investigate some new systems on the air. Martin County (the Stuart, Florida, area) is using an E.F. Johnson Multi-Net system. There are approximately a dozen such systems in the country that we know of, including Billings, Montana, and Chester County, Pennsylvania, among others. The system has confused people with PRO-92 and BC-780 scanners who believed they could track Multi-Net. The 92 and the 780 track Johnson LTR systems, but not Multi-Net, which was designed for public safety applications. Both Multi-Net and LTR use sub-audible signaling for system control rather than a dedicated control channel; however, there is no method on the market to track Multi-Net.

Multi-Net is incredibly annoying to listen to as there are ever-present dead carriers. One channel appears to be a steady carrier but is also used as a voice channel. Reports from other areas (Jacksonville) find no constant carrier, but other strange characteristics.

Speaking of unusual trunking systems, Lindsay Blanton recently reported that Wise County in the Dallas area is now using an MPT-1327 trunking system. This system, as we understand it, uses a very low-speed (1200 baud) control channel. The format is popular in Australia and, to a lesser extent, Europe. We can only surmise that these systems are less expensive than the more common forms of trunking and that's why they are appealing to certain counties and communities.

It's interesting that while APCO and the federal government struggle to implement a standardized communications format for public safety, local municipalities and public safety agencies still often fall back on the marketplace – and the low bid and low cost provider of equipment – to answer their needs.

U.S. NOAA Weather Radio Stations and Frequencies

Courtesy of the National Weather Service

MISSISSIPPI

Ackerman	KIH51	162.475	300	Jackson
Booneville	KIH53	162.400	700	Memphis, TN
Bude	KIH48	162.550	400	Jackson
Columbia	WXL21	162.400	30	Jackson
Gulfport	KIH21	162.400	1000	New Orleans/Baton Rouge, LA
Hattiesburg	KIH47	162.475	1000	Jackson
Inverness	KIH50	162.550	500	Jackson
Jackson	KIH38	162.400	800	Jackson
Kosciusko	WWG38	162.425	300	Jackson
Meridian	KIH49	162.550	500	Jackson
Oxford	KIH52	162.550	400	Memphis, TN
Parchman	WWG37	162.500	100	Jackson

MONTANA

Billings	WXL27	162.550	300	Billings
Butte	WXL79	162.550	100	Missoula
Conrad	WWG84	162.500	100	Great Falls
Glasgow	WXL32	162.400	300	Glasgow
Glendive	WWF93	162.475	100	Glasgow
Great Falls	WXJ43	162.550	300	Great Falls
Havre (Squaw Butte)	WXL53	162.400	300	Great Falls
Helena	WXK66	162.400	300	Great Falls
Kalispell	WXL82	162.550	100	Missoula
Malta	WWG85	162.475	100	Glasgow
Miles City	WXL54	162.400	300	Billings
Missoula	WXL25	162.400	100	Missoula
Plentywood	WWF50	162.475	50	Glasgow
Scoby	WWF92	162.450	25	Glasgow

NORTH CAROLINA

Asheville	WXL56	162.400	250	Greenville/Spartanburg, SC
Badin	WWF60	162.425	1000	Raleigh/Durham
Cape Hatteras	KIG77	162.475	1000	Moorehead City
Charlotte	WXL70	162.475	200	Greenville/Spartanburg, SC
Fayetteville	WXL50	162.475	250	Raleigh/Durham
Joanna Bald Mtn	WWG82	162.525	100	Greenville/Spartanburg, SC
Lumber Bridge	WWF89	162.525	100	Wilmington
Margaretsville	WWG33	162.450	100	Wakefield
New Bern	KEC84	162.400	1000	Moorehead City
Raleigh/Durham	WXL58	162.550	1000	Raleigh/Durham
Rocky Mount	WXL59	162.475	1000	Raleigh/Durham
Wilmington	KHB31	162.550	1000	Wilmington
Winston-Salem	WXL42	162.400	100	Raleigh/Durham

NORTH DAKOTA

Bismarck	WXL78	162.475	1000	Bismarck
Devils Lake	WWG25	162.425	100	Eastern
Dickinson	WXL80	162.400	800	Bismarck
Fargo	WXK42	162.475	500	Eastern
Grand Forks	WWF83	162.475	50	Eastern
Jamestown	WXL81	162.550	1000	Bismarck
Minot	WXL83	162.400	1000	Bismarck
Petersburg	WXM38	162.400	1000	Eastern
Williston	WXL84	162.550	1000	Williston

NORTH MARIANA ISLANDS

Saipan (Mt Topochau)	WXM86	162.550	110	Guam
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NEBRASKA

Bassett	WXL73	162.475	630	North Platte
Grand Island	WXL74	162.400	1000	Hastings
Holdrege	WXL75	162.475	1000	Hastings
Lincoln	WXM20	162.475	1000	Omaha
Merriman	WXL76	162.400	800	North Platte
Norfolk	WXL77	162.550	800	Omaha
North Platte	WXL68	162.550	1000	North Platte
Omaha	KIH61	162.400	1000	Omaha
Scottsbluff	WXL67	162.475	1000	Cheyenne, WY

NEW HAMPSHIRE

Concord	WXJ40	162.400	330	Portland
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NEW JERSEY

Atlantic City	KHB38	162.400	1000	Philadelphia, PA
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NEW MEXICO

Albuquerque	WXJ34	162.400	100	Albuquerque
Carlsbad	WWF37	162.475	100	Midland/Odessa, TX
Clovis	WXJ35	162.475	100	Albuquerque
Des Moines	WXL90	162.550	100	Albuquerque
Farmington	WXJ97	162.475	100	Albuquerque
Hobbs	WXJ36	162.400	100	Midland/Odessa, TX
Las Cruces	WXL91	162.400	100	El Paso, TX
Roswell	WWG36	162.450	100	Albuquerque
Ruidoso	WXJ38	162.550	100	Albuquerque
Santa Fe	WXJ33	162.550	100	Albuquerque

NEVADA

Elko	WXL28	162.550	100	Elko
Ely (Cave Mt.)	WXL69	162.400	100	Elko
Eureka	WWF81	162.550	100	Elko
Hawthorne	WWF59	162.475	100	Reno
Las Vegas (Boulder City)	WXL36	162.550	100	Las Vegas
Northwest Nevada	WWG20	162.450	100	Reno
Reno	WXK58	162.550	100	Reno
Winnemucca	WXL29	162.400	100	Elko

NEW YORK

Albany	WXL34	162.550	1000	Albany
Binghamton	WXL38	162.475	1000	Binghamton
Buffalo	KEB98	162.550	330	Buffalo
Cooperstown	WWH35	162.425	100	Binghamton
Elmira	WXM31	162.400	1000	Binghamton
Kingston	WXL37	162.475	1000	Albany
Little Valley	WWG32	162.425	100	Buffalo
New York City	KW035	162.550	500	New York
Riverhead	WXM80	162.475	1000	New York
Rochester	KHA53	162.400	500	Buffalo
Stamford	WWF43	162.400	60	Binghamton
Syracuse	WXL31	162.550	1000	Binghamton
Walton	WWH34	162.425	100	Binghamton
Watertown	WXN68	162.475	100	Buffalo

OHIO

Akron	KD094	162.400	500	Cleveland
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Bridgeport	WWF35	162.525	1000	Pittsburgh
Cleveland	KHB59	162.550	500	Cleveland
Columbus	KIG86	162.550	1000	Cincinnati
Dayton	WXJ46	162.475	1000	Cincinnati
High Hill	WXJ47	162.475	1000	Pittsburgh
Lima	WXJ93	162.400	1000	Cincinnati
Sandusky	KHB97	162.400	1000	Cleveland
Toledo	WXL51	162.550	100	Cleveland

OKLAHOMA

Altus	WWG97	162.425	95	Oklahoma City
Clinton	WXK87	162.475	500	Oklahoma City
Enid	WXL48	162.475	200	Oklahoma City
Grove	WWH38	162.500	300	Tulsa
Lawton	WXK86	162.550	1000	Oklahoma City
McAlester	WXL49	162.475	1000	Tulsa
Oklahoma City	WXK85	162.400	1000	Oklahoma City
Ponca City	WWF42	162.450	500	Oklahoma City
Tulsa	KIH27	162.550	500	Tulsa
Woodward	WWG46	162.500	100	Oklahoma City

OREGON

Astoria	KEC91	162.400	100	Portland
Bend/Redmond	WWF80	162.500	120	Pendleton
Brookings	KIH37	162.550	500	Eureka
Coos Bay	KIH32	162.400	330	Medford
Eugene	KEC42	162.400	100	Portland
Heppner	WWH28	162.425	100	Pendleton
Klamath Falls	WXL97	162.550	100	Medford
Medford	WXL85	162.400	330	Medford
Mt. Ashland	WWF97	162.475	100	Medford
Neahkahnie Mtn	WWF94	162.425	25	Portland
Newport	KIH33	162.550	100	Portland
Pendleton	WXL95	162.400	330	Pendleton
Portland	KIG98	162.550	330	Portland
Roseburg	WXL98	162.550	100	Medford
Salem	WXL96	162.475	100	Portland
Tillamook	WWF95	162.475	25	Portland
Umatilla	WWF57	162.500	330	Pendleton

PENNSYLVANIA

Allentown	WXL39	162.400	1000	Philadelphia
Clearfield	WXL52	162.550	500	Central
Erie	KEC58	162.400	330	Cleveland, OH
Harrisburg	WXL40	162.550	1000	Central
Johnstown	WXM33	162.400	250	Central
Parker	WWG53	162.425	1000	Pittsburgh
Philadelphia	KIH28	162.475	1000	Philadelphia
Pittsburgh	KIH35	162.550	1000	Pittsburgh
State College	WXM59	162.475	100	Central
Three Springs	WWG52	162.525	1000	Central
Towanda	WXM95	162.550	1000	Binghamton, NY
Warren	WWG51	162.450	1000	Central
Wellsboro	WXM94	162.475	1000	Central
Wilkes-Barre	WXL43	162.550	250	Binghamton, NY
Williamsport	WXL55	162.400	1000	Central

PUERTO RICO

Maricao	WXJ69	162.550	1000	San Juan
San Juan	WXJ68	162.400	1000	San Juan

RHODE ISLAND

Providence	WXJ39	162.400	500	Boston, MA
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(Continued Next Month)



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More US Coast Guard FAX Changes

The United States weather service has made extensive schedule changes in its marine weather facsimile (FAX). Many start times for the various weather products have been slightly adjusted. This is because the wind and seas charts are now sent in double versions which take a couple of minutes longer to transmit.

All stations except Honolulu are United States Coast Guard. All transmissions are frequency-modulated (FM), but they are tuned in upper sideband (USB), and 1.9 kilohertz (kHz) below the listed frequency. Settings are 120 lines per minute and index of cooperation (IOC) of 576.

Honolulu's Central Pacific broadcast comes from the National Oceanographic and Atmospheric Agency (NOAA) station KVM70. Six new wind and sea charts have been added. Frequencies are 9982.5, 11090, 16135, and 23331.5 kHz. The lengthy broadcasts begin at 0533, 1150, 1733, and 2350 coordinated universal time (UTC).

In Alaska, short transmissions come from Coast Guard communication station NOJ, in Kodiak. They have added a new frequency, 12412.5, to the existing 2054, 4298, and 8459 kHz. This should help a lot, and they are looking for reports. Listen at 0400, 1000, 1800, and 2200.

Eastern Pacific transmissions from the Communication Area Master Station, Pacific (CAMSPAC), in Point Reyes, California, have changed slightly to reflect the longer transmission times of the double wind/seas charts. Frequencies are 4346, 8682, 12730, 17151.2, and 22527 kHz. Times are 0245, 0800, 1430, and 1930. Broadcasts can continue for hours.

Last, though definitely not least, the double charts have been added to the many interesting tropical weather products coming from NMG, in New Orleans, Louisiana. This is a nice one in hurricane season. Frequencies remain 4317.9, 8503.9, and 12789.9 kHz. Broadcasts begin at 0000, 0600, 1200, and 1800.

There's also an Atlantic Ocean schedule at NMF, Boston, remote from the Communications Area Master Station, Atlantic (CAMSLANT). It has not changed. Frequencies are 4235, 6340.5, 9110, and 12750 kHz. Times are 0230, 0745, 1400, and 1900.

Note that not all frequencies will necessarily be in use at all times. Frequencies used by Boston, Honolulu, and Pt. Reyes reflect propagation, going higher in day time, lower at night. Detailed schedules are available on the Internet, including the Utility World web site at <http://www.ominous-valve.com/uteworld.html>.

◆ Bad Neighborhoods

Every city has its dirtier sections, where all the rough characters hang out. Radio, as a virtual city, is not any different.

For a long time, one of the worst neighborhoods has been in and around ultra-congested 40 meters, roughly 6800 to 7500 kilohertz (kHz). Amateurs, broadcasters, utilities, pirates, terrorists, smugglers, and spies all duke it out for precious frequencies. International law takes the biggest beating here, and anything is possible.

Right now, 6955 kHz seems to be the popular frequency for pirate broadcasting stations. These are the entertaining radio anarchists who risk large fines to broadcast the whole planet on shortwave radio. Out of necessity, they move around, and not that long ago 7415 was a major pirate frequency. It still attracts an interesting crowd.

Both frequencies are in utility bands, but this doesn't mean much. The pirates, who weren't in any position to complain, were ultimately run off 7415 by a series of bigger, licensed broadcasters. In the last year or so, however, the frequency has settled down mostly as the nighttime channel of a smaller, legal, American station started by a reformed pirate.

This station attracts American shortwave's usual motley crew, notably Brother Stair, the doomsday preacher who argues with Satan on his phone answering machine, and who regularly predicts the exact date and time of the Apocalypse. A different day of reckoning was at hand, however, when maritime powerhouse KPH, in Northern California, started up exactly one kilohertz lower.

Those who missed this experience will just have to imagine the audible effect of KPH's absolutely blistering sync blasts in SITOR (Simplex Teleprinting Over Radio), its e-mail databursts, and its wall-bending Morse identifiers. In southern California, where all KPH's frequencies have always been strong enough to fade car paint, the obliteration of 7415 was not only total, but spectacular. In wartime, people pay big

money for jamming this effective.

Needless to say, a lot of broadcast people started asking a lot of utility people just what the heck was going on with this nasty, "new" station. They found out that "new" KPH is actually one of the oldest radio stations in the world. It was started a century ago by pioneer Lee DeForest to communicate with ships in Morse code.

KPH originally meant "Palace Hotel," in what was most definitely not a bad neighborhood, at least not until it was destroyed by the 1906 earthquake. DeForest sold the call to Marconi, who began planting monumental antenna farms all over scenic Point Reyes to the north. These were taken over by the giant Radio Corporation of America, then by Western Union/MCI, and finally by Globe Wireless.

Today, KPH remains a formidable player, though only as one part of a much larger, digital station also survives as



a very nice radio museum, where the original transmitters are restored and fired up for special events. The commercial maritime signal, though, comes from Globe's new "supersite" outside Dixon, California. Nobody will be dropping the "Power House" nickname any time soon. These people still know how to make some serious radio waves.

This all seemed odd, though. Globe has never been the least bit secretive about its frequencies, and this new one never showed on any of the lists. Then, one day, there was suddenly no KPH. Silent. Gone, and never to return to 7414. The Destroying Angel had left Brother Stair's frequency.

What happened? Nobody's talking. KPH certainly had the right to 7414, a utility allocation. The most popular story, however, is that it was all a mistake. Supposedly, someone misread a document, either at the Federal Communications Commission or somewhere else. The result was the expensive startup of a major, commercial, digital radio node on the wrong frequency.

What's the right frequency, Kenneth? Stay tuned.



ABBREVIATIONS USED IN THIS COLUMN

Aeradio	Aeronautical Radio
AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
CAMSLANT	Communication Area Master Station, Atlantic
COMSTA	Communications Station
CW	Continuous Wave (Morse telegraphy)
EAM	Emergency Action Message
E10a	Israeli Phonetic Station, null message format
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
FEMA	Federal Emergency Management Agency
FM	Frequency Modulation
JSTARS	Joint Surveillance Target Attack Radar System
LDOC	Long Distance Operational Control
M8	Cuban CW "numbers," ANDUWRIGMT for 1-0
MARS	Military Affiliate Radio System
MFA	Ministry of Foreign Affairs
NAOC	National Airborne Operations Center (E-4B aircraft)
Ops	Operations
RSA	Republic of South Africa
RTTY	Radio Teletype
SHARES	Shared Resources
SITOR-A	Simplex Telex Over Radio, ARQ mode
SITOR-B	Simplex Telex Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
V2	Cuban "numbers" starting with "Atencion!"
VFT	Voice Frequency Telegraphy
VOLMET	Flight Weather broadcasts

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 (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

- 4724.0 Offutt-US Air Force Global High Frequency System, NE, with two EAM, simulcast on 6739, at 0625. (Brent Davenport-CO)
- 5120.0 OWC-Dutch Air Force, calling OWE in ALE, at 1959. OWP, sounding in ALE at 2036. OWE, calling OWP in ALE at 2052. OWI, sounding in ALE at 2236. (Day Watson-UK) [OWE is *FTK Karup and the voice call is Primrose -Hugh*]
- 5416.5 Unid-Spanish Guardia Civil, with encrypted traffic in ARQ (400/100) at 2012. (Watson-UK)
- 5841.0 Coast Guard 33C-US Coast Guard, working Panther, US Drug Enforcement Agency, Bahamas, in an hours-long pursuit of a "go-fast" boat, starting at 0044. (Ron Perron-MD)
- 5852.0 ASI-UK military or diplomatic net, sounding in ALE at 2226. KUW, possibly Kuwait, sounding at 2230. PRI, sounding at 2314. Other such UK net ALE bursts heard on 14814, 19464, and 19977. (Watson-UK)
- 6445.0 Unid-Mystery "slot machine" station, with very strange video-gambling type noises, databursts, and multitone keying in sync with 5 other frequencies, using an unknown modulation at 0807. (Tom Severt-KS) [Someone's got to know what this thing is. -Hugh]
- 6501.0 CAMSLANT Chesapeake-US Coast Guard, VA, working "S-4-C," who had a receiver problem, apparently out of desperation using the same channel where the "Perfect Paul" speech synthesizer was giving weather bulletins, at 0640. (Davenport-CO)
- 6676.0 Sydney VOLMET, Australia, with voice synthesized weather observations at 1002. (Perron-MD) Bangkok VOLMET, Thailand, with aviation weather at 2241. (Patrice Privat-France)
- 6697.0 Curly Top-US military, with EAM, tends to broadcast at hour plus 14 and 44 minutes, at 0614. (Jeff Haverlah-TX)
- 6712.0 Unid-several Spanish speakers in a large net including a base station and two other unheard players, all going away when US Air Force Global started up on the channel for EAMs, at 0440. (Davenport-CO).
- 6739.0 "Puerto Rico"-US Air Force, with an EAM at 0723. (Davenport-CO) [Salinas with a new name? -Hugh]
- 6742.0 Unid-Two English speaking males, one in the US, with Irish accents and only first names for identification, at 0203. (Perron-MD)
- 6768.0 Cuban Cut Number Station (M8), with CW "numbers" at 1203. Cuban CW "numbers," at 1301. (Camillo Castillo-Panama)
- 6796.0 Cuban Cut Number Station (M8), with CW "numbers," three different days of week at 1200. (Castillo-Panama)
- 6854.0 Cuban "Atencion" station (V2), with AM "numbers" at 0305. Cuban Cut Number Station (M8), with CW "numbers" at 1200. (Castillo-Panama)
- 6910.0 SYN2-Israeli Intelligence (E10a), repeating phonetic callup, weak and hard to read, at 0525. (Gary Cohen - MA)
- 7414.0 KPH-Globe Wireless San Francisco digital node, Dixon, CA, with blistering SITOR and GlobeData markers, absolutely obliterating Brother Stair and other AM broadcasts on 7415, audible several days, around the clock, until an abrupt disappearance allegedly because KPH had been assigned the "wrong" frequency. (Hugh Stegman-CA)
- 8007.0 Base 0-Turkish military, sounding in ALE at 1749. Base 1, sounding at 1759. Base 4, sounding at 1951. (Ary Boender-Netherlands)
- 8272.0 Unid-Large, nightly, impromptu net of Philippine sailors, with news items in English and chatter in several languages, this night with several Pacific stations hearing stories of politics and stolen sugar, at 0645. (Stegman-CA)
- 8383.5 Unid-Ship in port at Gdansk, Poland, working Boufarik Radio (shore frequency was 8423.5), in SITOR-A, at 2000. (Watson-UK)
- 8555.5 UIW-Kaliningrad Radio, Russia, working ship UBHN in very fast CW, at 1730. (Watson-UK)
- 8855.0 Piarco Radio-Air route control, working British Airways Speedbird 209, at 0625. Piarco Radio, working Iberia 6634, at 0640. Belem Radio, working aircraft C-GCDS, high altitude, at 0655. Iberia 6650, with position report for Cayenne Radio, at 0743. (Privat-France)
- 8888.0 Russian language female VOLMET, probably Syktyvkar, at 0203. (Perron-MD)
- 8930.0 N743SA-unknown aircraft, identifying variously as ELY 803 and Southern Air, working a ground station at 0022. (Perron-MD)
- 8939.0 Unid-Russian language VOLMET, probably Kiev, at 0250. (Perron-MD)
- 8942.0 Singapore Radio-Air route control, working Federal Express freighter Fedex 19A, at 2235. Singapore, working United Parcel Service freighter UPS 6959 at 2240, and Northwest 20 at 2246. Unid flight calling Penang, also some weak data bursts at 2256. (Privat-France)
- 8980.0 Coast Guard Rescue 2141-US Coast Guard, in a patch via CAMSLANT to District 6 Miami Ops, reporting that no distressed vessel can be found, and so they are returning, at 0057. (Perron-MD)
- 8983.0 COMSTA New Orleans-US Coast Guard, LA, working Coast Guard 2125 in a search, at 0347. (Perron-MD)
- 8992.0 Reach 9166- US Air Force Air Mobility Command, with patch to Yokota, Japan, via Hickam Global, HI, terminated after the conversation was stepped on by a priority EAM, at 0656. AIR 91-US Air Force, with a patch to Riviera Control via Thule, 30 people aboard, at 0753. (Davenport-CO) Navy 49676-US Navy aircraft, working Andrews AFB, MD, enroute to Kennedy Airport, New York, at 1859. (Haverlah-TX)

- 9016.0 Credible-US military, working Applicant, probably an airborne command post, then calling Back Seat, at 1746. (Haverlah-TX)
- 9025.0 Lajes-US Air Force, Lajes Field, Azores, with an EAM, simulcast on 6712, at 0252. (Perron-MD) "Default"-Unid ALE station, apparently forgetting to enter its real identifier and sending the default string instead, calling SE2 at 2137. (Boender-Netherlands)
- 10075.0 Houston Radio-LDOC, TX working aircraft N463LM and Dynasty 389, at 0147. (Perron-MD)
- 10493.0 WGY 908-FEMA Region 8, Denver, CO, and alternate net control, working various MARS stations in the quarterly drill, in LSB at 1828. AFA3HY-SHARES Coordination Station, Shawnee, KS, calling WGY 912, FEMA Special Facility, Mt. Weather, VA, USB, at 1958. (Tom Sevart-KS) WGY 910-FEMA Region 10, Bothell, WA, calling WGY 912, Mt. Weather Emergency Assistance Center, VA, but raising WGY 918-Denver, CO, then passing Seattle earthquake traffic, at approximately 1900. (Larry Van Horn-NC)
- 10586.5 WWJ 98-US Federal Highway Administration, checking into the SHARES net at 1850. (Davenport-CO)
- 10780.0 Razor 28-US Air Force, probably an E-8C JSTARS, requesting a patch from Cape Radio, Cape Canaveral, FL, who told him unable because a space shuttle countdown had busied all the circuits, at 2225. (Perron-MD)
- 11121.0 SCUD-Probably a fictitious training callsign being used by US Army Signal Intelligence, with simulated military traffic in CW, at 1614. Same station, with more training messages in SITOR-B, at 1732. (Sevart-KS)
- 11122.0 9MR-Malay Naval Radio, Malaysia, with 5-letter code group message in RTTY (850/50), at 1535. (Bob Hall-RSA)
- 11175.0 Hickam-US Air Force, HI, calling DB387 at 0334, 0338 and 0342, then with an ALE burst and more calls at 0345, 0349, and 0351. Hickam, working Air Evac 5103, a C-17 inbound with 1 patient, at 0406, then one last try for DB387 at 0416. (Davenport-CO) King 16-US Air Force, on the rescue of a 16-year-old California girl who had fallen 30 feet into a ravine, with patches to Moffett Rescue, also using 11181, 11200, and 9320, at 0553. (Sevart-KS) King 16, now using a Rescue callsign, working Offutt Global, sent to 11200 for a patch to Moffett that set up a California Highway Patrol helicopter evacuation at the landing site, at 0615. (Cohen-MA) ADNFF-US Army Vessel Perryville, LCU-2034, in radio checks with Andrews at 1356. (Perron-MD)
- 11220.0 Navy 49676-US Navy, working Andrews, given frequency F-311 for radio guard, at 1905. (Haverlah-TX)
- 11226.0 Reach 901-US Air Force Air Mobility Command, enroute to Bahrain, with a patch via Ascension to Hilda East, at 2358. (Perron-MD)
- 11232.0 Trenton Military-Canadian Forces, working Coast Guard 1501, at 1903. (Sevart-KS)
- 11244.0 Cutty Sark-US military, with EAM simulcast on 321.0 megahertz, at 0059. (Sevart-KS)
- 11360.0 Unid-Weird Chinese speaking net in which each station passes a 4-number group and leaves, at 2150. (Perron-MD)
- 11366.0 Unid-Unknown Portuguese speaking male getting weather data for Manaus, Brazil, probably over a Varig LDOC, at 0110. (Perron-MD)
- 11494.0 Darkstar Oscar-US military, calling Fly Fish, no joy at 1828. (Haverlah-TX)
- 12359.0 "Herb"-Control of the informal daily weather net, with Southbound II working many small vessels. (Sevart-KS)
- 12412.5 NOJ-US Coast Guard, Kodiak, Alaska, with fuzzy weather FAX (120/576) at 1800. (Watson-UK) [This is a new frequency. -Hugh]
- 13155.0 Catch Fly-US military, with an EAM simulcast on 8992 and 11244, at 2009. (Haverlah-TX)
- 13245.0 Post Hole-US military, with an EAM simulcast on 8992 and 11244, at 2208. (Haverlah-TX)
- 13342.0 Stockholm-Stockholm Aeradio, Sweden, in Swedish conversation with unknown aircraft regarding arrival in the Dominican Republic, at 1258. (Perron-MD)
- 13907.0 Glass Ware-US military, with an EAM simulcast on 8992 and 11244, at 2206. (Haverlah-TX)
- 13927.0 AFA1EN-US Air Force MARS, Shelbyville, IN, patching aircraft JOSA 456 to Buckley AFB weather office, then working Hitman 01, a C-130. AFA2HM, Augusta, KY, in radio checks with Dark 22, probably a bomber. AFA3HS also on-frequency, all at 2049. (Perron-MD)
- 14395.0 FE9-FEMA, in ALE with CVT in a special SHARES exercise using an airborne command post aircraft, at 1735. (Haverlah-TX) [FE9 was a NAOE E-4B aircraft used during this exercise - Hugh]
- 14396.5 AFA3HY-US National Communications System SHARES Coordination Station, Shawnee, KS, sending aircraft "Foxrot Echo 9" to 10586.5 for WWJ 98's check-in, at 1848. (Davenport-CO) FE9-Was the E-4B airborne command post in the SHARES test, voice at 1809. AFA3HY (partial callsign copied), working WAR46, US military Joint Alternate Command Post, PA, with traffic related to the Seattle earthquake, at 2036. (Haverlah-TX)
- 14776.0 OH5-Unknown US Federal, calling FC6, FEMA Region 6, TX, in ALE at 1733. FC8FEM-FEMA Region 8, Denver, CO, sounding in ALE at 1746. FCSFEM-FEMA Special Facility in VA, calling FM6FEM, Region 6, at 1900. (Watson-UK)
- 14983.0 RBV76-Tashkent Meteorological, Russia, with clear FAX weather charts (60/576), at 1535. (Hall-RSA)
- 15016.0 Andrews-US Air Force, Andrews AFB, MD, calling Mainsail ("any station this net") and then with an echoey EAM, at 1600. (Cohen-MA) [Echoes are from distant remote transmitters. - Hugh]
- 15867.0 Service Center-Probably US Customs, working Stingray 31 in clear and old-style Parkhill scrambling, at 1426. (Perron-MD)
- 16791.5 Unid-Philippine English-language news stories in SITOR-B, including politics and that same stolen sugar discussed on 8272 voice, ended with, "Shared to you by ((Nagulian Boy))," at 0143. (Stegman-CA)
- 17916.0 G-GAFX-Air Freight Express B-747, reporting position to Stockholm Radio at 1416. Viking 445, speaking Danish in a patch via Stockholm to Copenhagen Ops, at 1427. (Perron-MD)
- 18018.0 Unid-Spanish speaking male giving Panama weather to an unid aircraft, on what at least used to be a US Air Force frequency, at 0033. (Perron-MD)
- 19131.0 Atlas-US Drug Enforcement Agency communications facility, IA, working DEA aircraft Flint 311, at 2018. (Perron-MD)
- 19692.5 ZSC-Capetown Radio, RSA, with SITOR-B high seas forecasts and warnings at 1736. (Watson-UK)
- 21865.0 Unid-Polish MFA, Warsaw, with consular traffic in Polish, probably to Brasilia embassy, at 1225. (Hall-RSA)
- 22596.3 Unid-Unknown RTTY (850/100), with encrypted traffic in plain old Baudot keying, at 1101. (Hall-RSA)
- 22924.0 MTS-UK Royal Air Force, Port Stanley, with link checks in Piccolo at 0831. Station went to VFT on 29924.4, at 1148. (Watson-UK)
- 23190.0 P6Z-French MFA, Paris, with FEC traffic in French, at 1210. (Hall-RSA)
- 23386.3 LOR-Argentine Navy, Puerto Belgrano, with RTTY weather (200/75R) and then encrypted traffic for GEB010, at 1630. (Watson-UK)
- 24332.0 GXQ-British Royal Navy, London, identifying in Piccolo and standing by, at 1154. (Watson-UK)
- 25870.0 WFLA-Program audio simulcast of this commercial AM station in Tampa, FL, in FM at 1856. (Sevart-KS)
- 26441.7 RFFHCN-French Army, Aubagne, France, with military ARQ traffic, in French, at 0719. RFFDCC, French Army, Paris, with ARQ in French at 1111. RFVI-French Navy, Le Port, with ARQ at 1111. RFFAAC-French Ministry Of Defense, Paris, with ARQ at 1604. (Hall-RSA)

Chirps, Chips, OTHRs and Other Odd Stuff

This month we take an exotic departure and look at some rather unusual stuff and well-hidden signals that you might not have realized were even “there” before.

◆ Chirpsounders

These systems have been around for decades and are used to “sound” the ionosphere – the different, electrically-charged layers of gas surrounding the earth that determine how a signal at a particular HF frequency will propagate. You can think of them working in a way that’s similar to an echosounder which measures depth from the sea’s surface to an object beneath. It does this by emitting a short pulse of sound, and listening for its return echo as the sound bounces off any intervening object. Knowing that sound has a particular speed in water, and by measuring the time from pulse sent to its return, one can estimate distance to an object.

Chirpsounders (or chirps for short) work in a similar fashion but use the ionosphere as the medium rather than water. They do this by sweeping an unmodulated carrier precisely and quickly from one frequency to another, typically at rates of 100 or 125kHz per second. A receiver (usually co-located with the chirpsounder) is very accurately locked to the sweeping transmitter’s frequency. As the time-delayed reflection bounces from the ionosphere above, the receiver will hear a beat note offset by a few hundred hertz from the transmitter. The resulting plot of delay against frequency is known as an ionogram and is used by many military, government, scientific and commercial organizations as an aid in determining the prevailing conditions for HF propagation, for frequency management, and so on.

How to hear one of these things? Well, as one can imagine with a chirp travelling at 100kHz per second, it will pass through the 3 kHz bandwidth of a typical receiver in approximately 30 milliseconds – not a lot of time at all. But anyway, park your receiver on a daytime clear frequency, let’s say 16100 kHz, and listen. Within a few minutes you will almost certainly hear the unmistakable “fwip” sound as a chirp passes by. You can easily simulate the sound for yourself by tuning as rapidly as you can through a strong broadcast station’s signal or, if you’re really stuck, check the audio clip of a chirp in the Resources section.

So, now you can identify a chirp, the question is where are they? Until now, the origins of these signals have usually been known only to their operators or users, but Peter Martinez – UK radio amateur and inventor of the popular PSK31 digital mode – has been employing a novel DSP-based technique to locate them. In short, using his software in combination with GPS-derived precise tim-

ing, three listeners can “triangulate” the position of each chirp. Over 40 have been located thus far, many located at strategic transmitter facilities of NATO forces. See “Chirps Project” in the Resources section for more information.

◆ Chips

Now I have you tuned in eagle-eared to this unusual stuff, let’s look for another “hidden” signal – the chips. For quite some time now, military organizations have used a technique known as frequency hopping to ensure secure and robust communications. In one scheme, as two stations start conversing, the equipment exchanges information which synchronize the transmitter and receiver so that they follow each other as they hop from frequency to frequency. This hopping happens extremely quickly and apparently at random thus ensuring security. Again, with a little patience, like the chirps, you can hear the individual pieces of a transmission. Pick a clear frequency, say 17467 kHz, and once in a while you will hear a brief burst of noise (in addition to more than a few chirps, now that you can identify them!).

See “chips” in the Resources section for an example audio clip (not an actual chip but very representative of the sound you’ll hear).

◆ SuperDARN

Chirpsounders aren’t the only way of sounding the ionosphere. John’s Hopkins University’s Applied Physics Laboratory, for example, is part of an extensive network of radars using HF radio to study auroral conditions in the atmosphere. Known as SuperDARN (Super Dual Auroral Radar Network) radars in the US, Canada, Iceland, Finland, South Africa and Antarctica share data. The JHU/APL-operated radar in Alaska is licensed under the callsign WA2XPM.

The data from these radars can be seen in real-time on the web, and heard throughout the HF spectrum as a rapid-fire, machine gun-like signal extending for about 50 kHz. Typical SuperDARN frequency ranges are as follows (the lower frequencies prevailing at night):

8000-8100 9040-9500 9900-9950
10150-11175 11400-11650 12050-12230
13410-13600 13800-14000 14350-14990
15600-16360 17410-17550 18030-18068
18168-18780 18900-19680 19800-19990

For more information and a SuperDARN audio clip, see the Resources section.

◆ OTHR “Over The Horizon Radar”

The microwaves used by most radars travel

only relatively short distances and in line of sight. HF radio waves, however, are reflected off the ionosphere and can travel long distances, well beyond the line of sight. Reflections from objects encountering the radar’s beam are similarly propagated by the ionosphere and hence with the help of some more sophisticated equipment and signal processing, HF can be used for radar that can “see” over the horizon.

Probably the most famous of these OTHRs was the Russian “Woodpecker,” scourge of just about every legitimate HF user in the 70s. The Woodpecker was abandoned shortly after the end of the Cold War, but there are a number of OTHRs operational today. One of these almost certainly emanates from the UK Sovereign Base at Akrotiri, Cyprus. Another is used by the US NOAA (National Oceanic and Atmospheric Administration) to study ocean currents, wave movements, wind speeds and other phenomena, and the US DEA (Drug Enforcement Agency) use an OTHR to track possible drug smuggling ship movements in the Gulf of Mexico and Caribbean. The Australian Air Force also operate an OTHR for early warning purposes known as the Jindalee System.

In the main, the signal from an OTHR has a very unpleasant buzzing sound. Most also occupy a wide swathe of frequency, typically 20 to 30kHz and are thus fairly easy to spot by ear. Here are some spot frequencies carrying either OTHR or signals from other ionospheric sounders.

10685 10731 11502 13400 13445 13505
13572 14590 14595 14775 14855 14883
14905 14945 15948 16045 16063 17411
17460 17463 18345 18882 19033 19404
19485 19577 19650 19825 20120

That’s all for this month. 73s and good digital DX.

RESOURCES

SuperDARN Homepage	superdarn.jhuapl.edu
SuperDARN Audio Clip	rover.wiesbaden.netsurf.de/~signals/WAV/SUPERDARN.WAV
Chirpsounder Audio Clip	rover.wiesbaden.netsurf.de/~signals/WAV/IONOSONDE.WAV
USAF Sounder Audio Clip	rover.wiesbaden.netsurf.de/~signals/WAV/USAF-IONO.WAV
Chirps Project Homepage	www.qsl.net/z11bpu/chirp/chirps.html
Chips Audio Clip	rover.wiesbaden.netsurf.de/~signals/WAV/ALEPSK.WAV
NOAA ROTHr Homepage	www1.etl.noaa.gov/othr/
Cyprus OTHR Audio Clip	rover.wiesbaden.netsurf.de/~signals/WAV/OTHR50.WAV

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Allan H. Weiner at Sea Again

The former pirate has been an FCC-licensed shortwave broadcaster for almost three years at WBCQ in frigid Maine, but Allan Weiner can't get the tropical seawater out of his blood. As soon as funding had been confirmed, he announced at the SWL Winterfest another shipborne shortwave project, and later detailed it in an interview for *World of Radio*:

The M/V *Katie*, named for Scott Becker's daughter, will be equipped for SW broadcasting, outfitted this spring in May and June, tour the east and Gulf coasts in July, including Portland and Florida, and then go to Belize this summer. It will be fully capable for remote broadcasting via WBCQ at first, and later via SW transmitters aboard, perhaps 20 kW maximum. No problems are anticipated from the FCC or in licensing by Belize, for which it will be partly used, 100% legal.

The key word here is "radio fun," a project to promote SW, not for profit like the previous ship broadcasting ventures. The financial backers are anonymous. The ship has been in storage in

Boston Harbor; the *Katie* is an able vessel, in good shape, about 65-70 feet long, but beamy, wider than normal. It has a brand new engine, but is also a sailboat with 60' mast which will be useful for antennas. Generator and transmitter need to be installed. This may be water-cooled, with a keel cooler, so very compact and efficient. We have a number of volunteers to staff this and WBCQ; the Monticello site has trailers and campers where people stay. It will be a busy summer.

Later on *Allan Weiner Worldwide*, he gave some more details: Probably will have two transmitters covering any frequency; licensed to Belize, and transmitting in other countries' territorial waters. She has 6-cylinder diesel engine, rebuilt 3-4 years ago, with no more than four hours' time on it. Was used for offshore long-line fishing, weeks at a time; built in 1990-1993; very heavy, large displacement, like a tub, stable, which is good. A big fish hold is in the center, where transmitters, studio and lounge are to be installed. SWBC onboard will *not* be operated while in US waters.

ALASKA KNLS A-01 English: 0800-0900 11765, 1300-1400 11870 (via Wolfgang Büschel)

ALBANIA RADIO TIRANA, A-01 English: NAM, 0145-0200 and 0230-0300 6115 and 7160, both 305 degrees, 100 kW from Cerrik site; Eu 1845-1900 7210 Shijak 100 kW 310d, 9510 Cerrik 100 kW 305d; 2130-2200 7130 and 9540 instead (via Andreas Volk, ADDX)

ARGENTINA On 6441 I have logged R. Luz del Mundo, an unofficial stn. At 1140 with pre-recorded evangelic preaching; ID at 1213, "en su frecuencia de Onda Corta 3220 y 6440 khz... para todo el mundo. En el aire Luz del Mundo." 3220 not hrd (Horacio Nigro, Uruguay, *Cumbre DX*) daily 1000-0500, with 50 watts AM. Address: Catamarca 2560, 1847-Rafael Calzada (BA), Argentina; promises to answer reports (Gabriel Iván Barrera, *Cumbre DX*)

AUSTRALIA Christian Voice via Darwin, A-01; this version shows CIRAF targets, azimuths, all in English, 250 kW; arranged into two senders by time order:

17775 0000 0300 49,50,54 317

17820 0700 0900 43,44,50 340

13775 0900 1400 43,44,50 340

13730 1400 1700 43,44,50 340

9720 1700 2100 43,44,50 340

and

9865 2100 2400 54 290

21680 0000 0900 54 290

17825 1000 1200 41,49,54 303

13795 1200 1700 41,49,54 303

11890 1700 1900 41,49,54 303

(via Wolfgang Büschel)

AUSTRIA Beginning with the A-01 season, Adventist World Radio stopped using Rimavská Sobota, Slovakia, site after seven years, replacing with Moosbrunn, Austria, a 500 kW unit operating with 300 kW, 12 hour a day relay for coverage into Africa, Middle East, and Pakistan. The other 500/300 kW transmitter at Moosbrunn with an omni-directional antenna carries AWR to Europe morning and evening in English and German. AWR usage of leased facilities at Jülich in Germany and Meyerton in South Africa will continue (Dr Adrian M. Peterson, DX Editor, AWR) Trans World Radio also transmits Russian via Moosbrunn on 9745 for 15 to 75 minutes between 1400 and 1515 (Kai Ludwig, Germany)

BELGIUM [and non] A01 English from RVI:

0700 9865 Eu via Jülich, Germany

1130 9925 N&S Eu 200 kW Wavre

1130 9865 EAs via Petropavlovsk,

Russia

1730 5910 SEu, 9925 N&SEu both

200 kW Wavre; 13710 SEeu/ME 100

kW Jülich

1930 9925 Eu via new relay site 200

kW Moscow [also SA m - A. Volk]

2300 & 0400 15565 NAM via Bonaire

(RVI Radio World, Paul Brems)

The 2300 time was announced re-

peatedly, though published schedules continued to show 2230 (gh) From A-01, new interval signal and jingles, new name as "RVI, Flanders International Radio," or "Flanders Radio International" (*Radio World*)

BOLIVIA Radio Mosoj Chaski is a Society for International Ministries project <http://www.sim.org> in partnership with New Tribes Mission, Pioneers and Quechuas for Christ missions. Address: Radio Mosoj Chaski, Casilla 4493, Cochabamba, Bolivia. Tel: + 042 20651. Fax: + 042 51041. E-mail: chaski@bo.net Web Site: <http://tunari.socs.uts.edu.au/rmc/> 0900-1200 and 2200-0100 daily in Quechua on 3310 (© BBC Monitoring)

BRAZIL Many radio stations no longer use 'Caixas Postais', (P.O. Box). Several letters came back to me. I phone the station, and obtain the correct address. In most cases, no more CP. Please, try the street address (Rudolf Grimm, SP, *radioescutas*)

CAMBODIA [non] Voice of Justice "Vitthayu Samleng Yuttethoar" is operated by Sam Rangsai Party (SRP), the main Cambodian opposition party. It commenced a weekly test transmission on 17 Feb, believed to be broadcast from a neighboring country thought to be Thailand. Later reports however believe the station to be broadcasting from Taiwan. Address: 49 Street 214, Phnom Penh, Cambodia. E-mail: samrainsy@bigpond.com.kh Web Site: <http://www.samrainsyparty.org> 1000-1100 Sat in Cambodian on 15455 (© BBC Monitoring)

First broadcast heard poor-fair *0958-1048* (Mike Barraclough, England, *DX Listening Digest*) Thailand will never allow anyone to set up a radio station for the sole purpose of undermining another country or interfering in Thailand's internal affairs, the Foreign Ministry said (*Bangkok Post* via Andy Sennitt, RNMN) Nice reply from Ms. Tioulong Saumura, in charge of the radio broadcasting for Sam Rainsy Party, and also a member of Parliament in Phnom Penh: "Maybe we should have a 10 minute-condensed programme out of our 60 minute-programme for non-Cambodian speakers such as you. I shall submit the idea to my party leaders" (Björn Fransson, Gotland, *World of Radio*) It was missing Feb 24, back March 3 but half an hour early by mistake, missing again March 10, back at 1000 on March 17... (Wolfgang Büschel, Germany)

CAMEROON Radio Cameroon provincial station - Buea, 0430-2315 daily in French, English, vernaculars on 6005 including local news in English at 0530, 0630; National network news at 1400, 1630, 1830, 2300 (© BBC Monitoring) I don't recall any DX reports of this in ages; is 6005 really active? (gh, *World of Radio*) 6005 was the ONLY active SW frequency from within Cameroon observed during a BBCM survey there last October! (Dave Kenny, BBCM, DXLD)

At 4 kW, no chance to hear in Europe, with 6005

terribly crowded (Thorsten Hallmann, Germany)

CENTRAL AFRICAN REPUBLIC "Radio

Centrafrique" or the "national station" of

Radiodiffusion-Télévision Centrafricaine, in

French, Sango and other local languages. SW fre-

quencies (5035/7220 kHz) are subject to varia-

tion, e.g. 5033-5034. Address: BP 940, Bangui,

CAR. Tel and Fax: 615124; 612588; 616125;

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-00=winter season, October 29-March 31; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

613707; 613242; 611822. Daily 0600-1800 on 7220v, 1800-2300 on 5035v. In French/Sango including 10 minutes of news in French at 0600, 0700, 0800, 1300; 25 minutes at 1800 (© BBC Monitoring)

CHECHNYA [non] Radio Chechnya Svobodnaya ceased SW March 1, still on AM/FM/LW (Konstantin Gusev, DX Bistvo, via Sergei Sosiedkin)

Some R. Free Chechnya frequencies remained, now with R. Rossii programming, 11635 and 15605 (gh)

CHINA [non] World Falun Dafa Radio has three transmitters, and reception correlates with Bulgaria, not FE or ME. One puts out much more signal to the west and is frequently reported. Two are active from the program sign-on, while the third usually goes on about five minutes later, to confuse the Chinese jamming stations. Frequency switching is as frequent as every five minutes (Olle Alm, Sweden, DXLD)

CONGO DR Two HCJB engineers are installing a low-power SW transmitter for partner ministry Believer's Express in Bukavu, per March edition of HCJB's *Prayerworld* (Christer Brunström, *SW Bulletin*) 6210, Radio Kahuzi reactivated on shortwave from Bukavu, started Feb 22nd after HCJB personnel installed a 1,000 watt transmitter. Running at 810 watts, they feel it will get out about 300 miles. Time schedule not known. All this per HCJB. This is the station of the Christian group Believers' Express; website is <http://www.besi.org> Kahuzi is still on FM and schedule we have had previously is: 0700-1030, 1200-1400, and 1430-1830. Not sure if this is still current or if it even applies to the shortwave. The station is named after the highest mountain in this area (Hans Johnson, *Cumbre DX*)

COSTA RICA RFPI's new antennas are holding up well in the wind, designed to withstand 75 to 100 mph, as well as to handle the necessary power, be cheap to construct, and have sufficient gain. But due to limited space, a couple of acres, the antenna at 200 feet for 7450 must be aimed further east than preferred, toward Europe, favoring ENAm, diminishing signal in WNAm. *Global Community Forum* is back, with up to three programs a week, including live call-ins. The new ones are UT Thu and Sun 0230-0330 (RFPI *Mailbag*) Some new program times for RFPI's Mar-Apr-May quarter: *Counterspin* [Media Analysis] Mon 1800, Sat 1600 (new time); *Alternative Radio* Wed 1600, Sat 1930 (new time); *Freespeech Radio News* Fri 1730 (new time), Sat 1630 (encore) – plus repeats 6, 12/18 hours later (RFPI *Weekly Update*)

DOMINICAN REPUBLIC Longtime DXer César Objío, whom I had the pleasure of meeting in a visit there many years ago, says he is writing a book (in Spanish, of course) about the history of radio in his country. He is looking for copies of any DR verifications from any year, to illustrate the book. Contributors will be credited. I think he is not on Internet. Send to: César Objío, Calle Enrique Henriques 69, Ensanche Lugo, Gaczué, Santo Domingo, Dominican Republic (gh, from a Musing in NRC DX News)

ECUADOR HCJB's English website has been redesigned, easier to navigate: <http://www.hcjb.org/english> (Allen Graham, *DX Partyline*) A-01 English to NAm: 100 kW on 9745 0000-0400 at 351 degrees, 0400-0700 at 325d. Also 50 kW 0000-0700 on 15115 330d. Eu 0600-0800 11680 250 kW 36d. S Pac 0700-1100 11755 100 kW 228d, 1900-2200 17660 100 kW 41d; and new to India 2300-0100 17660 100 kW 41d (Doug Weber, HCJB via Wolfgang Büschel) Convenient, so happens India and Europe in same direction from Pifo (gh) On HCJB's transmitter site move: this still is not certain, as construction on Quito's new airport has not begun, but if HCJB does have to replace Pifo site near Quito, with Santa Elena west of Guayaquil on the coast, the plan is to move transmitters one by one, in order to keep some frequencies on the air, and hopefully to add two new transmitters. Towers at the new site come from VOA-Greenville, and the antennas will be log-periodics, instead of curtains at Pifo. HCJB maintains its commitment to serve the three Americas, and the new site will cover the Southern Cone much better than at present, but probably will not have antennas for Europe or South Pacific (Allen Graham, HCJB, on VOA *Communications World*)

FINLAND YLE A-01 schedule for NAm includes only one English broadcast, staying in our mornings: 1230-1300 on 15400 17670 (via Joe Hanlon, PA)

FRANCE Radio France International cut English at 1200 and 1400 from 60 to 30 minutes in early March, but still a sesquihour at 1600 (Mick Knaption, *England, DX Listening Digest*) RFI said it has new morning broadcasts at 0400, 0500, 0600 and 0700, in English (Chris Hambly, Victoria) But announced these are only on local FM and satellite (Sven Ohlsson, DXLD) RFI's new morning English broadcasts may not be on shortwave, but they're all available on demand from http://www.rfi.fr/Langues/rfi_anglais_main.html (Kevin Kelly, <http://www.PublicRadioFan.com>)

GEORGIA Radio Georgia again audible on 11805.3, English at 0630. Prior to that, only a het on VOA Kavala, which goes off at 0630 (M-F). Reasonable amount of carrier, but usual poor modulation (Craig Seager, Bathurst, Australia) Exactly the same situation on the other worldwide! Fair signal but very rapid flutter; modulation so weak that it could not be sure it was English, though intonation fit; overpowered by sound of flutter itself. And don't rely on this due to severe power shortages in Georgia (gh)

GOA AIR Panaji in the clear on 9700 for English news 1530-1545 in March. Still trying to QSL this radio-country (Bill Flynn, OR, DXLD)

GREECE I translated VOG's program titles as of Feb, during hours when on to NAm, and these include: *Thread of Ariadne*, which may not be the Greek fable, but rather the thread of life that ties the Greeks in America to the Old Country. Ariadne in Greek Mythology was King Minos' daughter who gave Theseus the thread by which he found his way out of the labyrinth. It's Tue 1200-1245 on 9690 [now 15455?] and Sat 1900-2000 [17705 or 17565]. *Know Songs of the Sea*, UT Sun 0300-0320 when English news is aired other days, and M-F 1245-1300, Sat 1340-1400 (John Babbis, Maryland, DXLD)

GUATEMALA Radio Cultural Coatán, 4780, has used our name for years without permission. They have never been part of our group. There is no record according to the government of any sort of license. Radio Nacional, 6180, is not

on, and may never return. I got it back on the air for a while in 98-99, with old tubes and some parts from TGN and other sources. I had it on more or less but at about 3 kW. Radio Verdad's strange 4052.5 frequency is because the government changed the system of licenses, now an open auction. Any frequency for any purpose to the highest bidder (forget international treaties!). He bid for and won a 5 kHz bandwidth in a communications band (Wayne Berger, R. Cultural, via Hans Johnson, *Cumbre DX*)

HONDURAS HRMI reactivated on 5010-USB. Jim Planck at IMF World Missions, says 5890 had broken down and had been off about a year. HRMI was asked to leave 5890; kept getting stepped on by VOA. They reactivated on 5010 with new transmitter running 150 watts, plan to increase to authorized 2.5 kW. Schedule is *1200-0430*. By May or June they plan another transmitter on 3340 with 1 kW (Hans Johnson, *Cumbre DX*) IMF also building station in New Mexico, q.v.

JAPAN On the Radio Heritage site, "WVTR Radio Tokyo," story of radio & life in occupied Japan: <http://radiodx.com/spdxr/WVTR.htm> (Paul Ormandy, New Zealand)

KOREA NORTH The overseas service changed its name from "Radio Pyongyang" to "Voice of Korea" on Feb. 16, Kim Jong Il's birthday (Toru Yamashita, Asian Broadcasting Institute) Provincial stations relay programmes from the KCBS in P'yongyang when not carrying local programmes which are weekdays at 0500-0600 approx. but SW frequency usage is sporadic: Chongjin, North Hamgyong 3940v; Hamhung, South Hamgyong 3220; Hyesan, Yanggang 3920; Kangaye, Chugong 3960; Pyongsong, South Pyongan 3350; Sariwon, North Hwanghae 2350; Wonsan, Kangwong 3970v (© BBC Monitoring)

KOREA SOUTH RKL website added special event page for Visit Korea Year, in conjunction with 10-part monthly series which started in Feb on a Thursday for the Snow Festival (RKL *Multiwave Feedback*) Which Thu of the month varies: Feb 1, Mar 22... #4 sometime in May on Korean martial arts, Tae Kwan Do (gh)

KURDISTAN [non] R. Bopeshawa, 1500-1600 on 9450 kHz: M/W/F first half in Arabic, second half in Kurdish. On Thu all in Kurdish. ID (in Kurdish): Aira Radio Bopeshawa (R. Petraitis, *Clandestine Radio Watch*)

LATIN AMERICA The LA-DX Webpage has been moved to: <http://www.rovers.net/~hackmohr/> (Mark Mohrmann, VT) Very useful for checking unIDs by frequency, latest and archive loggings! (gh)

LIBERIA *Suffocating the Media in Terror* reports how Charles Taylor took over the radio stations here: <http://www.theperspective.org/suffocating.html> See homepage for links to many other articles about Liberia (via Mike Cooper, DXLD)

LITHUANIA R Vilnius discontinued Jülich, Germany, 6120, 5 Mar. English 0030-0100 continued on 9875 from Sitkunai (Mark J. Fine) Really pounds into central Oregon, S9 at 0030, 10 over by 0100 in March (Joe Barry, Bend, DXLD) Generally better reports in WNAm than ENAm for this (gh)

MALI Terrific surprise to hear ORTM Bamako, 4835, with weekly News Magazine in English, Sat 1906-1918 (Tapio Kalmi, Finland, *hard-core-dx*)

NEW ZEALAND On the 3rd Thursday of each month the RNZI transmitter is shut down for routine maintenance from 2230 UT Wed to 0255 UT Thu [perhaps one hour later now]. Sometimes it is necessary to extend the maintenance period so that after the 03 News the TX is turned off again until the work is complete. We regret that from time to time this will conflict with scheduled programmes. *Mailbox* can be downloaded from our website and we have added an extra playing on the Monday of the *Mailbox* week at 0705. RNZI will revise its schedule again May 7, but until then: Tue-Sat *1650 on 6095; daily 1855 15120, 2050 (Sun 2058) 17675, 0459 15120, 0705 11720, 1105-1305 15175; 1305-1650 6095 available if needed (via Adrian Sainsbury, Technical Manager, RNZI)

PAPUA NEW GUINEA According to Deborah Wells, "KBBN" still hopes to be on shortwave by July. PANGTEL told them that 3200-3400 is crowded, but will try to coordinate 10 to 15 kHz down from 3205. Also looking at the 2300-2500 and 3900-3950 kHz ranges (via Hans Johnson, *Cumbre DX*)

NBC is creating its web site at: <http://www.nbc.com.pg/> (Pentti Lintujärvi, *hard-core-dx*)

PERÚ On 4573.63, Radio Independencia, Provincia de Chiclayo, heard only once until 0225*, seemingly a radio pirate who ravages the region. On 6270v, Radio El Libertador, Bagua Grande/barrio El Libertador, provincia Utcubamba, departamento Amazonas at 0000 and *1030. On 6435.55, Radio Universo/Radio Cielo, unknown QTH testing with good audio at 0040. On 5544.72, Estación Equis, Bagua, Amazonas, active some days in March, juvenile format until 0300* (Björn Malm, Ecuador, *SW Bulletin*) Also as early as 2311, romantic music (Pedro F. Arrunátegui, Perú)

RUSSIA Radio Gardarika (St. Petersburg's local FM station) began shortwave Feb 16. Schedule later changed to 1900-2130 UT daily on 6235 to Europe. Report to: Radio Studio Doma Radio "Gardarika", Lgovskiy prospekt 174, St. Petersburg, 197002, Russia or studiosw@metroclub.ru (Mikhail Timofeyev, *hard-core-dx*) About confusing IDs heard: Radio Gardarika operates three networks, the "traditional" one on the wired network, "Nevskaya volna" on 69.05 MHz and "Radio studio" on 102.4 MHz. The shortwave contains a mixture of both, hence both these IDs are given (Bernd Trutenau via Kai Ludwig) Nice large-format QSL card received (Guido Schotmans, Belgium, *hard-core-dx*) Summer timing 1800-2030 UT on a different frequency (Mikhail Timofeyev)

SERBIA [non] Pres. Kostunica addressed the staff of R. Yugoslavia on the station's 65th anniversary, saying "It is greatly in the interest of the state that Radio Yugoslavia should anew broadcast its shortwave program. I sincerely hope that the problem of your transmitter in Bijeljina will be solved as soon as possible. We have discussed it with representatives of the international com-

KRAI BILONG BAIBEL-92.5 FM
KBBN
NEKI KRAI LONG PLES DRAI

Shortwave Broadcasting

munity in Bosnia-Herzegovina on several occasions, and I am convinced that this issue will be the topic of discussion between the Yugoslav government and the Ministerial Council of Bosnia-Herzegovina." (c) (RNMN)

SOMALIA R. Galkacyo has a new website: <http://www.radiogalkayo.com> (Thorsten Hallmann, Germany) Webmasters are in Qatar (gh)

SOUTH AMERICA R. Corsario Internacional, a pirate playing music of the 50s, 60s and 70s, has been heard several times at 0330-0400 on 14540, mostly in AM, but once on USB, radiocorsario@latinmail.com ID says they broadcast every day (José M. Valdés R., YV5LIX, Venezuela, *Conexión Digital*)

SUDAN 7200.3, Radio Republic of Sudan, 0422-0437 in vernacular, drums and song (Claudio Morales, Argentina, DXLD)

SWEDEN R. Sweden English A-01 English to NAm: 0230-0300 9495; 0330-0400 9495 except May-Aug 15245; 1130, 1230 and 1330 on 18960 (via Cowin Martin, BDXC-UK) plus the new RCI relays! Via Sackville, Canada: 9755 0200-0300 and 11895 0300-0400, both for the Americas, in Swedish and English (*Electronic DX Press*) Sweden gets 9495 kHz/250 kW/268 deg at 0200 to 0400 UT from Sackville (Ricky Leong, referring to RCI info)

SWITZERLAND SRI will gradually be discontinuing its shortwave broadcasting, with no further programs after the end of 2004. Also reducing satellite broadcasting, retaining only English. Reasons: Swiss electronic media easily accessible in Europe via satellite; internet increasingly popular around the world; only limited prospects for expensive SW services. SRI will continue to provide news of Switzerland via its on-line service: <http://www.swissinfo.org> in eight languages. SWBC discontinued in three stages: WNAm on 9905 and Australia already ended March 24, 2001; most other targets including ENAm on 9885 end October 27, 2001. Near East, Africa and South America stay until the end of 2004 (Your swissinfo team via Mike Barraclough) They may not want to admit it, but most of its audience is still listening on shortwave. In fact, by their own admission fewer than 100 people per day are listening in English via the internet which shortwave is supposed to replace. SRI's own web page <http://www.SWISSINFO.org> according to ALEXA.COM is only the 38,500th most popular – a low ranking even compared to other international broadcasters (Larry Nebron, CA)

TIBET Tibet Information Network reports that Chinese authorities have stepped up their jamming of Tibetan language broadcasts of VOA, RFA, and the exile station Voice of Tibet. Jamming equipment has been upgraded at two locations near Lhasa. This suggests jamming in Lhasa involves groundwave signals, more difficult to overcome than skywave jamming, which would come from transmitters in China (VOA *Communications World* via John Norfolk) The entire long article on increased jamming here can be found at <http://www.tibetinfo.net/news-updates/nu280201.htm> (via Mick Knaptton, England, DXLD)

TURKEY From March 13, V. of Turkey has a live call-in show on the UT Tuesday 2300 [now 2200 on 11845, also webcast], hosted by Reshide and my sister Kizilgul Morali. E-mail in advance with your phone number and we will call you: ankayra@yahoo.com Or, the phones are 90-312-491-2896 and -491-2370 (Reshide Morali, VOT, DXLD)

U S A Jim Planck and IMF [of HRFM HONDURAS, q.v.] are building a new SW station near Piñon, New Mexico, about 175 km NE of El Paso. Property already purchased and they have one 50 kW transmitter. George Jacobs is handling the FCC process. Will have two 50 kW and target both Mexico and Canada in support of IMF's missionary and church building efforts. No word yet on call sign or frequencies, but they would try to get a tropical frequency for Mexico. When they come on the air depends on how fast permits and license are granted by FCC (Hans Johnson, *Cumbre DX*) Aren't there enough preachers on SW already?! It would be nice if at least 50% of New Mexico's SW stations actually brought us something about NM news and culture (gh)

WWCR is full of surprises, heard carrying a Public Radio International show, complete with PRI logo, Dialog, Sat 1200-1230, Thu 1230-1300 [as anticipated timeshift]. It's produced by the Woodrow Wilson Institute a.k.a. International Center for Scholars, per closing info, also audible on web via <http://www.wilsoncenter.org/dialog> Now's the time for fans of other PRI and even NPR shows much in need of SW exposure to lobby them and WWCR to pick them up (gh)

World of Radio on WWCR: See our website for latest schedule; note that the UT Monday 0000 is on 3215 in May, 9475 from June (gh)

Ken Berryhill has received a new honor as 'Father of WRVU' at Vanderbilt University. Besides SW-only WWCR, Ken's *Country Classics* and *The Old Record Shop* are webcast on WRVU Thu 1700-1900 UT, via <http://wrvu.org/home.html> (gh)

The *Shortwave Report* appears on KZYX, Mendocino County, California, <http://www.kzyx.org> 2nd and 4th Fridays at 7-7:30 pm PT, also webcast, and ondemand via <http://www.outfarpress.com> Dan Roberts promotes SWL by compiling off-air recordings of several stations each fortnight (gh)

WHRA, Maine, serves some useful purpose in providing one of the most distant DX signals I can hear on the planet. March 1 at 1630 I noted 17650 with an extremely heavy echo, almost as loud as the direct signal, and too quick to be a satellite delay. Therefore, it is longpath in addition to shortpath. In round numbers, WHRA is about 2600 km from me; Earth's circumference is about 40100 km, so the long path is 37500 km, which is 34900 km further than the short path. At the speed of light, 299000 km/sec, the delay is .12 second. The echo severely degraded intelligibility of the preacher. A brief piano interlude followed, sounding as if it were four-hand rather than two-hand (gh, OK)

Acting Secretary of State Powell sent a letter to BBG Chairman Nathanson asking the BBG to reverse its decision to close the VOA Thai Service. "At the beginning of the Bush Administration, it is essential that we reinforce our commitment to preserving close relations with our Thai allies. The VOA Thai

Service represents an important symbol of that U.S.-Thai friendship." (VOA *Communications World* via John Norfolk)

See <http://hawkins.pair.com/radmail.html#voamemsect> (a great site with many more interesting radio stories like this one) By John Vodenik, Voice of America Transmitter Technician - WB9AUJ, Mason, Ohio: Having been employed at Bethany Relay Station for almost 10 years, I have a few stories I would like to tell. I'll start with the spark transmitter that a few of us constructed one slow Saturday... (via Mike Terry, BDXC-UK)

You can find combined summer schedules of US radio stations at: http://www.fcc.gov/ib/pnd/neg/hf_web/hfff0z01.txt (DX-bistro - Konstantin Gusev, Moscow, Signal)

[non] GBGM of UMC satisfied with coverage of Africa using Jülich site, except for South Africa; may add Madagascar for that (GBGM spokesman Brian Brightly interviewed on VOA CW) United Methodist Church A-01 via Jülich: 0400-0559 on 11775 (140d) and 13810 (160), 1700-1859 on 13820 (145) and 15485 (160) (Kai Ludwig, Germany) Now IDs as R. Africa International, the less cumbersome name we have been awaiting; E-mail remained radio@gbgm-umc.org (gh)

URUGUAY On 6154, Radio Sarandi del Yí, Durazno, CWA155, new station on the air around 0045-0300, nominal 6155. Promises souvenir for reports to norasan@adinet.com.uy SW outlet uses the "fantasy" name "Banda Oriental," the ancient name of the territory which is Uruguay today. Phone and fax +03679155. Sked 0130-0300. They inaugurated on Mar 1, 2001, with tests. Power is 2 kW. Antenna: folded dipole (Horacio Nigro, Uruguay, DXLD)

VATICAN/ITALY The fight between them over "electrosmog" put out by Vatican Radio, allegedly harming myriads of Romans living nearby, generated huge press in March. The trial of three VR officials was put off until September, and the Vatican maintained there was no scientific proof of such danger, and besides, Italy has no jurisdiction. Environment Minister Willer Bordon slammed the Vatican's decision to ignore Italian legal action for electromagnetic pollution as "incredible" and ordered The Vatican to reduce magnetic fields in 15 days from 18 volts per meter to six in accordance with Italian law. VR said it had reduced the power of some SW broadcasts anyway, and was moving toward Internet instead, notably the Japanese service (summary of BBC and other press reports)

What the Vatican omits to say is that although they have used the Santa Maria site for 40 years, the power has progressively increased from the old 80-100 kW transmitters to the 5 x 500 kW units now in use. Plus a 10 kW on the out of band frequency of 1611, which was upgraded to 100 kW. If the Vatican loses this case it could start a chain reaction concerning all people that live in proximity to any high power transmitter site (Andy Cadier, BDXC-UK)

Whatever the merits, it has been a PR disaster for the Roman Catholic Church. The way out of this is obvious: VR has already started relays via foreign sites in a minor way. They might as well contract for all their broadcasts to go out via other sites and let someone else take the heat for "electrosmog", like SRI has been doing (gh)

VENEZUELA Ecos del Torbes was on 4830 instead of 4980 (Karel Honzik, the Czech Republic, *hard-core-dx*) 4830 is the R. Táchira frequency (gh) Ecos del Torbes and Radio Táchira are co-owned (Don Moore, IA)

[non] *Aló, Presidente* does not appear every week, if Pres. Chávez is away on travels, but 9820 via Cuba was changed from scratchy SSB to high-power AM, much better in NAm, Sundays 1400-1800 (gh)

VIETNAM Since at least the mid-90s, a Vietnamese station has been heard in the range 4657-4722 kHz. Now it has finally been IDed as a 'new' provincial station. Thanks to Gaku Iwata, who tells us that Satoshi Hasebe says it is Lang Son, in the far north. Satoshi says it currently operates around 4660 at 1000-1430 with relays of VOV-Hanoi2 except for local programs at 1030-1100, 1130-1200. ID is "Day la dai phat thanh Lang Son". Signals are very poor and the audio is extremely low. Do not confuse it with the Laotian regional at Houa Phan, also around 4660 at *1000-1230*. Houa Phan has carried the news from LNR at 1200-1230, \ 6130 (via Hans Johnson, *Cumbre DX*)

At a House of Representatives Subcommittee on International Operations hearing, acting chairman Chris Smith indicated his concern about the jamming of Radio Free Asia broadcasts. Richard Richter, President of Radio Free Asia, gave this account of the effectiveness of Vietnam's jamming of his station's Vietnamese-language broadcasts:

The situation in Vietnam is such that depending on economics and weather, our transmission is better or worse. When there is a flood, the transmission is better. In and around Saigon, the Delta, listeners report to us that the ability to listen is not nearly as bad as it used to be. Around Hanoi it's terrible. As a matter of fact there is a new jamming station which has been put in by an American company that is being used against us (VOA *Communications World*) That's Continental (Wolfgang Büschel, BC-DX)

WESTERN SAHARA [non] Italian DX Club A.I.R. periodical "RADIORAMA" reports on a visit to R. Nacional Saharahui at Rabuni, Algeria, near Tindouf. Antenna shown is a vertical metallic mast approx. 14m high with a 3-element SW dipole 10m above ground. On SW transmits with 20 kW. Summer schedule 0600-0700, 1800-2400. MW 1550, SW in the 7300-7500 kHz range not fixed, varies due to Moroccan jamming from installations near Agadir. Three photos of the studio show a most modern high tech standard, long run tape recorder and also a Compaq? desktop PC. Rabuni location consists of concrete buildings constructed in local traditional style (Wolfgang Büschel, BC-DX)

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

0000 UTC on 15180

NORTH KOREA: Voice of Korea. Muffled audio for segment on *The Great Leader*, // 11710, 13760; 1200 on 9850; 1900 on 11710. (Jim Boynton, Newton, MA; Claudio Morales, Buenos Aires, Argentina) Spanish service 0109, 13748.89 alternating by man and woman. Music program at 0125 to station ID by noting parallel on 15180.07 at 0136. Strong, but very unstable and varying signal. Note that nominal frequency for RP is supposed to be 13760. Guess those gerbils are really asleep at the generator again, even if they moved to (intended) 13750 kHz. (Mark Fine, Remington, VA) Spanish service audible 1826-1833 + 1951-2003 on 9335, English commencing 1957 with IDs and schedules. Interval signal at 2000 to anthem and French text. (Harold Frodge, Midland, MI) 0145 on 17735 English service. (Robert Timek, Milford, MI) 2120-2125+ on 9335 in Spanish. (Frodge, MI)

0009 UTC on 5677.98

PERU: Radio Ilucan. Spanish text for evening comunicados. Canned identification at 0012, ID repeat over Peruvian flute music. Peru's **Radio Chota** 4890, 0018-0027 with Peruvian vocal music. Announcer's text including IDs. (Mark Veldhuis, Borne, Netherlands/Cumbre DX) Peru's **Radio San Francisco Solano** tentatively logged 4750.15 at 1030-1102+ including an interval signal to campo music. "Solano" heard 1057, SIO=322. (Frodge, MI)

0015 UTC on 11615

CZECH REP: Radio Prague. Good signal for English service, equally strong // 13580. (Salmaniw, Victoria, BC Canada/Cumbre DX; Morales, ARG) 5930 at 2120 *Economic News* // 9430. (Bob Fraser, Cohasset, MA)

0100 UTC on 9385

UKRAINE: Radio Ukraine Int'l. News into Ukraine Today, poor signal quality. (Boynton, MA) Ukrainian service at 2310 tune-in, 13590. Poor-fair signal quality, improving to good level by 0015. (Salmaniw, CAN/Cumbre DX) Newscast with commentary to station ID. (Morales, ARG)

0200 UTC on 11785

IRAQ: Radio Baghdad Int'l. Good signal quality for English service's national news to selected Arabic music. "Baghdad" identification. (William McGuire, Cheverly, MD) German service 2145 on 11787. (Timek, MI)

0658 UTC on 7230

UNITED KINGDOM: NHK/Radio Japan relay. Japanese music program with fair signal quality. (David W. Weronka, Benson, NC) **Radio Japan-Gabon relay** 1700 on 15355. (Boynton, MA)

0700 UTC on 4960

VANUATU: Radio Vanuatu. Interval signal at tune-in to English text of very low audio quality, followed by French ID best signal at 0719. Regional music, signal fair to good quality. (Daniele Canonica, Muggio, Switzerland)

0930 UTC on 3279.6

ECUADOR: La Voz del Napo. Station sign-on with identification, "Esta es La Voz del Napo desde la ciudad de tena, Sudamerica." Male announcer continues with religious programming in Quecha dialect with several mentions of Santa Maria and the Catholic faith. Fair signal quality. Ecuador's Radio El Buen Pastor 4814.9 at 1015 for Quecha service. Morning regional messages into folklorica music. No discernable ID but numerous mentions of "La Voz" with references to city Loja. Poor signal quality. (Leigh Morris, South Australia/HCDX) 1016-1022+ on 3279.6. (Frodge, MI)

1000 UTC on 6165

UNITED STATES: VOA. News Now, followed by sports update and *Earth & Sky* segment. (Boynton, MA) News Now 2300 on 17820. (McGuire, MD; Morales, ARG)

1011 UTC on 9155

AZERBAIJAN: Dada Gorgud. Fast paced regional music to Arabic text and announcements. Signal S3. (Zacharias Liangas, Thessaloniki, Greece)

1115 UTC on 6070

CANADA: CFRX. Newsman tells of recent vacation in the Dominican Republic, ID "CFRB," into local traffic report. **Radio Japan** Canadian relay 6120 at 1120; BBCWS Canadian relay 5965 at 1125, including news item on controversy that Waffen SS veterans are living in England. (Fraser, MA) 1957-2008+ (Frodge, MI) **Radio Canada Int'l** 0200 on 6040 *Maple Leaf Mailbag, Canada Today* 2100 on 13650. (Boynton, MA) **RCI** audible 9805 at 2110 (Tom Banks, Dallas, TX) 11990 at 0235 report on music festival. (McGuire, MD)

1147 UTC on 15060

TAIWAN: Taiwan Radio/Central Radio. Chinese variety program of chat and Asian music. English station identification at 1159 as "Taiwan Radio," followed by a Chinese ID as, "Zhongyang diantai (central station), station not on at 1500 recheck. (Liangas, GRC)

1202 UTC on 5025

CUBA: Radio Rebelde. Spanish world news to 1203, followed by Cuban sports roundup to 1207. *Buenos Dias* children's morning program. (Frodge, MI) **Radio Havana** 13750 at 2115 *Caribbean Outlook* including interview with a singer-composer from the Antilles. (Fraser, MI)

1600 UTC on 7165

ETHIOPIA: Radio Ethiopia. External service noted at the hour with ID, "This is the external service of Radio Ethiopia." English program with '80s pop vocals music program. Fanfare ID into news bulletin at 1638 and summary of the top news items. Service continues in French, good signal while // 9560 blocked by **Voice of Turkey**, // 11800 untraced. (Morris, AUS/HCDX)

1900 UTC on 3366

GHANA: GBC. Time pips at tune-in to, "you are tuned to Radio Ghana." Election results from polling stations throughout the country. Good signal although later blocked by **Kenya's KBC** on frequency. (Morris, AUS/HCDX)

1920 UTC 3375

ANGOLA: Radio Nacional de Angola. Best to monitor on 3374.2 kHz. French service of announcer's chat to station identification, SIO=232. (Cannonica, SUI) Audible 0513-0530 on 7245. Portuguese political commentary to ID. QRM from **Tajik Radio SINPO**=33443. (Morales, ARG)

1932 UTC on 9535

THAILAND: Voice of America relay. International newscast in special English at 1934. *Words and Their Stories* segment continuing in special English. SIO=343. (Frodge, MI) 2036 on 9535 to abrupt 2045*. (Timek, MI)

1948 UTC on 4976

UGANDA: Radio Uganda. English program and news to item on national politics. Very good signal, SIO=454. (Cannonica, SUI)

2044 UTC on 9675

UNITED KINGDOM: World Beacon. Pastor Halloway's religious text...sounds like he's having a seizure. Announcer's "WB" identification at 2045 into new religious segment. SIO=3+53. (Frodge, MI) BBC 15280 at 0105. World news to ID, focus report on India. (McGuire, MD)

2049 UTC on 9965

ARMENIA: Voice of Armenia. Feature program on Armenia's role in WWII. "Voice of Armenia" ID at 2057*. (Frodge, MI) Excellent Armenian music and text on their national choir to perform at Notre Dame cathedral. Weather update to weekly *Music Review* segment. Station identification and information to 2100*. (Timek, MI)

2145 UTC on 9990

EGYPT: Radio Cairo. Political commentary on Israel-Palestinian conflicts to 2147. Arabic vocal tunes. Feature on Islamic art. (Frodge, MI) Arabic language lesson 9905, 2345-2350. (Weronka, NC)

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

INCREASE Your QSL Return Rate!

Have you found your foreign QSL return rate rewarding, or frustrating and futile? Whether you prefer enclosing an IRC with your report, currency, or (my favorite) return postage to the country of origin, QSLing remains a popular phase of the radio hobby.

The excitement of finding QSLs in your mailbox can be yours on a regular basis. Bill Plum of *DX Stamp Service* notes, "I think we've developed a very good and very easy and very rewarding method to QSL, a method that, in the long run, will cut down on mail theft as well as get you that treasured QSL." Indeed, this widely popular method has increased return rates for shortwave enthusiasts, as well as medium wave, utility and amateur radio operators.

What You Will Need to Get Started

The foreign stamps of the county to which you will send your report.

A return self-addressed envelope (European Air Return envelope) to yourself to which you affix the foreign stamps. Print your name and address or place an address label on the envelope. Make sure the stamps on this envelope correspond to the country to which your mailer envelope is addressed.

A mailer envelope, (European Air Mailer) slightly larger than the SASE, addressed to the station, QSL Manager, Program Director or particular language service. Print the name and address, do not write in script; print your name and address in the upper left corner, or better yet use a printed address label. The European Air Return envelope will fit into the European Air Mailer without folding, an important factor to the collector.

So what happens now ?

What could be easier? The station did not have to buy an envelope, address the envelope, buy stamps or worse...wonder what to do with currency or an IRC. With any luck, your QSL is soon on your way, because you took the time to make the station's QSLing process easier, and cut their time in half.

Ready to increase your QSL return rate? Send an SASE to Bill Plum-*DX Stamp Service*, for a price list of his DX supplies (including mailer envelopes) and foreign stamps: 12 Glenn Road, Flemington, NJ 08822-3322. FAX: 908-782-2612, Ph: 908-788-1020. Keep us posted on your return rate.

BOLIVIA

Radio Emisora Mallku, 4796.5 kHz. Full data letter signed by Freddy Mamani Machaca. Received in 62 days for a Spanish report, two U.S. dollars and an SAE. Station address: Casilla No. 16, Uyuni, Provincia Antonio Quijarro, Departamento de Potosi, Bolivia. (Daniel Canonica, Muggio, Switzerland)

CZECH REPUBLIC

Radio Prague, 15545 kHz. Full data QSL card showing the Czechoslovak Radio building in Prague during the Warsaw Pact invasion in 1968 and today's site, plus sticker and brochure. Received in 150 days for an email report. Accompanied by a letter of apology for long delay due to malfunctioning reception report software at Czech Radio website. Station address: Vinohradská 12, Praha 2, 120 99 Prague, Czech Republic or via web: www.radio.cz (Ken Maltz Syosset, NY)

EQUATORIAL GUINEA

Radio Africa, 15184 kHz. Full data form letter unsigned with station stamp affixed. Received in three weeks for taped report and one IRC. Station address: Pan American Broadcasting, 20410 Town Center Lane # 200, Cupertino, CA 95014 USA. (Joe Talbot, Red Deer, Alberta, Canada)

GUINEA

Radio TV-Guineenee (RTG), 7215 kHz. Date only "thank you for your interest in our station" French form letter signed by Issa Conde-Le Directeur de la Radiodiffusion Nationale. Received in 63 days for a French report, cassette tape and two US dollars. Previous two reports of two years ago unanswered. Station ad-

dress: Boite Postal 391, Conakry, Guinea. (Randy Stewart, Battlefield, MO)

ISRAEL

Galei Zahal (Israel Defense Forces Radio), 15785 kHz. Full data QSL. Received in 44 days for an English report, one U.S. dollar, one IRC and Phoenix, AZ, postcards, plus a list of all the Phoenix synagogues in the Phoenix area. Station address: Zahal, Military Mail No. 01005, Israel. (George Gotzbach, NM)

MEDIUM WAVE

540 XEJAZZ Tijuana, Mexico. Received verification letter signed by Tom White-Director of Engineering. Received in six days for an AM report. Station address: P.O. Box 250028, Los Angeles, CA 90025. (Patrick Martin, Seaside, OR)

909 New Zealand, Hawkes Bay, Southern Star. Received QSL card and letter signed by Brian Fergusson-Program Director. Received in 50 days for a taped report. Station address: Southern Star, Private Bag 92-636, Symonds St., Auckland, NZ. 981 New Zealand, Timaru, Southern Star. Received QSL card and letter signed by Brian Fergusson-Program Director. Received in 60 days for a taped report. Station address: (see 909 New Zealand) New Zealand MW QSL # 106. (Martin, OR)

Australian Greek Radio, 1683 kHz AM. Partial data letter signed by Con Nicolis. Received in 45 days for a cassette tape of programming. Station address: Australian Greek Radio Rentals, 1246 Cantebury Rd., Roselands NSW 2196. Australia. (Martin, OR)

KBLL, 1620 kHz AM, Blackfoot, ID. Verification letter signed by Carl Watkins-Chief Engineer. Received in 11 days for an AM report. Station address: P.O. Box 699, Blackfoot, ID 83221. This Station is QSLing again, so re-send your AM reports. (Martin, OR)

KQLL, 1430 kHz AM, Tulsa, OK. Partial data letter signed by Clark H. Dixon-Chief Engineer, plus station bumper sticker. Letter refers to the station as both KQLL and KAKC. The latter being the sister station on 1300. Unusual reception for this station, as I was hearing them over local KEZW. Received in 68 days for an AM report and one U.S. dollar. Station address: 5801 East 41st St., Suite 900, Tulsa, OK 74135. (Patrick Griffith, Westminster, CO)

WTIR, 1680 kHz AM. Winter Garden, FL. Full data *Certificate of Reception* with illegible signature for Chief Engineer. Received in 100 days for a taped report and mint stamps. Station address: P.O. Box 149161, Orlando, FL 32814. (Mickey Delmage, Sherwood Park, Alberta, Canada)

MOROCCO

Voice of America relay, 15445 kHz. Full data large *Hawaii* scenery card. Received in 42 days for an English report. Station address: 330 Independence Ave., S.W., Washington, DC 20237 USA. (Ross Comeau, Andover, MA)

Programs on DXing, SWLing and the Media

Given the interests of those who read this magazine, it stands to reason that, for us, among the most popular programs on shortwave are those which deal directly with our favorite leisure activity. Accordingly, and by popular demand, this column will take up the task of providing a comprehensive listing of these programs every May and November.

Each of these programs has a somewhat different focus. *Communications World* casts the widest net, chronicling everything from shortwave to satellite to the Internet. *World of Radio* gives a comprehensive activities report on the HF broadcast bands, including frequencies, personalities, station and program information. *DX Partyline* attempts to serve both new and seasoned DXers and SWLers by providing a place for the clubs to impart information about their events and projects, and by reading reports from listeners around the world about what is being heard on the bands in their respective regions. *DXers Unlimited* tends toward light technical topics. *DXing with Cumbre*, whenever possible, likes to emphasize new DX catches. *MediaScan* reports primarily on European satellite and broadband developments. *The Media Report* is unique for looking at the motivations behind the mass media and those who seek to influence it, both at home and abroad. A few, such as *Ask WWCR* and *Feedback*, concentrate solely on information about their own respective stations. The rest, more or less, look at the hobby from the point of view of those who are a part of it in their respective home countries.

Even with the recent losses of *Media Network* and *Waveguide*, this is still quite a list. As you may have noticed, this column takes up all of one page, so, the format used will have to be economical. Nonetheless, all the information that was contained in former iterations is still here. For most stations refer to the *Shortwave Guide* pages for frequency information. (Some listings have frequency information to clarify which of the station's multiple services is carrying the program.) The one letter day abbreviations are those used in *MT's Shortwave Guide* section. Times are approximate and both times and frequencies are subject to change.

Ask WWCR:

On **WWCR** - **A** 1315 (15685), 2045 (15685); **S** 0145 (5070), 1015 (9475), 1845 (12160); **M** 0445 (5070), 1115 (15685); **T** 0500 (5070), 0945 (7435); **W** 0230 (7385).

CIDX Report:

On **R. Canada Int.** - **S** 0407, 0507, 1707, 2007; **M** 0107 (fortnightly within *The Maple Leaf Mailbag* program).

Communications World:

On **VOA News Now** - **A** 0133, 0533, 0933, 1333, 1733, 2133.

On **VOA** (special ssb broadcasts) - **A** 0700 (6873ssb); **S** 1400 (18275ssb).

On **WWCR Tennessee** - **S** 0200 (5070); **M** 0530 (3210); **W** 0930 (7435), 1100 (15685).
On **WBCQ Maine** - **S** 2100 (7415).

Continent of Media:

On **R. for Peace Intl.** - **F** 1900; **A** 0100, 0700, 1300, 1730, 2330; **S** 0530; **T** 2000; **W** 0200, 1400. (Note: Although heard weekly, program is updated monthly.)

DX Blockbuster:

On **R. Budapest** - **A** 1905, 2135; **S** 0105, 0235.

DX Corner:

On **Voice of Turkey**, fortnightly - **F** 2040; **A** 2210; **S** 0310.

DXers' Corner:

On **All India Radio**, fortnightly - **M** 1840, 2130; **T** 2340

DX Mailbag:

On **R. Romania Intl.** - **A** 1350, 2350.

DX Partyline:

On **HCJB Ecuador** - **A** 0710, 0910, 1910; **S** 0110, 0410

DXers Special:

On **RAE Argentina** - **W** 1845; **H** 0245

DXers Unlimited:

On **R. Habana Cuba** (in two weekly editions):
First edition - **A** 2105; **S** 0136, 0336, 0536.
Second edition - **T** 2105, 2305; **W** 0142, 0342, 0542.

DXing with Cumbre:

On **WHRI Indiana** - **F** 2300 (5745); **A** 0500 (5745 & 7315), 0730 (5745 & 7315), 1130 (9495), 1230 (15105), 1800 (13760), 2230 (9495), 2330 (5745); **S** 0300 (5745), 0430 (5745), 0630 (5745), 1430 (6040), 1500 (15105).

On **KWHR Hawaii** - **A** 0300 (17510), 0600 (17780), 1000 (11565), 1430 (11565); **S** 0600 (17780), 1300 (11565), 1830 (9930)

On **WHRA Maine** - **F** 2130 (17650); **A** 2130 (17650); **S** 0830 on 7435.

Feedback:

On **R. Australia** - **F** 2105; **A** 0005, 0605; **S** 0305.

Ham Radio Today:

On **HCJB Ecuador** - **W** 0730, 0930, 1930; **H** 0130, 0430; **A** 1030, 2000; **S** 0200.

Mailbox:

On **R. New Zealand Intl.** (fortnightly) - **M** 2135; **W** 1735; **H** 0305; **F** 1930

Media Report:

On **R. Australia** - **H** 0130, 1030, 1530, 2330.

MediaScan:

On **R. Sweden** - **T** 1745, 1145, 1245, 1345, 1945, 2145; **W** 0245, 0345.

Multiwave Feedback:

On **R. Korea Intl.** - **S** 0835, 1035, 1305, 1635, 2135, 2205; **M** 0235.

Radio Bulgaria Calling:

On **R. Bulgaria** - **F** 1945, 2345; **A** 1145, 2145; **S** 0245.

Radio Waves:

On **R. Exterior de Espana** - **A** 2140; **S** 0040, 0140, 0540; **M** 2035.

Radio World:

On **R. Vlaanderen Intl.** - **S** 0700, 1030, 1130, 1730, 2235; **M** 0400.

Special Program for Radio Amateurs:

On **R. Romania Intl.** - **M** 2350; **T** 1350.

Spectrum:

On **WWCR Tennessee** - **S** 0300 (5070); **M** 0700 (3210).

The Real Amateur Radio Show:

On **WBCQ Maine** - **A** 2300 (7415).

Viva Miami:

On **WRMI Florida** - **F** 2100 (15725); **S** 0230 (7385), 1300 (9955), 1530 (9955), 2200 (9955); **M** 0030 (9955), 0400 (7385); **W** 0230 (7385).

Wavescan:

On **Adventist World R. Italy** - **S** 0930, 1230
On **KSDA Guam** - **S** 1000, 1030, 1200, 1330, 1430, 1600, 1730, 2130

On **WRMI Florida** - **F** 2130 (15725); **A** 0415 (monthly, after 4th Fri. on 7385); **S** 1230 (9955), 1500 (9955), 2330 (9955); **M** 0230 (7385);

World of Radio:

On **WBCQ Maine** - **W** 2330 (7415); **S** 0200 (9335).

On **WWCR Tennessee** - **H** 2030 (15685); **F** 0930 (7435); **A** 0230 (3215), 1130 (15685); **S** 0230 (5070), 0628 (5070), 1900 (12160); **M** 0000 (3215), 0501 (3210); **T** 1100 (15685).
On **R. for Peace Intl.** - **F** 1930; **A** 0130, 0730, 1330, 1800; **S** 0000, 0600, 1200; **T** 1900; **W** 0100, 0700, 1300.

Special thanks to Ivan Grishin, Glenn Hauser, Marie Lamb and John Norfolk whose valuable work has been included in this month's column. If you have information that can add to this listing or correct an inaccuracy, please consider yourself obligated to step up and provide it.

Until June, good listening!



HOW TO USE THE SHORTWAVE GUIDE

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

Convert your time to UTC.

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

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

Find the station you want to hear.

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

If a broadcast is not *daily*, the days of broadcast A 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

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

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

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

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations

and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before publication.

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

Target Areas

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

Choose a program or station you want to hear.

Selected programs appear on the lower half of the page for prime listening hours – space does not permit 24 hour listings nor can every station be listed. However, listings for the most popular stations and selected lesser-known stations illustrate the variety available on shortwave. The format of the listings alternates among three different styles – by station, by genre and by day – month by month. Times listed are approximate and programs are subject to change.

The program listings emphasize broadcasts targeted to North America. In most cases, the stations and programs listed should be readily receivable in North America using a portable radio. Most broadcasters produce one broadcast in English per day that is repeated over a 24 hour period to all areas. If you are able to listen to transmissions to other areas of the world during "non-prime time" hours, referring to the prime time listings for those stations will likely be helpful in determining what programs will be broadcast.

Occasionally, a program or station listing may be followed by a reference to another listing for the same program or station at a different time. This is done to conserve space and make it possible to provide more listings.

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PROGRAM HIGHLIGHTS

JOHN FIGLIOZZI

New from RFI

Some might feel that we ought to ignore a station that can't be bothered to throw a few kilowatts our way, but it is noteworthy that **Radio France Internationale (RFI)** has reconfigured its English schedule and programs. No, they still don't use shortwave to North America; but since signal propagation ignores target boundaries, some of their new broadcasts should be receivable here at more convenient times.

Three weekday half-hour morning broadcasts to East Africa, consisting primarily of world, African and French news, have been added. They air at **0400 UT** on 15155 kHz; **0500** on 17800 and **0600** on 17800 and 21620.

There is a new one hour morning broadcast to Nigeria at **0700** on 15605. The content of the first half-hour is similar to the three other morning broadcasts. The second half hour includes a daily magazine program such as *Club 9516* with the notorious David Page, *Week-end* (the ubiquitous Radio E collaboration), a French lesson and other topical offerings.

The **1200** broadcast, now to Nigeria and East Africa on 15540 and 25820, has been trimmed to a half-hour and includes a news bulletin and one of the aforementioned magazine programs. The **1400** broadcast, to the Middle East on 17620 and India on 11610, is also now thirty minutes and consists largely of news during the week, with the magazine *Asia-Pacific* on Saturdays and a report on cultural events in France and a listener phone-in on Sundays.

The **1600** broadcast has remained ninety minutes. News covers the first half-hour and a magazine program covers the second. At **1700**, news from East Africa is emphasized. Weekend programming includes *Spotlight on Africa*, cultural events in France, health issues, a sports report, the African media and the listener phone-in. Frequencies are 11615, 11995, 12015, 15605, 17605 and 17850 to various parts of Africa.

[Source: <http://www.rfi.fr> which advises that frequencies may change after May 5.]



FREQUENCIES

0300 0310	mtwhf	Greece, Voice of	5895eu	7455na	7475eu	12105na	0300 0400	Taiwan, Radio Taipei International	5950na	9680na	11745as	11825as
0300 0310		Vatican City, Vatican Radio	7305am	9605am			0300 0400	Turkey, Voice of	7270af	11655va	21715as	
0300 0327		Czech Rep, Radio Prague Intl	7345na	7385na	9870na		0300 0400	Uganda, Radio	4976do	5026do		
0300 0330		Egypt, Radio Cairo	9475am				0300 0400	UK, BBC World Service	3255af	5975am	6005af	6135am
0300 0330	stwhfa	Mexico, R Mexico International	9705am	11770am					6175na	6190af	6195eu	7120af
0300 0330		S Africa, Channel Africa	6035af						7160af	9410eu	11730af	12035af
0300 0330		Thailand, Radio	9655am	11905am	15395na				12095me	15280as	15310as	15360as
0300 0345		Germany, Deutsche Welle	9535na	9640na	13780am	15105na			15420af	15575me	17760as	17790as
0300 0400		Anguilla, Caribbean Beacon	6090am						21660as	21830as		
0300 0400	vl	Australia, ABC/Alice Springs	4835do				0300 0400	Ukraine, R Ukraine International	7320eu	7410eu	9640eu	11840eu
0300 0400	vl	Australia, ABC/Katherine	5025do						13590na			
0300 0400	vl	Australia, ABC/Tennant Creek	4910do				0300 0400	USA, Armed Forces Radio	4278va	4319va	4993va	5765va
0300 0400		Australia, Christian Voice	21680pa						6350va	6458va	6847va	10320va
0300 0400		Australia, Radio	9660pa	12080pa	15240as	15415as			10940va	12579va	12689va	13362va
			15515va	17580va	17750as	21725va			16847va			
0300 0400	mtwhf	Bhutan, Bhutan BC Service	6035do				0300 0400	USA, KAJI Dallas TX	5755va			
0300 0400	vl	Botswana, Radio	3356do	4820do	7255do		0300 0400	USA, KTBN Salt Lake City UT	7510na			
0300 0400		Canada, CBC Northern Service	9625do				0300 0400	USA, KWHR Naalehu HI	17510as			
0300 0400		Canada, CFRX Toronto ON	6070do				0300 0400	USA, Voice of America	5855af	6080af	7105af	7275af
0300 0400		Canada, CFPV Calgary AB	6030do						7290af	7340af	9575af	9885af
0300 0400		Canada, CHNX Halifax, NS	6130do						17895af			
0300 0400		Canada, CKZN St John's NF	6160do				0300 0400	USA, WBCQ Monticello ME	7415na	9335na		
0300 0400		Canada, CKZU Vancouver BC	6160do				0300 0400	USA, WEWN Birmingham AL	5825na			
0300 0400		China China Radio International	9690na				0300 0400	USA, WHRA Greenbush ME	7580eu			
0300 0400		Costa Rica, Faro del Caribe	5054ca	6175ca	9644ca		0300 0400	USA, WHRI Noblesville IN	5745va	7315am		
0300 0400		Costa Rica, R for Peace Intl	7450irr	15049va			0300 0400	USA, WINB, Red Lion PA	12160am			
0300 0400		Costa Rica, University Network	5920al	6970va	7480va	15048va	0300 0400	USA, WJCR Upton KY	7490am	13595as		
			21815irr				0300 0400	USA, WMLK Bethel PA	9465eu			
0300 0400		Cuba, Radio Havana	6000na	9820na	11705na		0300 0400	USA, WRMI Miami FL	7385na	9955sa		
0300 0400		Ecuador, HCJB	9745na	15115na	21455usb		0300 0400	USA, WRNO New Orleans LA	7395am			
0300 0400	a/monthly	Finland, Scandv Weekend Radio	11720va				0300 0400	USA, WSHB Cypress Crk SC	5850na	11930eu		
0300 0400	vl	Guatemala, Radio Cultural	3300do	5955do			0300 0400	USA, WTJC Newport NC	9370na			
0300 0400		Guyana, Voice of	3289do	5949do			0300 0400	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0300 0400	sm	Honduras, Radio Luz y Vida	3250ca				0300 0400	USA, WWFV McCaysville GA	3270va	5085am		
0300 0400		Japan, Radio	17825ca	21610pa			0300 0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300 0400		Kenya, Kenya BC Corp	4935do				0300 0400 vl	Vanuatu, Radio	3945do	4960do	7260do	
0300 0400	vl	Lesotho, Radio	4800do				0300 0400	Zambia, Christian Voice	6065do			
0300 0400		Malaysia, Radio	7295do				0300 0400 vl	Zambia, National BC Corp	6165do	6265do		
0300 0400		Malaysia, Voice of Islam	6175as	9750as	15295as		0300 0400 vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
0300 0400		Namibia, Namibian BC Corp	3270af	3289af			0310 0315	Vatican City, Vatican Radio	7305am	9605am	9660af	
0300 0400		New Zealand, R New Zealand Int	17675pa				0315 0340	Vatican City, Vatican Radio	9660af			
0300 0400		Oman, Radio Sultanate of	15355va				0330 0345 vl	Libya, Voice of Africa	11815af	15435af	17725af	
0300 0400	vl	Papua, New Guinea, NBC	9675do	11880irr			0330 0357	Czech Rep, Radio Prague Intl	11600as	15470as		
0300 0400		Philippines, Radyo Pilipinas	11885		15120pa	15270pa	0330 0357	Vietnam, Voice of	9795na			
0300 0400		Russia, Voice of Russia WS	9665na	11750na	12000na	17565na	0330 0400	Austria, AWR Europe	17635as			
			17650na	17660na	17690na		0330 0400	Myanmar, Radio	9730do			
0300 0400		Singapore, SBC Radio One	6150do				0330 0400	Sweden, Radio	11895na	15245na		
0300 0400	vl/as	Solomon Islands, SIBC	5020do				0330 0400	UAE, Radio Dubai	11725na	12005na	13675na	15400na
0300 0400	vl/a	Solomon Islands, SIBC	9545do				0345 0400 f	Seychelles, FEBA Radio	11885af			
0300 0400		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as	0357 0400 vl	Malawi, Malawi BC Corp	5995do			

SELECTED PROGRAMS BY CONTENT

0230	R. Korea Int.	F	Korea and Its Splendors	R. Sweden	M	Sounds Nordic (exc. 1st wk.)	
	R. Taipei Int.	T/Trends (society) H/Hot Spots (nightlife)		0232	Voice of Russia	S	Songs from Russia
		F/East Meets West (visitors)				W	Musical Portraits
	R. Sweden	S	Weekend (Europe magazine-1 st wk.) Sweden Today (2 nd wk) Studio 49 (topical discussion-4 th wk.)	0240	Swiss R. Int.	S	Sounds Good (Swiss music-3rd/5th wk.)
	Swiss R. Int.	D	Newsnet (Swiss magazine)	0250	Voice of Vietnam	S	Music (Vietnamese)
	Voice of Vietnam	D	Current Affairs				
0232	Voice of Russia	M	This is Russia				
		T	Kaleidoscope (events)				
		H	Moscow Yesterday and Today				
0240	Swiss R. Int.	S	The Name Game (geo quiz-1 st wk.)				
		M	Swiss Scene				
	Voice of Vietnam	S	Weekly Review				
		T/W/F/A	Press Review				
		H	Talk of the Week				
0245	R. Sweden	F	Nordic Report (1 st wk.) The S-Files (things Swedish-4 th wk.)				
		A	Review of the Newsweek				
	Voice of Vietnam	T	Vietnam: Land & People				
		A	Rural Vietnam				

Informational Features

0200	HCJB	F	Viewpoint (issues)
0210	R. Habana Cuba	S	The World of Stamps
0215	R. Taipei Int.	S	Great Wall Forum (mainland issues)
0230	R. Korea Int.	T	Exploring the New Millennium
0232	Voice of Russia	F	Russian by Radio
0245	R. Taipei Int.	M-A	Let's Learn Chinese

Music

0200	HCJB	A	Walkin' in the Sunshine (country)
	R. Habana Cuba	M	Top Tens (Cuban popular)
0205	R. New Zealand Int.	A	Home Grown (from 0105)
0206	R. New Zealand Int.	M-F	Wayne's Music (personal selections)
0210	R. Korea Int.	M	Korean Pop Interactive (requests)
0215	R. Taipei Int.	M	Jade Bells and Bamboo Pipes (traditional)
0230	R. Habana Cuba	M	The Jazz Place
	R. Korea Int.	A	Notes of Nostalgia (traditional)

Entertainment/Variety, Magazine Shows

0200	HCJB	M	Sunday Nite
		H	Adventures in Odyssey (children's stories)
		S	WBCQ(741.5kHz)
		S	Magic Radio
0205	R. Australia	S	Margaret Throsby Interview
0232	Voice of Russia	A	Audio Book Club
0240	Voice of Vietnam	M	Sunday Show

SWL, Media and Communications

0200	HCJB	S	Ham Radio Today
		S	World of Radio
0210	R. Budapest	S	DX Blockbuster
0230	R. Korea Int.	M	Multiwave Feedback
		A	World of Radio
0245	R. Sweden	W	Media Scan (1 st /3 rd wk.)

Listener Contact/Interactive

0210	R. Budapest	M	And the Gatepost (monthly)
0211	Voice of Russia	S/M/H	Moscow Mailbag
0230	R. Korea Int.	S	From Us to You
		M	In Touch with Stockholm (1 st wk.)
0240	Swiss R. Int.	S	Capital Letters (2 nd /4 th wk.)
0245	R. Taipei Int.	S	Mailbag Time
		H	Letterbox
0246	Voice of Russia	S	You Write to Moscow

Sport

0205	R. Australia	S/A	Grandstand (live sports action*)
0235	R. New Zealand Int.	S/A	Live Sport (in season)
0245	R. Sweden	T	Sportscan

(*special on 9660, 12080, 17580, 21725 kHz only.)

0300 UTC

Newscasts (*extended)

0300	BBCWS(am)	S/M	World Briefing*
		T-A	News
		D	News
	China R. Int.	D	News
	Deutsche Welle	D	News
	R. Australia	D	News
	R. Habana Cuba	T-S	International News
	R. New Zealand Int.	S/A	News
		M-F	Pacific Regional News
	R. Prague	D	News
	R. Taipei Int.	D	News
	Voice of Russia	D	News
0310	R. Habana Cuba	T-S	National News
0330	R. Budapest	D	News
	R. Habana Cuba	D	News Bulletin
	Voice of Russia	D	News in Brief
	Voice of Vietnam	D	News

Current Affairs Magazines/Features

0300	Channel Africa	M-F	Dateline Africa
0305	Deutsche Welle	S/M	Weekend Review
		T-A	Newslink
	R. New Zealand Int.	W	Pacific Report
		F	Dateline Pacific
0310	China R. Int.	S/Report on Developing Countries	M-F/Current Affairs
		A/Global Review	
0311	Voice of Russia	M	Sunday Panorama
		T-A	News & Views
0315	R. Habana Cuba	T-S	Viewpoint
0330	Channel Africa	S	Network Africa
	Deutsche Welle	T	Insight (international affairs)
	R. New Zealand Int.	F	Pacific Correspondent
	R. Sweden	T-A	60 Degrees North
0340	R. Habana Cuba	M/F	Caribbean Outlook
		A/Weekly Review	



FREQUENCIES

0400 0405	USA, WWCR Nashville TN	5070na	5935na	7435na	0400 0500	Russia, Voice of Russia WS	9665na	11750na	12000na	17565na	
0400 0405 sm	USA, WWCR Nashville TN	3210na			0400 0500	Singapore, SBC Radio One	6150do				
0400 0405 twfha	USA, WWCR Nashville TN	3215na			0400 0500 v/a	Solomon Islands, SIBC	5020do				
0400 0415	Israel, Kol Israel	9435va	15640va	17545va	0400 0500 v/a	Solomon Islands, SIBC	9545do				
0400 0430	Belgium, RVI Flanders R Intl	15595na			0400 0500	Uganda, Radio	4976do	5026do			
0400 0430	France R France International	15155af			0400 0500	UK, BBC World Service	3225af	5975am	6005af	6135am	
0400 0430 twfha	Mexico, R Mexico International	9705am	11770am		0400 0500		6175na	6190af	6195eu	7120af	
0400 0430 vl	Nigeria, Radio/Kaduna	6090do	7275do				7160af	9410eu	12035eu	12095me	
0400 0430	S Africa, Channel Africa	5955af					15280as	15310as	15420af	15575me	
0400 0430	Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as		17640af	17760as	17790as	21660as	
		15425as					21830as				
0400 0430	Switzerland, Swiss R International	9610eu	9885am				4278va	4319va	4993va	5765va	
0400 0445	Germany, Deutsche Welle	7225af	9565af	9765af	13690af	0400 0500	USA, Armed Forces Radio	6350va	6458va	6847va	10320va
0400 0455	USA, WYFR Okeechobee FL	6065na	9355eu	9505na			10940va	12579va	12689va	13362va	
0400 0456	China China Radio International	9560na	9730na				16847va				
0400 0456	Romania, R Romania International	11940na	15365na	15365na	17735as	0400 0500	USA, KAIJ Dallas TX	5755va			
		21480as				0400 0500	USA, KTBN Salt Lake City UT	7510na			
0400 0458	New Zealand, R New Zealand Int	17675pa				0400 0500	USA, KWHR Naalehu HI	17780as			
0400 0500	Anguilla, Caribbean Beacon	6090am				0400 0500	USA, Voice of America	4960af	5855af	6080af	7275af
0400 0500 vl	Australia, ABC/Alice Springs	4835do					7290af	9530va	9575af	11965me	
0400 0500 vl	Australia, ABC/Katherine	5025do					15205va	17895af			
0400 0500 vl	Australia, ABC/Tennant Creek	4910do					7415na	9335na			
0400 0500	Australia, Christian Voice	21680pa				0400 0500	USA, WBCQ Monticello ME	5825na			
0400 0500	Australia, Radio	9660pa	12080pa	15240as	15415as	0400 0500	USA, WEWN Birmingham AL	7580eu			
		15515va	17580va	17750as	21725va	0400 0500	USA, WHRA Greenbush ME	5745va	7315am		
0400 0500 vl	Botswana, Radio	3356do	4820do	7255do		0400 0500	USA, WHRI Noblesville IN	7490am	13595as		
0400 0500	Canada, CBC Northern Service	9625do				0400 0500	USA, WJCR Upton KY	9465eu			
0400 0500	Canada, CFRX Toronto ON	6070do				0400 0500	USA, WMLK Bethel PA	7385na	9955sa		
0400 0500	Canada, CFVP Calgary AB	6030do				0400 0500	USA, WRMI Miami FL	11930eu	15195af		
0400 0500	Canada, CHNX Halifax, NS	6130do				0400 0500	USA, WWSB Cypress Crk SC	9370na			
0400 0500	Canada, CKZN St John's NF	6160do				0400 0500	USA, WWFV McCaysville GA	3270va	5085am		
0400 0500	Canada, CKZU Vancouver BC	6160do				0400 0500	Zambia, Christian Voice	6065do			
0400 0500	Costa Rica, R for Peace Intl	7450irr	15049va			0400 0500 vl	Zambia, National BC Corp	6165do	6265do		
0400 0500	Costa Rica, University Network	5920al	6970va	7480va	15048va	0400 0500 vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
0400 0500	Cuba, Radio Havana	6000na	9820na	11705na		0405 0500	USA, WWCR Nashville TN	3210na	5070na	5935na	7435na
0400 0500	Ecuador, HCJB	9745na	15115na	21455usb		0425 0440	Italy, RAI International	5975af	7150af		
0400 0500 a/monthly	Finland, Scandy Weekend Radio	11720va				0427 0525 a	Liberia, Voice of Hope	12060af	15320af		
0400 0500 vl	Guatemala, Radio Cultural	3300do	5955do			0430 0500	Italy, Italian Radio Relay Service	3985va			
0400 0500	Guyana, Voice of	3289do	5949do			0430 0500	Netherlands, Radio	6165na	9590na		
0400 0500	Kenya, Kenya BC Corp	4935do				0430 0500 vl	Nigeria, Radio/Ibadan	6050do			
0400 0500 vl	Lesotho, Radio	4800do				0430 0500 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
0400 0500 vl	Malawi, Malawi BC Corp	3380do	5995do			0430 0500 vl	Nigeria, Radio/Lagos	3326do	4990do		
0400 0500	Malaysia, Radio	7295do				0430 0500	S Africa, Adv World Radio Africa	11975af			
0400 0500	Malaysia, Voice of Islam	6175as	9750as	15295as		0430 0500	Sri Lanka, Sri Lanka BC Corp	6130do			
0400 0500	Myanmar, Radio	9730do				0430 0500	Swaziland, Trans World Radio	3200af	4775af		
0400 0500	Namibia, Namibian BC Corp	3270af	3289af			0430 0500 mtwhfa	Switzerland, Swiss R International	9885am			
0400 0500	New Zealand, ZLXA	3935do	7290do			0445 0500	USA, WYFR Okeechobee FL	9355eu			
0400 0500 vl	Nigeria, Radio/Enugu	6025do				0459 0500	New Zealand, R New Zealand Int	15120pa			
0400 0500 vl	Papua, New Guinea, NBC	9675do	11880irr								

SELECTED PROGRAMS BY CONTENT

Business/Economics

0315	R. Taipei Int.	T	Taiwan Economic Journal
0320	R. Prague	F	Economic Report
0330	China R. Int.	W	China Horizons
	R. New Zealand Int.	W	Tradewinds
0340	R. Budapest	M	Europe Unlimited (trade-monthly)
0345	R. Sweden	H	Money Matters
	Voice of Vietnam	F	Vietnam Economy

Science/Technology/Health/Environment

0300	R. Habana Cuba	M	Breakthrough
0315	Deutsche Welle	S	Spectrum
0330	BBCWS(am)	S	Science in Action
	Deutsche Welle	W	Man and Environment
	R. Australia	S	Ockham's Razor
0345	R. Sweden	F	Greenscan (ecology-2nd wk.) Heartbeat (health-3rd wk.)

Arts and Culture

0305	R. New Zealand Int.	M	Tagata o te Moana (Pacific culture)
	R. Prague	S	Readings from Czech Literature
0310	R. Prague	M	The Arts
0315	Deutsche Welle	M	Arts on the Air
0320	China R. Int.	S	In the Spotlight
0330	R. Sweden	S	Spectrum (3rd wk.)
	Voice of Russia	W/F	Russian history/culture program
0340	R. Budapest	M	Spotlight (monthly)
0345	Voice of Vietnam	W	Culture and Society
		A	Literature and Arts

Local Lives and Views

0305	R. Australia	A	Rural Reporter (outback)
	R. Prague	M	Letter from Prague
		T-A	Current Affairs
0315	R. Prague	T	Spotlight (Czech current events) or One on One (interview)
		H	Czechs in History or Central Europe Today
0320	R. Australia	M-F	Pacific Focus
	R. Prague	W	Talking Point

0324	Voice of Russia	A	From the Weeklies
0330	BBCWS(am)	M	Russia: People and Events
		T	Just a Taste (food and culture)
		A	From Where I Stand (2nd or 3rd wk.)
	China R. Int.	M	People in the Know
		F	Life in China
	Deutsche Welle	H	Living in Germany
	R. Sweden	S	Weekend (Europe magazine-1st wk.) Sweden Today (2nd wk.) Studio 49 (topical discussion-4th wk.)
	R. Taipei Int.	M/W	Women in Taiwan H/Life Unusual A/Carol's Café
0332	Voice of Russia	S	Kaleidoscope (Russian events)
0335	R. Budapest	M	Heading for Hungary
		T-A	Hungary Today
	Voice of Vietnam	D	Current Affairs
0340	Voice of Vietnam	S	Weekly Review
		T/W/F/S	Press Review
		A	Talk of the Week
0345	R. Sweden	F	Nordic Report (1st wk.) The S-Files (things Swedish-4th wk.)
		A	Review of the Newsweek
	Voice of Vietnam	T	Vietnam: Land and People
		A	Rural Vietnam

Informational Features

0305	WWCR(3215kHz)	M	America's Greatest Heroes
0310	WWCR(3215kHz)	M	Profiles
0315	R. Taipei Int.	S/Instant Noodles	M/Life on the Outside H/Soundbite
		A/Nalowan	
0320	China R. Int.	H	Voices from Other Lands
0330	BBCWS(am)	W	Patterns of Faith H/Language Steamrollers (tracing "dead" languages) F/Heart and Soul (religion)
	Deutsche Welle	A	German by Radio
0332	R. Australia	A	Educational series
	Voice of Russia	T/H/S	20th Century

Music

0300	WBQ(7415kHz)	S	The Big Kaboom
	WHRI(7315 kHz)	S/M	Countdown Magazine (Christian contemporary)

0305	BBCWS(am)	W/The Alternative (rock) H/The Greenfield Collection (classical requests) F/Jazzmatazz A/Composer of the Month
0305	R. New Zealand Int.	T Top 5 (pop/rock)
		A Musical feature or series
		S Saturday Music (classical/folk/jazz)
0310	R. Prague	T-A Rendezvous (inspirational)
0315	HCJB	W Floating Air (traditional)
	R. Taipei Int.	F Miss Mook's Big Countdown
0330	HCJB	A Inspirational Classics
	R. Habana Cuba	M From Havana (Cuban musicians)
	R. New Zealand Int.	T New Releases
	R. Sweden	M Sounds Nordic (rock-exc. 1st wk.)
	R. Taipei Int.	T Formosa Oldies
	WWCR(5070kHz)	M The Old Record Shop (vintage)
0340	R. Australia	M/Australian Music Show (modern rock) T/F/Music Deli (international) W/Blacktracker (Aboriginal) H/Oz Country Style
0345	HCJB	W Wonderful Words of Life (hymns)
0350	Voice of Vietnam	S Music (Vietnamese)

Entertainment/Variety, Magazine Shows

0300	HCJB	S Alive! (Christian lifestyles)
		A Golden Age of Radio
0305	R. New Zealand Int.	S Playhouse (radio theatre)
0330	BBCWS(am)	M Westway Omnibus (two episodes)
	HCJB	M Radio Reading Room (Christian lit.)
		T Unshackled (radio's oldest drama series)
0332	Voice of Russia	M Audio Book Club
0340	Voice of Vietnam	M Sunday Show
0345	BBCWS(am)	T-A Off the Shelf (book readings)

SWL, Media and Communications

0300	WWCR(5070 kHz)	S	Spectrum
	WHRI(5745 kHz)	A	Dixing with Cumbre
0305	R. New Zealand Int.	H	Pacific Diners Report (biweekly) RNZI Talk (meet the staff-biweekly)
0340	R. Budapest	S	DX Blackbuster
	R. Habana Cuba	S/W	Diners Unlimited



FREQUENCIES

0500 0504	Pakistan, Radio	15180me	17835me	21460me	0500 0600	New Zealand, R New Zealand Int	15120pa		
0500 0515	Canada, CBC Northern Service	9625do			0500 0600	New Zealand, ZLXA	3935do	7290do	
0500 0515 s hfa	USA, KVOH Los Angeles CA	9975na			0500 0600 vl	Nigeria, Radio/Enugu	6025do		
0500 0520	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9660af	Nigeria, Radio/Ibadan	6050do		
		11625af	15570af			Nigeria, Radio/Kaduna	4770do	6090do	7275do 9570do
0500 0530	Canada, R Canada International	6145eu	7290eu	9595eu	11710eu	Nigeria, Radio/Lagos	3326do	4990do	
		13755af	15330af	17740af		Nigeria, Voice of	7255af	15120af	
0500 0530	France, R France International	17800af				Papua, New Guinea, NBC	9675do	11880irr	
0500 0530	Netherlands, Radio	6165na	9845na			Russia, Voice of Russia WS	17635au	21790au	
0500 0530	S Africa, Adv World Radio Africa	5960af	6015af			Singapore, SBC Radio One	6150do		
0500 0530	S Africa, Channel Africa	11720af				Solomon Islands, SIBC	5020do	9545do	
0500 0530	Switzerland, Swiss R International	9610eu				Spain, R Exterior Espana	6055na		
0500 0530	Uganda, Radio	4976do	5026do			Sri Lanka, Sri Lanka BC Corp	6130do		
0500 0530	UK, BBC World Service	5975am	6005af	6175am	6190af	Swaziland, Trans World Radio	4775af	6035af	9500af
		6195eu	7160af	9410eu	9740as	USA, Armed Forces Radio	4278va	4319va	4993va 5765va
		11760me	11765af	11940af	11955pa		6350va	6458va	6847va 10320va
		12095eu	15280as	15310as	15360as		10940va	12579va	12689va 13362va
		15420af	15575as	17640af	17760as		16847va		
		17790as	17885af	21660as			5755va		
0500 0530 vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			USA, KAIJ Dallas TX	7510na		
0500 0545	Germany, Deutsche Welle	9690na	9785na	11985na		USA, KTBN Salt Lake City UT	11565pa	17780as	
0500 0600	Anguilla, Caribbean Beacon	6090am				USA, KWHR Naalehu HI	5970af	6035af	6080af 7195af
0500 0600 vl	Australia, ABC/Alice Springs	4835do				USA, Voice of America	9530va	11965me	12080af 13670af
0500 0600 vl	Australia, ABC/Katherine	5025do					15205va		
0500 0600 vl	Australia, ABC/Tennant Creek	4910do				USA, WBCQ Monticello ME	7415na	9335na	
0500 0600	Australia, Christian Voice	21680pa				USA, WEWN Birmingham AL	5825na		
0500 0600	Australia, Radio	9660pa	12080pa	15240as	15515va	USA, WHRA Greenbush ME	11730af		
		17580va	21725va			USA, WHRI Noblesville IN	5745va	7315am	
0500 0600 vl	Botswana, Radio	3356do	4820do	7255do		USA, WJCR Upton KY	7490am	13595as	
0500 0600	Canada, CFRX Toronto ON	6070do				USA, WMLK Bethel PA	9465eu		
0500 0600	Canada, CFVP Calgary AB	6030do				USA, WRMI Miami FL	7385na	9955sa	
0500 0600	Canada, CHNX Halifax, NS	6130do				USA, WRNO New Orleans LA	7395am		
0500 0600	Canada, CKZN St John's NF	6160do				USA, WSHB Cypress Crk SC	9840af	11930eu	
0500 0600	Canada, CKZU Vancouver BC	6160do				USA, WTJC Newport NC	9370na		
0500 0600	Costa Rica, R for Peace Intl	7450irr	15049va			USA, WWCR Nashville TN	3210na	5070na	5935na 7435na
0500 0600	Costa Rica, University Network	5920al	6970va	7480va	15048va	USA, WYFR Okeechobee FL	5985na	9355eu	11580eu
0500 0600	Cuba, Radio Havana	9550na	9820na	9830na		Vanuatu, Radio	3945do	4960do	7260do
0500 0600	Ecuador, HCJB	9745na	15115na	21455usb		Zambia, Christian Voice	6065do		
0500 0600 a/monthly	Finland, Scandv Weekend Radio	11720va				Zambia, National BC Corp	6165do	6265do	
0500 0600	Guyana, Voice of	3289do	5949do			USA, KVOH Los Angeles CA	9975na		
0500 0600	Italy, Italian Radio Relay Service	3985va				Canada, R Canada International	13755af	15330af	17740af
0500 0600	Japan, Radio	5975eu	6110na	7230eu	9835na	Georgia, Georgian Radio	11805eu		
		11715as	11760as	15195as	17810as	S Africa, Adv World Radio Africa	11970af		
		21755pa				Thailand, Radio	9655eu	11905eu	21795eu
0500 0600	Kenya, Kenya BC Corp	4935do				UAE, Radio Dubai	13675au	15435au	17830au 21700au
0500 0600	Kuwait, Radio	15110as				UK, BBC World Service	17885af		
0500 0600 vl	Lesotho, Radio	4800do				Zimbabwe, Zimbabwe BC Corp	5975do	6045do	
0500 0600 vl	Liberia, R Liberia International	5100do				Austria, R Austria International	6155eu	13730eu	
0500 0600 vl	Malawi, Malawi BC Corp	3380do	5995do			USA, KVOH Los Angeles CA	9975na		
0500 0600	Malaysia, Radio	7295do							
0500 0600	Malaysia, RTM Sarawak	7160do							
0500 0600	Malaysia, Voice of Islam	6175as	9750as	15295as					
0500 0600	Myanmar, Radio	9730do							
0500 0600	Namibia, Namibian BC Corp	3270af	3289af						

SELECTED PROGRAMS BY CONTENT

0345 R. Sweden W	Mediascan (1st/3rd wk.)	R. Australia D	News	Arts and Culture	0405 R. Australia S	Pacific Focus-Arts
Listener Contact/Interactive		R. Habana Cuba T-S	International News	0413 R. Vlaanderen Int. H/A	Around the Arts	
0305 R. Australia S	Feedback	R. New Zealand Int. D	News	0415 Swiss R. Int. H	Book Zone (2nd wk.)	
R. New Zealand Int. H	Mailbox (biweekly)	R. Vlaanderen Int. T-S	News	0420 China R. Int. S	In the Spotlight	
0315 R. Prague A	Mailbox	Voice of Russia D	News	0430 R. Australia S	Arts Talk	
0320 China R. Int. A	Listeners' Garden	R. Habana Cuba T-S	News Bulletin	0445 Swiss R. Int. H	Book Zone (2nd wk.)	
0330 BBCWS(am) A	Write On (exc. 2nd or 3rd wk.)	R. Netherlands S/M	News			
R. Sweden M	In Touch with Stockholm (1st wk.)	Voice of Russia D	News in Brief	Local Lives and Views		
0340 R. Budapest M	And the Gatepost	Current Affairs Magazines/Features		0400 Swiss R. Int. D	Newsnet (Swiss magazine)	
R. Habana Cuba H	Mailbag Show	0400 Channel Africa S	Network Africa (week in review)	0404 R. Vlaanderen Int. T-A	Belgium Today	
0345 Voice of Vietnam H	Letterbox	M-F	Dateline Africa	0405 R. New Zealand Int. M-F	In Touch with New Zealand (from 0205)	
Sport		R. Habana Cuba M	Weekly Review	0408 R. Vlaanderen Int. M	Tourism in Flanders	
0300 Channel Africa A	Channel Africa Sport	China R. Int. S/Report on Developing Countries	M-F/Current Affairs	T-A	Press Review	
R. Australia S/A	Grandstand (live action)*	A/Global Review		0410 Swiss R. Int. S	The Name Game (geo quiz-1st wk.)	
R. New Zealand Int. S/A	Live Sport (in season)	HCJB T-A	Studio 9 (on Latin America)	M	Swiss Scene	
0310 R. Australia M-F	Sport (daily report)	R. Habana Cuba T-A	Spotlight on the Americas	0413 R. Vlaanderen Int. T	Focus on Europe	
0320 BBCWS(am) S/M	Sports Roundup	BBCWS(am) A	Assignment	0418 R. Vlaanderen Int. H	Around Town	
0330 China R. Int. T	Sports World	R. Netherlands T-A	Newsline	A	Tourism in Flanders	
Deutsche Welle F	Spotlight on Sport	0455 R. Netherlands S	Insight (commentary)	0420 R. Prague W	Talking Point	
R. New Zealand Int. H	The World in Sport			0430 China R. Int. M	People in the Know	
0335 R. Habana Cuba T-A	Time Out	Business/Economics		F	Life in China	
0345 R. Sweden T	Sportscan	0411 Voice of Russia H	Newmarket	0432 Voice of Russia S	Newsnet (Swiss magazine)	
(*special on 9660, 12080, 17580, 21725 kHz only)		0413 R. Vlaanderen Int. F	Economics	0435 R. Netherlands S	Moscow Yesterday and Today	
		0415 Swiss R. Int. A	Business Spotlight	0440 Swiss R. Int. S	Europe Unzipped	
		0430 BBCWS(am) S	Global Business	M	The Name Game (geo quiz-1st wk.)	
		China R. Int. W	China Horizons	0446 Voice of Russia W	Swiss Scene	
		0445 Swiss R. Int. A	Business Spotlight		Russia: People and Events	
0400 UTC		Science/Technology/Health/Environment		Informational Features		
Newscasts (*extended)		0405 R. Australia A	Pacific Focus-Environment	0405 R. New Zealand Int. S	Feature or series on religion	
0400 BBCWS(am) D	The World Today*	0411 Voice of Russia W/A	Science and Engineering	0410 R. Habana Cuba S	The World of Stamps	
China R. Int. D	News	0413 R. Vlaanderen Int. W	Green Society (ecology)	0418 R. Vlaanderen Int. F	International Report	
HCJB D	Latin American & World News	0430 WWCR(5070 kHz) M	New Horizons	0420 China R. Int. H	Voices from Other Lands	



FREQUENCIES

0900	0915	vi	Ghana, Ghana BC Corp	3366do	4915do				
0900	0929		Czech Rep, Radio Prague Intl	21745as					
0900	0930		Guam, KTWV/ Trans World R	15330as					
0900	0930		UK, BBC World Service	6190af	6195as	9605as	9740as		
				11760me	11940af	11945as	12095eu		
				15190sa	15310as	15360as	15400af		
				15485eu	15565eu	15575as	17640eu		
				17655as	17760as	17790as	17830af		
				17885af	21470af	21660as			
0900	0945		Germany, Deutsche Welle	6140eu	6160pa	12035af	15410af		
				15470as	17715pa	17770pa	21800af		
				17820as	21560af	21680pa	17900as		
0900	1000		Anguilla, Caribbean Beacon	6090am					
0900	1000	vi	Australia, ABC/Alice Springs	2310do					
0900	1000	vi	Australia, ABC/Katherine	2485do					
0900	1000	vi	Australia, ABC/Tennant Creek	2325do					
0900	1000		Australia, Christian Voice	13755as					
0900	1000		Australia, Radio	9580va	13605va	15240as	21820va		
0900	1000	as	Australia, Radio	15400as					
0900	1000	vi	Botswana, Radio	7255do	9600do	7255do			
0900	1000		Canada, CFRX Toronto ON	6070do					
0900	1000		Canada, CFVP Calgary AB	6030do					
0900	1000		Canada, CHNX Halifax, NS	6130do					
0900	1000		Canada, CKZN St John's NF	6160do					
0900	1000		Canada, CKZU Vancouver BC	6160do					
0900	1000		China China Radio International	11730pa	15210pa				
0900	1000		Costa Rica, R for Peace Intl	15049irr	15049va				
0900	1000		Costa Rica, University Network	5920al	6970va	15048irr			
0900	1000		Ecuador, HCJB	11775pa					
0900	1000	mtwhf	Eqt Guinea, Radio Africa	15185af					
0900	1000	as/vl	Eqt. Guinea, Radio East Africa	15185af					
0900	1000	a/monthly	Finland, Scandv Weekend Radio	11690va					
0900	1000	a	Germany, Good News World R	5985eu	5995eu				
0900	1000		Germany, Overcomer Ministries	13800pa	13810au				
0900	1000		Germany, Trans World Radio	12070eu					
0900	1000		Germany, Voice of Hope	5975eu	21590me				
0900	1000		Guyana, Voice of	3289do	5949do				
0900	1000	as/vl	Italy, Italian Radio Relay Service	7120va					
0900	1000	vi	Kenya, Kenya BC Corp	4935do					
0900	1000	vi	Lesotho, Radio	4800do					
0900	1000	vi	Liberia, ELWA	4760do					
0900	1000	vi	Liberia, R Liberia International	6100do					
0900	1000		Malaysia, Radio	7295do					
0900	1000		Namibia, Namibian BC Corp	7165af	7215af				
0900	1000		New Zealand, R New Zealand Int	11720pa					
0900	1000		New Zealand, ZLXA	3935do	7290do				
0900	1000	vi	Nigeria, Radio/Enugu	6025do					
0900	1000	vi	Nigeria, Radio/Ibadan	6050do					
0900	1000	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
0900	1000	vi	Nigeria, Radio/Lagos	3326do	4990do				
0900	1000		Palau, KHBN/Voice of Hope	15725as					
0900	1000	vi	Papua, New Guinea, NBC	4890do	9675irr				
0900	1000		Sierra Leone, Sierra Leone BS	3316do					
0900	1000		Singapore, SBC Radio One	6150do					
0900	1000	vi	Solomon Islands, SIBC	5020do					
0900	1000		Sri Lanka, Sri Lanka BC Corp	6130do					
0900	1000		Uganda, Radio	5026do	7110do	7196do			
0900	1000		USA, Armed Forces Radio	4278va	4319va	4993va	5765va		
				6350va	6458va	6847va	10320va		
				10940va	12579va	12689va	13362va		
				16847va					
0900	1000		USA, KAIJ Dallas TX	5755va					
0900	1000		USA, KTBN Salt Lake City UT	7510na					
0900	1000		USA, KWHR Naalehu HI	11565pa	17780as				
0900	1000		USA, Voice of America	11930as	13610as	15150as			
0900	1000		USA, WBCQ Monticello ME	7415na					
0900	1000		USA, WEWN Birmingham AL	5825na					
0900	1000		USA, WHRA Greenbush ME	11730af					
0900	1000		USA, WHRI Noblesville IN	5745va	7315am				
0900	1000		USA, WJCR Upton KY	7490am	13595as				
0900	1000		USA, WRMI Miami FL	9955sa					
0900	1000		USA, WSHB Cypress Crk SC	9455eu	9860eu	11615eu			
0900	1000		USA, WTJC Newport NC	9370na					
0900	1000		USA, WWCR Nashville TN	2390na	5070na	5935na	7435na		
0900	1000	vi	Vanuatu, Radio	3945do	4960do	7260do			
0900	1000	mt hfa	Vatican City, Vatican Radio	5885eu					
0900	1000		Zambia, Christian Voice	9865do					
0900	1000	vi	Zambia, National BC Corp	6165do	6265do				
0900	1000	vi	Zimbabwe, Zimbabwe BC Corp	5975do	6045do				
0915	1000	vi	Ghana, Ghana BC Corp	6130do	4915do				
0930	1000	vi/as	Ghana, Ghana BC Corp	4915do	4915do				
0930	1000		Netherlands, Radio	9790as	12065as	13710as			
0945	1000		Germany, Deutsche Welle	6140eu					
1000	1027		Vietnam, Voice of	12019as	15115as				
1000	1030		Guam, KSDA/ Adventist World R	11560as	11705as				
1000	1030		Netherlands, Radio	9790as	12065as	13710as			
1000	1030		Palau, KHBN/Voice of Hope	15725as					
1000	1030		Singapore, RTE Radio	11685au					
1000	1030		Sri Lanka, Sri Lanka BC Corp	4940do					
1000	1100		Anguilla, Caribbean Beacon	11775am					
1000	1100	vi	Australia, ABC/Alice Springs	2310do					
1000	1100	vi	Australia, ABC/Katherine	2485do					
1000	1100	vi	Australia, ABC/Tennant Creek	2325do					
1000	1100		Australia, Christian Voice	13775as	17825as				
1000	1100		Australia, Radio	9580va	13605va	15240as	15400as		
				17750as	21820va				
1000	1100	as	Bhutan, Bhutan BC Service	6035do					
1000	1100	vi	Botswana, Radio	7255do	9600do	7255do			
1000	1100		Canada, CFRX Toronto ON	6070do					
1000	1100		Canada, CFVP Calgary AB	6030do					
1000	1100		Canada, CHNX Halifax, NS	6130do					
1000	1100		Canada, CKZN St John's NF	6160do					
1000	1100		Canada, CKZU Vancouver BC	6160do					
1000	1100		China China Radio International	11730pa	15210pa				
1000	1100		Costa Rica, R for Peace Intl	15049irr	15049va				
1000	1100		Costa Rica, University Network	5920al	6970va	15048irr			
1000	1100		Ecuador, HCJB	11755pa					
1000	1100	mtwhf	Eqt Guinea, Radio Africa	15185af					
1000	1100	as/vl	Eqt. Guinea, Radio East Africa	15185af					
1000	1100	a/monthly	Finland, Scandv Weekend Radio	11690va					
1000	1100		Germany, Deutsche Welle	6140eu					
1000	1100		Germany, Voice of Hope	21590me					
1000	1100	vi	Ghana, Ghana BC Corp	6130do	4915do				
1000	1100	vi/as	Ghana, Ghana BC Corp	4915do	4915do				
1000	1100		Guyana, Voice of	5949do					
1000	1100		India, All India Radio	11585as	13700au	15020as	17485au		
				17840au	17895au				
1000	1100	as/vl	Italy, Italian Radio Relay Service	7120va					
1000	1100		Japan, Radio	9695as	15590as	21755pa			
1000	1100		Jordan, Radio	11690eu					
1000	1100		Kenya, Kenya BC Corp	4935do					
1000	1100	vi	Lesotho, Radio	4800do					
1000	1100	vi	Liberia, ELWA	4760do					
1000	1100	vi	Liberia, R Liberia International	6100do					
1000	1100		Malaysia, Radio	7295do					
1000	1100		Namibia, Namibian BC Corp	7165af	7215af				
1000	1100		New Zealand, R New Zealand Int	11720pa					
1000	1100		New Zealand, ZLXA	3935do					
1000	1100	vi	Nigeria, Radio/Enugu	6025do					
1000	1100	vi	Nigeria, Radio/Ibadan	6050do					
1000	1100	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
1000	1100	vi	Nigeria, Radio/Lagos	4990do	7285do				
1000	1100	vi	Nigeria, Voice of	7255af	15120af				
1000	1100	vi	Papua, New Guinea, NBC	4890do	9675irr				
1000	1100		Seirra Leone, Sierra Leone BS	5980do					
1000	1100		Singapore, SBC Radio One	6150do					
1000	1100	vi	Solomon Islands, SIBC	5020do					
1000	1100		Uganda, Radio	5026do	7110do	7196do			
1000	1100		UK, BBC World Service	6190af	6195va	9740as	11760me		
				11940af	12095eu	15310as	15485eu		
				15565eu	15575as	17640eu	17790as		
				17885af	21470af	21660as			



FREQUENCIES

1600 1610	Vatican City, Vatican Radio	12065au	13765au	15235au		1600 1700	Sierra Leone, Sierra Leone BS	5980do				
1600 1615	Pakistan, Radio	11570me	15100af	15725af	17720af	1600 1700	South Korea, R Korea Intl	5975om	6150eu	9515af	9870af	
1600 1625	Netherlands, Radio	9890as	11835as	12075as		1600 1700	Sri Lanka, Sri Lanka BC Corp	4940do				
1600 1627	Czech Rep, Radio Prague Intl	5930eu	21745af			1600 1700	Taiwan, Radio Taipei International	11550as				
1600 1630	Iran, VOIRI	7245as	9635as	11775as		1600 1700	Uganda, Radio	4976do	5026do			
1600 1630	Israel, Kol Israel	15615va	15640va	17545va	21665va	1600 1700	UK, BBC World Service	3915as	5975as	6190af	6195as	
1600 1630	Jordan, Radio	11690na	17680al					7160as	9410eu	9410eu	9515na	9740as
1600 1630	S Africa, Channel Africa	9525af						11940af	12095eu	15310as	15400af	15485eu
1600 1630	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu			15565eu	17700as	17830af	17840am	21470af
1600 1630 vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do					21660af				
1600 1645	Germany, Deutsche Welle	6140eu	6170as	7225as	9735af	1600 1700 a	UK, Merlin Network One	6175eu				
		11665af	17595as	21840af		1600 1700	UK, World Beacon	15455eu				
1600 1650 occsnal	New Zealand, R New Zealand Int	6095pa				1600 1700	USA, Armed Forces Radio	6350va	4319va	4993va	5765va	
1600 1656	North Korea, Voice of Korea	3560va	6520va	9660va	9975va			12579va	6458va	6847va	10320va	10940va
1600 1700	Algeria, R Algiers International	11715va	15160va						12689va	13362va	16847va	
1600 1700	Anguilla, Caribbean Beacon	11775am				1600 1700	USA, KAIJ Dallas TX	13815va				
1600 1700 vl	Australia, ABC/Alice Springs	2310do				1600 1700	USA, KTBN Salt Lake City UT	15590na				
1600 1700 vl	Australia, ABC/Katherine	2485do				1600 1700	USA, KWHR Naalehu HI	9930as				
1600 1700 vl	Australia, ABC/Tennant Creek	2325do				1600 1700	USA, VOA Special English	13600af	15445af	17895af		
1600 1700	Australia, Christian Voice	13730as	13795as			1600 1700	USA, Voice of America	6035af	6160as	7125as	9645as	
1600 1700	Australia, Radio	5995va	6080pa	9580va	9655va			9700me	9760as	13605af	13710af	15205eu
		11650pa	11660va					15225af	15255va	15410af		
1600 1700 vl	Botswana, Radio	3356do		7255do		1600 1700	USA, WEWN Birmingham AL	11875na				
1600 1700	Canada, CBC Northern Service	9625do				1600 1700	USA, WHRA Greenbush ME	17650af				
1600 1700	Canada, CFRX Toronto ON	6070do				1600 1700	USA, WHRI Noblesville IN	13760va		15105am		
1600 1700	Canada, CFVP Calgary AB	6030do				1600 1700	USA, WINB Red Lion PA	13570am				
1600 1700	Canada, CHNX Halifax, NS	6130do				1600 1700	USA, WJCR Upton KY	7490am		13595as		
1600 1700	Canada, CKZN St John's NF	6160do				1600 1700	USA, WMLK Bethel PA	15265eu				
1600 1700	Canada, CKZU Vancouver BC	6160do				1600 1700	USA, WRMI Miami FL	9955am				
1600 1700	China China Radio International	7190af	13650af			1600 1700	USA, WRNO New Orleans LA	7395am	15420al			
1600 1700	Costa Rica, R for Peace Intl	15049irr	21815usb			1600 1700	USA, WSHB Cypress Crk SC	18910af				
1600 1700	Costa Rica, University Network	15048va	21815usb			1600 1700	USA, WTJC Newport NC	9370na				
1600 1700	Ethiopia, Radio	7165af	9560af			1600 1700	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1600 1700 a/monthly	Finland, Scandy Weekend Radio	11690va				1600 1700	USA, WWFV McCaysville GA	12172va				
1600 1700	France R France International	11615af	11995af	12015af	15605af	1600 1700 mtwhf	USA, WWFV McCaysville GA	12172va				
		17605af	17850af			1600 1700	USA, WYFR Okeechobee FL	11830na	17750na	18980eu	21455eu	
1600 1700 a	Germany, Good News World R	15105af						21525af				
1600 1700 as	Germany, Overcomer Ministries	17490eu				1600 1700	Zambia, Christian Voice	4965do				
1600 1700 vl	Ghana, Ghana BC Corp	4915do	6130do			1600 1700 vl	Zambia, National BC Corp	6165do	6265do			
1600 1700	Guam, KSDA/ Adventist World R	11850as				1615 1630	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu	
1600 1700	Guyana, Voice of	5949do						15595eu				
1600 1700	Kenya, Kenya BC Corp	4935do				1615 1700 as	UK, BBC World Service	11860af	21490af			
1600 1700 vl	Lesotho, Radio	4800do				1625 1640	Armenia, Trans World Radio	5855me				
1600 1700 vl	Liberia, ELWA	4760do				1630 1657	Vietnam, Voice of	9730eu	11630al	13740eu		
1600 1700 vl	Liberia, R Liberia International	6100do				1630 1700 vl	Cameroon, CRTV Radio Buea	6005do				
1600 1700 vl	Malawi, Malawi BC Corp	3380do				1630 1700	Egypt, Radio Cairo	15255af				
1600 1700	Malaysia, Radio	7295do				1630 1700 s	Seychelles, FEBA Radio	11605as				
1600 1700	Namibia, Namibian BC Corp	7165af	7215af			1630 1700	Slovakia, R Slovakia International	5920eu	6055eu	7345eu		
1600 1700	New Zealand, ZLXA	3935do				1630 1700	Somalia, Radio Galkayo	6985va				
1600 1700 vl	Nigeria, Radio/Enugu	6025do				1630 1700 as	UK, BBC World Service	9515na	11860af	21490af		
1600 1700 vl	Nigeria, Radio/Ibadan	6050do				1630 1700 f	UK, Merlin Network One	11535as				
1600 1700 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	1630 1700 mtwh	UK, Merlin Network One	11590as				
1600 1700 vl	Nigeria, Radio/Lagos	3326do	4990do			1630 1700 as	UK, Merlin Network One	11540as				
1600 1700 vl	Nigeria, Voice of	7255af	15120af			1630 1700 vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
1600 1700	Russia, Voice of Russia WS	9875as	11985me	12065as	15540me	1645 1700	Germany, Deutsche Welle	6140eu				
1600 1700	S Africa, World Beacon	6145af				1651 1700 mtwhf	New Zealand, R New Zealand Int	6095as				

SELECTED PROGRAMS BY CONTENT

1600 UTC

Newscasts (*extended)

1600 BBCWS(am) S/News Summary A/News
R. Australia D News

Current Events Magazines/Features

1600 BBCWS(am) M-F Europe Today

Business/Finance

1630 BBCWS(am) M-F World Business Report

Local Lives and Views

1605 R. Australia S/The National Interest T/The Comfort Zone (homes/gardens/food) W/Verbatim (oral histories) H/Hindsight (history) F/Away! (Aboriginal culture)
1630 R. Australia W Earshot (Australian voices)

Music

1600 WWCR(15685kHz)M-F Worldwide Country Radio
1602 WHRI(15105 kHz) A 20: The Countdown Magazine (Christian rock)
1605 R. Australia A Melisma (from 1505)

Entertainment/Variety, Magazine Shows

1605 R. Australia M Margaret Throsby Interview

Sport

1605 BBCWS(am) S/Sunday Sportsworld A/Sportsworld (from 1405)
1645 BBCWS(am) M-F Sports Roundup

Hauser's Highlights

TURKEY: Voice of Turkey

A01 in English; all these are Emirler Site, all 500 kW, all 7 days a week, and from 25 March until 28 October 01 — EXCEPT for another odd date change projected: At 0300, 11655 until 1 September, 7115 from 2 September. All are DSB, except USB on 9730. CIRAF target zones shown:

7115 0300 0400 2-7,10,18, 27N,28
7170 2030 2130 39-41,49,54,55,58-60
7190 2200 2300 9,17,18S,27,28W, 37N
7270 0300 0400 38E,39,40W
9730 1830 1930 18S,27,28
9785 1830 1930 18S,27,28
116550300 0400 2,7,10,18, 27N,28
118452200 2300 4,7E,8,9,11,27,28W
178101230 1330 30S,40, 41,49,54,55,58N
178301230 1330 18S,27, 28W
217150300 0400 40,41,49,54,58N

(via Andreas Volk via BC-DX)

Hauser's Highlights

ROMANIA: Radio Romania International

English schedule as found on web March 25

Northern America 0200 - 0300 11,940 ; 15,340
Japan 0200 - 0300 15,105 ; 17,735
New Zealand 0200 - 0300 15,180 ; 17,790
Northern America 0400 - 0500 11,940 ; 15,365
India 0400 - 0500 17,735 ; 21,480
Northern America 0600 - 0700 11,940 ; 15,180
Western Europe 06.41 - 06.56 11,775 ; 15,365
Northeast Africa 0700 - 0800 17,735
Western Europe 1400 - 1500 15,250 ; 17,735
Western Europe 1700 - 1800 15,380 ; 17,805
Northern Europe 1700 - 1800 11,740 ; 15,365
Western Europe 2100 - 2200 11,940 ; 15,365
Northern Europe 2100 - 2200 9,725 ; 11,740
Western Europe 2300 - 2400 9,750 ; 11,775
Northern America 2300 - 2400 11,940 ; 15,105
<http://www.rrl.ro/language.htm>



FREQUENCIES

2100	2110	Kenya, Kenya BC Corp	4935do				
2100	2115	Egypt, Radio Cairo	15375af				
2100	2130	Australia, ABC/Alice Springs	2310do				
2100	2130	Australia, ABC/Katherine	2485do				
2100	2130	Australia, ABC/Tennant Creek	2325do				
2100	2130	Australia, Radio	7240pa	9500as	9580va	9660pa	
			11880va	12080pa	17715va	21740va	
2100	2130	Austria, AWR Europe	15165af				
2100	2130	China China Radio International	5965eu	9840eu	11735af	13640of	
2100	2130	Cuba, Radio Havana	13660eu	13750eu			
2100	2130	Mexico, R. Mexico International	9705am	11770am			
2100	2130	South Korea, R. Korea Intl	3975eu	15575eu			
2100	2130	Turkey, Voice of	7170as				
2100	2130	UK, BBC World Service	5975am				
2100	2145	Germany, Deutsche Welle	9670pa	9765pa	9875af	11865af	
			11915pa	15135af			
2100	2145	USA, WYFR Okeechobee FL	13855af	15120af	17845af	18980eu	
2100	2156	Romania, R. Romania International	9725eu	11740eu	11940eu	15365eu	
2100	2200	Angola, R. Nacional de Angola	3374va	4950va	7245va		
2100	2200	Anguilla, Caribbean Beacon	11775am				
2100	2200	Australia, Christian Voice	9865pa				
2100	2200	Botswana, Radio	3356do	4820do			
2100	2200	Bulgaria, Radio	9400eu	11900eu			
2100	2200	Canada, CBC Northern Service	9625do				
2100	2200	Canada, CFRX Toronto ON	6070do				
2100	2200	Canada, CFVP Calgary AB	6030do				
2100	2200	Canada, CHNX Halifax, NS	6130do				
2100	2200	Canada, CKZN St John's NF	6160do				
2100	2200	Canada, CKZU Vancouver BC	6160do				
2100	2200	Costa Rica, R. for Peace Intl	15049irr	21815usb			
2100	2200	Costa Rica, University Network	15048va	15065va	21815usb		
2100	2200	Ecuador, HCJB	17660eu	21455usb			
2100	2200	Eat Guinea, Radio Africa	15185af				
2100	2200	Finland, Scandv Weekend Radio	11720va				
2100	2200	Ghana, Ghana BC Corp	3366do	4915do			
2100	2200	India, All India Radio	7150au	7410eu	9650eu	9910au	
			9950eu	11620au	11715au		
2100	2200	Italy, Italian Radio Relay Service	3985va				
2100	2200	Japan, Radio	6035pa	6055eu	6180eu	11850pa	
			11855af	11920pa	17825na	21670pa	
2100	2200	Lesotho, Radio	4800do				
2100	2200	Liberia, ELWA	4760do				
2100	2200	Liberia, R. Liberia International	5100do				
2100	2200	Malawi, Malawi BC Corp	3380do				
2100	2200	Namibia, Namibian BC Corp	3270af	3289af			
2100	2200	New Zealand, R. New Zealand Int	17675pa				
2100	2200	New Zealand, ZLXA	3935do	7290do			
2100	2200	Nigeria, Radio/Enugu	6025do				
2100	2200	Nigeria, Radio/Ibadan	6050do				
2100	2200	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
2100	2200	Nigeria, Radio/Lagos	3326do	4990do			
2100	2200	Papua, New Guinea, NBC	4890do				
2100	2200	Russia, World Beacon	7360eu				
2100	2200	S Africa, World Beacon	3230af	9675af	11640af		
2100	2200	Sierra Leone, Sierra Leone BS	3316do				
2100	2200	Solomon Islands, SIBC	5020do	9545do			
2100	2200	Spain, R. Exterior Espana	9595af	9840eu			
2100	2200	Sri Lanka, Sri Lanka BC Corp	4940irr				
2100	2200	Syria, Radio Damascus	12085eu	13610eu			
2100	2200	UK, World Beacon	9675af				
2100	2200	Ukraine, R. Ukraine International	5905eu	7410eu	11705eu	11950eu	
			13590na				
2100	2200	USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
			6350va	6458va	6847va	10320va	10940va
			12579va	12689va	13362va	16847va	
			13815va				
2100	2200	USA, KAIJ Dallas TX	15590na				
2100	2200	USA, KTBN Salt Lake City UT	17510as				
2100	2200	USA, KWHR Naalehu HI	6035af	6040me	6095me	7375af	
2100	2200	USA, Voice of America	7415as	9530af	9705as	9760eu	11870pa
			11975af	15185as	15410af	15445af	15580af
			17740as	17820as	17895af		
2100	2200	USA, WBCQ Monticello ME	7415na	9335na	17495na		
2100	2200	USA, WEWN Birmingham AL	11875na	13615na	15745eu		
2100	2200	USA, WHRA Greenbush ME	17650af				
2100	2200	USA, WHRI Noblesville IN	9495am	13760va			
2100	2200	USA, WINB Red Lion PA	13570am				
2100	2200	USA, WJCR Upton KY	7490am	13595as			
2100	2200	USA, WRMI Miami FL	9955sa				
2100	2200	USA, WRNO New Orleans LA	7395am	15420al			
2100	2200	USA, WSHB Cypress Crk SC	15665va	18910af			
2100	2200	USA, WTJC Newport NC	9370na				
2100	2200	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
2100	2200	USA, WWFV McCaysville GA	6890va				
2100	2200	USA, WWFV McCaysville GA	9320va				
2100	2200	Vanuatu, Radio	3945do	4960do	7260do		
2100	2200	Zambia, Christian Voice	4965do				
2100	2200	Zambia, National BC Corp	6165do	6265do			
2100	2200	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
2115	2130	UK, BBC Caribbean Report	5975ca	11675ca	15390ca		
2115	2200	Egypt, Radio Cairo	9990eu	15375af			
2120	2200	Greece, Voice of	9420au	15650au			
2130	2145	UK, BBC Calling Falklands	11680sa				
2130	2157	Czech Rep, Radio Prague Intl	11600au	15545af			
2130	2200	Albania, R. Tirana International	7130eu	9540eu			
2130	2200	Australia, ABC/Alice Springs	4835do				
2130	2200	Australia, ABC/Katherine	5025do				

2130	2200	vi	Australia, ABC/Tennant Creek	4910do			
2130	2200		Australia, Radio	7240pa	9660pa	11880va	12080pa
				17715va	21740va		
2130	2200	mtwhf	Austria, R. Austria International	5945eu	6155eu		
2130	2200		Guam, KSDA/ Adventist World R	11980as	15240as		
2130	2200		Hungary, Radio Budapest	3975eu			
2130	2200		Iran, VOIRI	9570as	13745as		
2130	2200		South Korea, R. Korea Intl	15575eu			
2130	2200		Sweden, Radio	6065eu	15255as		
2130	2200		Uzbekistan, Radio Tashkent	7105eu	9540eu		
2145	2200		USA, WYFR Okeechobee FL	13855af	15120af	17845af	

2200

2200	2210	vi	Malawi, Malawi BC Corp	3380do			
2200	2210	vi	Zambia, National BC Corp	6165do	6265do		
2200	2220	s	Greece, Voice of	9420au	15650au		
2200	2225		Italy, RAI International	9675as	11900as	15240as	
2200	2230		Canada, R. Canada International	9755am	13670am	17695am	
2200	2230	mtwhf	Canada, R. Canada International	15305am	17880am		
2200	2230		India, All India Radio	7150au	7410eu	9650eu	9910au
				9950eu	11620au	11715au	
2200	2230		Iran, VOIRI	9570as	13745as		
2200	2230	mtwhf	Mexico, R. Mexico International	9705am	11770am		
2200	2230	vi	Papua, New Guinea, NBC	4890do			
2200	2230	mtwhf	USA, Voice of America	5855af	6035af	7375af	7415af
				11975af			
2200	2245		Egypt, Radio Cairo	9990eu			
2200	2245		USA, WYFR Okeechobee FL	11740na	15120af	17845af	
2200	2300		Anguilla, Caribbean Beacon	6090am			
2200	2300	vi	Australia, ABC/Alice Springs	4835do			
2200	2300	vi	Australia, ABC/Katherine	5025do			
2200	2300	vi	Australia, ABC/Tennant Creek	4910do			
2200	2300		Australia, Christian Voice	9865pa			
2200	2300		Australia, Radio	15240as	17715va	17795va	21740va
2200	2300		Canada, CBC Northern Service	9625do			
2200	2300		Canada, CFRX Toronto ON	6070do			
2200	2300		Canada, CFVP Calgary AB	6030do			
2200	2300		Canada, CHNX Halifax, NS	6130do			
2200	2300		Canada, CKZN St John's NF	6160do			
2200	2300		Canada, CKZU Vancouver BC	6160do			
2200	2300		China China Radio International	7170eu			
2200	2300		Costa Rica, R. for Peace Intl	15049irr	21815usb		
2200	2300		Costa Rica, University Network	15048va	15065va	21815usb	
2200	2300	mtwhf	Eat Guinea, Radio Africa	15185af			
2200	2300	f/monthly	Finland, Scandv Weekend Radio	11690va			
2200	2300	vi	Ghana, Ghana BC Corp	3366do	4915do		
2200	2300	fas/vl	Italy, Italian Radio Relay Service	3985va			
2200	2300	vi	Liberia, R. Liberia International	5100do			
2200	2300		Malaysia, Radio	7295do			
2200	2300		Namibia, Namibian BC Corp	3270af	3289af		
2200	2300		New Zealand, R. New Zealand Int	17675pa			
2200	2300		New Zealand, ZLXA	3935do	7290do		
2200	2300	vi	Nigeria, Radio/Enugu	6025do			
2200	2300	vi	Nigeria, Radio/Ibadan	6050do			
2200	2300	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
2200	2300	vi	Nigeria, Radio/Lagos	3326do	4990do		
2200	2300		Sierra Leone, Sierra Leone BS	3316do			
2200	2300	vi	Solomon Islands, SIBC	5020do	9545do		
2200	2300		Sri Lanka, Sri Lanka BC Corp	4940irr			
2200	2300		Taiwan, Radio Taipei International	111565eu	15600eu		
2200	2300		Turkey, Voice of	7190va	11845va		
2200	2300		UK, BBC World Service	5965as	5975am	6175na	

Satellite Service Guide



All Frequencies MHz

Robert Smathers
roberts@nmia.com
www.grove-ent.com/mtsg.html

Panamsat Galaxy 11 - C-Band

91 degrees West longitude

1(H)	3720	WB Network (digital)
2(V)	3740	Occasional video
3(H)	3760	BET/BET on Jazz/BET International (digital)
4(V)	3780	Fox Sports Network (digital)
5(H)	3800	FX/Fox Sports Network (digital)
6(V)	3820	Game Show Network (VC2+)
		Cable Radio Network 7.30
7(H)	3840	Golf Channel (VC2+)
8(V)	3860	TNT/TBS feeds (occasional)/Occasional video
9(H)	3880	Z-Music/Recovery Network (digital)
10(V)	3900	Shop at Home Network
11(H)	3920	Eternal Word Television Network (digital)
12(V)	3940	WE: Woman's Entertainment Network (VC2+)
13(H)	3960	Ovation Television (digital)
14(V)	3980	Independent Film Channel (VC2+)
		RAI Satelradio Italy 7.38
		Heritage Broadcasting 7.78
15(H)	4000	Major Broadcasting Cable Network (digital)
16(V)	4020	Access Television Network (digital)
17(H)	4040	Toon Disney/Soapnet (digital)
18(V)	4060	Fox News Channel (VC2+)
19(H)	4080	Data Transmissions
20(V)	4100	(none)
21(H)	4120	(none)
22(V)	4140	Fox Sports World (digital)
23(H)	4160	Fox Sports Network (digital)
24(V)	4180	International Channel (digital)

Panamsat Galaxy 11 - Ku-Band

Note: Transponders 1-24 are North American beamed.
Transponders 25-40 are beamed to South America.

1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	Data Transmissions
4(V)	11780	Occasional video
5(H)	11800	Data Transmissions
6(V)	11820	Data Transmissions
7(H)	11840	Data Transmissions
8(V)	11860	Data Transmissions
9(H)	11880	Data Transmissions
10(V)	11900	Data Transmissions
11(H)	11920	Data Transmissions
12(V)	11940	Data Transmissions
13(H)	11960	Occasional video
14(V)	11980	Occasional video
15(H)	12000	Occasional video
16(V)	12020	Occasional video
17(H)	12040	Data Transmissions
18(V)	12060	Primedia (digital)
19(H)	12080	Data Transmissions
20(V)	12100	Data Transmissions
21(H)	12120	Data Transmissions
22(V)	12140	Occasional video
23(H)	12160	Data Transmissions
24(V)	12180	Occasional video
25(H)	10964	
26(V)	10976	
27(H)	10994	
28(V)	11006	
29(H)	11024	
30(V)	11036	
31(H)	11054	
32(V)	11066	
33(H)	11084	
34(V)	11096	
35(H)	11114	

36(V)	11156	
37(H)	11144	
38(V)	11156	
39(H)	11174	
40(V)	11186	

Loral Orion Telstar 6 - C-Band

93 degrees West longitude

1(V)	3720	Occasional video
2(H)	3740	Occasional video
3(V)	3760	Occasional video
4(H)	3780	Occasional video
5(V)	3800	FOX feeds (digital)
6(H)	3820	Occasional video
7(V)	3840	Occasional video
8(H)	3860	Occasional video
9(V)	3880	Occasional video
10(H)	3900	FOX News Edge
11(V)	3920	Occasional video
12(H)	3940	Occasional video
13(V)	3960	FOX-West (LEITCH)
14(H)	3980	Occasional video
15(V)	4000	Occasional video
16(H)	4020	Occasional video
17(V)	4040	FOX feeds
18(H)	4060	Occasional video
19(V)	4080	Occasional video
20(H)	4100	CBS-East (digital)/CBS HDTV (digital)
21(V)	4120	Occasional video
22(H)	4140	Occasional video
23(V)	4160	CBS-West (digital)/CBS HDTV (digital)
24(H)	4180	Occasional video

Loral Orion Telstar 6 - Ku-Band

1(V)	11728.5	CBS Newsnet (digital)/CBS SNG (digital)
2(H)	11735.0	Data Transmissions
3(V)	11789.5	CBS SNG (digital)
4(H)	11796.0	Occasional video
5(V)	11836.0	Occasional video
6(H)	11842.5	Occasional video
7(V)	11867.0	Occasional video
8(H)	11873.5	World Satellite Network (digital)
9(V)	11898.0	World Satellite Network (digital)
10(H)	11904.5	World Satellite Network (digital)
11(V)	11929.0	CBS SNG (digital)
12(H)	11935.5	Occasional video
13(V)	11960.0	Data Transmissions
14(H)	11966.5	Occasional video
15(V)	11991.0	World Satellite Network (digital)
16(H)	11997.5	Occasional video
17(V)	12022.0	Occasional video
18(H)	12028.5	World Satellite Network (digital)
19(V)	12053.0	Occasional video
20(H)	12059.5	Occasional video
21(V)	12084.0	Data Transmissions
22(H)	12090.5	World Satellite Network (digital)
23(V)	12115.0	Occasional video
24(H)	12121.5	Data Transmissions
25(V)	12146.0	Occasional video
26(H)	12152.5	Data Transmissions
27(V)	12177.0	World Satellite Network (digital)
28(H)	12183.5	Occasional video

Panamsat Galaxy 3R - C-Band

95 degrees West longitude

1(H)	3720	XXtra Hot TV (VC2+)
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2(V)	3740	Occasional video
3(H)	3760	Occasional video
4(V)	3780	Occasional video
5(H)	3800	Occasional video
6(V)	3820	Occasional video
7(H)	3840	Global Broadcast Network (GBN)
8(V)	3860	Infomercials
9(H)	3880	Occasional video
10(V)	3900	Horse Racing (digital)
11(H)	3920	Horse Racing (digital)
12(V)	3940	Horse Racing (digital)
13(H)	3960	Horse Racing (digital)
14(V)	3980	Horse Racing (digital)
15(H)	4000	Occasional video
16(V)	4020	HBO Plus - East (VC2+)
17(H)	4040	MoreMax - East (VC2+)
18(V)	4060	Infomercia TV
19(H)	4080	HBO Signature - East (VC2+)
20(V)	4100	HBO Plus - West (VC2+)
21(H)	4120	Occasional video
22(V)	4140	Occasional video
23(H)	4160	Occasional video
24(V)	4180	Data Transmissions/Gems Shopping Network (digital)
		Horse Racing (digital)

Panamsat Galaxy 3R - Ku-Band

01(H)	11720	Ethnic American Broadcasting Company (digital)
02(V)	11750	Data Transmissions
03(H)	11750	FM Squared audio services
		Data transmissions .06, 2.93, 3.07 and 3.15 MHz
		AP Network News 3.53 MHz
		In-Store audio network ads (various companies)
		.62, .71, .81, .88, 1.05, 1.15, 1.26, 2.06, 3.25, 3.44, 3.62, 3.70, 3.80, 3.88, 3.97, 4.20, and 4.55 MHz
		Muzak Services .15, .27, .39, .51, .98, 1.36, 1.48, 1.60, 1.72, 1.84, 1.96, 2.19, 2.31, 2.44, 2.56, 2.68, 2.80, 3.34, 4.08, 4.34, 4.45, and 4.64 MHz
04(H)	11780	Occasional video
05(V)	11810	Data Transmissions
06(H)	11810	Ethnic American Broadcasting Company (digital)
07(H)	11840	Ethnic American Broadcasting Company (digital)
08(V)	11870	Data Transmissions
09(H)	11870	Occasional video
10(H)	11900	Data Transmissions
11(V)	11930	MSNBC feeds
12(H)	11930	Occasional video
13(H)	11960	Ethnic American Broadcasting Company (digital)
14(V)	11990	Data Transmissions
15(H)	11990	Ethnic American Broadcasting Company (digital)
16(H)	12020	FM Squared audio services
		Data transmissions .06, .47, .64, 1.95, 2.18, 2.45, 2.52, 2.82, 2.92, 3.20, 3.38, 3.47, 3.73, 3.97, 4.14, and 4.24 MHz
		In-Store audio networks .15, .27, .39, .99, 1.11, 1.59, 1.71, and 1.83 MHz
17(V)	12050	The Racing Network (digital)
18(H)	12050	Occasional video
19(H)	12080	Data Transmissions
20(V)	12110	Data Transmissions
21(H)	12110	Occasional video
22(H)	12140	Data Transmissions
23(V)	12170	Data Transmissions
24(H)	12170	CCTV-4 China

See Universal Electronic's ad on page 25 for satellite equipment.



Federal Aviation Administration

This month's edition of *The Fed Files* profiles the government agency responsible for the civil aviation here in the United States – the Federal Aviation Administration (FAA).

The FAA was originally designated the Federal Aviation Agency when established by the Federal Aviation Act of 1958. The present name was adopted in 1967 when the agency became a component of the Department of Transportation. The FAA's major functions include:

- * regulating civil aviation to promote safety and fulfill the requirements of national defense;
- * encouraging and developing civil aeronautics, including new aviation technology;
- * developing and operating a common system of air traffic control and navigation for both civil and military aircraft;
- * research and development with respect to the National Airspace System and civil aeronautics;
- * developing and implementing programs to control aircraft noise and other environmental effects of civil aviation; and
- * regulating U.S. commercial space transportation.

◆ FAA in the HF Spectrum

The Recovery Communications (RCOM) Program unifies all FAA emergency command and control communications (C3) systems and projects into one program. The FAA defines Emergency C3 systems as those means of communications that the FAA employs to direct management, operations, and reconstitution of the National Airspace system (NAS) in support of FAA, Department of Transportation, and Department of Defense missions during national disasters or national security emergencies.

The FAA maintains a variety of fixed-position, portable, and transportable C3 communications systems for use in support of emergency operations. Such C3 systems include RCOM/NARACS High Frequency/Single Side Band (HF/SSB) network and the Very High Frequency/Frequency Modulated (VHF/FM) nets.

In 1995, the FAA approved the deployment of the RCOM HF/SSB upgrades; a five-year contract was awarded to Eastern Computer Incorporated (ECI) to upgrade the RCOM/ National Radio Communications System (NARACS). ECI has installed the RCOM HF/SSB upgrade at all the FAA Region Offices and Emergency Operations Centers, and is in the final phases of installing the NARACS/Automatic

Table One

FAA Recovery Communications/National Radio Communications System (RCOM/NARACS) HF SSB Network

Frequencies:

5860 7475 7611 8125 9914 11637 13457 13630 15851 16348 kHz

ALE ID	Add. Location	Miscellaneous Information
DEFAULT	Unknown	Probably an FAA unit that has not set their ALE ID properly in their unit
FAA	Unknown	Probably not a properly loaded unit, has not been seen as a regular participant on the net
FAAAL	Anchorage, AK	KDM 53-Alaska Region Office/EOC
FAAAE	Kansas City, MO	KKU 40-Central Region Office/EOC
FAAACT	Atlantic City, NJ	KLM 80-William J. Hughes Tech Center
FAAACY	Atlantic City, NJ	WHX 74-Flight Inspection Field Office
FAAAEA	Jamaica, NY	KJK 82-Eastern Region Office/EOC
FAAAGL	Des Plaines, IL	WHX 51-Great Lakes Region Office/EOC
FAAANE	Burlington, MA	WHX 45-New England Region Office/EOC
FAAANC	Anchorage, AK	WHX 73-Flight Inspection Field Office
FAAANM	Renton, WA	WHX 20-Northwest Mtn Region office/EOC
FAAASO	College Park, GA	KDM 49-Southern Region Office/EOC
FAAASW	Fort Worth, TX	KDM 47-Southwest Region Office/EOC
FAAATL	Atlanta, GA	KLM 44-Flight Inspection Field Office
FAAAWP	Fremont, CA	KMR 96-Oakland ARTCC
FAABTL	Battle Creek, MI	KLM 43-Flight Inspection Field Office
FAADCA	Washington, DC	KEM 80-FAA Headquarters
FAAECI	Unknown	Eastern Computer Incorporated Contractor for FAA ARTCC RCOM HF Network upgrade
FAAEKN	Unknown	This is NOT a station in Elkins, WV
FAAKLO	Boonsboro, MD	KLO 87-FAA Emergency Relocation Site (Tentative ID)
FAALGT	Longmont, CO	KCP 63-Western US C3 NCS/SCS Mountain
FAAMRB	Martinsburg, WV	KIT 88-Eastern US C3 Net NCS
FAAOEX	Oklahoma City, OK	KIA 21-FAA Aeronautical Center
FAAOKC	Oklahoma City, OK	WHZ 77-Flight Inspection Field Office
FAASAC	Sacramento, CA	WHZ 78-Flight Inspection Field Office
FAASJU	San Juan, PR	KDM 45-San Juan ARTCC
FAAZAB	Albuquerque, NM	KGH 23-Albuquerque ARTCC
FAAZAN	Anchorage, AK	KBX 44-Anchorage ARTCC
FAAZBW	Nashua, NH	KLD 70-Boston ARTCC
FAAZDC	Leesburg, VA	KJK 80-Washington ARTCC
FAAZDV	Longmont, CO	KCJ 70-Denver ARTCC
FAAZFW	Fort Worth, TX	KBQ 25-Fort Worth ARTCC
FAAZHU	Houston, TX	KMU 31-Houston ARTCC
FAAZID	Indianapolis, IN	KLB 48-Indianapolis ARTCC
FAAZIX	Hilliard, FL	KJK 79-Jacksonville ARTCC
FAAZKC	Olathe, KS	KKA 82-Kansas City ARTCC
FAAZLA	Palmdale, CA	KJK 77-Los Angeles ARTCC
FAAZLC	Salt Lake City, UT	KDC 20-Salt Lake City ARTCC
FAAZMA	Miami, FL	KMA 47-Miami ARTCC
FAAZME	Memphis, TN	KDM 52-Memphis ARTCC
FAAZNY	Farmington, MN	KCJ 20-Minneapolis ARTCC
FAAZNP	Ronkonkoma, NY	KCD 73-New York ARTCC
FAAZOA	Fremont, CA	KMR 96-Oakland ARTCC
FAAZOB	Cleveland, OH	KLA 25-Cleveland ARTCC
FAAZSE	Auburn, WA	WHX 44-Seattle ARTCC
FAAZTL	Hampton, GA	KUV 64-Atlanta ARTCC
FAAZUA	Aurora, IL	KJB 96-Chicago ARTCC

Link Establishment (ALE) upgrades at all of the FAA Air Route Traffic Control Centers (ARTCCs).

Table One is a profile of the FAA Recovery Communications/National Radio Communications System (RCOM/NARACS) HF SSB Network including all known ALE identifications.

If you want to decode HF ALE transmissions all you need is a shortwave radio, a computer with soundcard, and free ALE software from Charles Brain, G4GUO. You can download that free software off his internet website at <http://www.chbrain.dircon.co.uk>. You can learn more about ALE on the Worldwide Utility News (WUN) website at <http://www.wunclub.com/files.html>.

FAA HF connectivity nets are conducted on Wednesday UTC (Universal Coordinated Time). The East Coast net meets at 1545 UTC on 8125 kHz with KIT 88 as net control. The West Coast net was last reported on 13630 kHz at 1845 UTC.

◆ FAA in the VHF Spectrum

The existing VHF/FM network deployment was accomplished in each of the nine regions during 1983 through 1986 to allow the FAA to meet internal emergency communications requirements. These regional VHF/FM networks, which are still operating, are comprised of hand held and mobile radios along with an infrastructure of fixed radio base stations and repeaters.

The FAA must replace these existing VHF/FM networks in order to comply with the National Telecommunications and Information Administration (NTIA) mandate that requires transition from 25 kHz to 12.5 kHz channel spacing by December 2004. In 1998, the RCOM program was two weeks from a contract award to procure new VHF/FM radio equipment when funds were redirected to other higher priority Agency programs.

The primary purpose of the VHF/FM network is to support emergency operations with day-to-day operations as a secondary consideration. The VHF/FM also provides communications throughout each region for accident investigation, security and maintenance operations.

Here is a list of some known FAA frequencies showing activity. (For paired frequencies – repeater output/repeater input, all narrowband FM mode).

Main FAA Frequencies:

166.175 (Simplex channel 11) 166.175/164.050 166.175/

165.3375 166.175/165.4375 166.250/165.6125 172.100/
 165.625 165.6375 165.6625 165.6875 165.7125 165.7375
 172.125 (Simplex channel 8) 172.150 (Simplex channel 9)
 172.175 (Simplex channel 10) 172.825/169.225 (Channel 7)
 172.850/169.250 (Channel 4) 172.875/169.275 (Channel 5)
 172.900/169.300 (Channel 6) 172.925/169.325 (Channel 1)
 172.950/169.350 (Channel 2) 172.975/169.375 (Channel 3)
 Note: Channel 12 has been noted in this system as the repeater talk
 around frequency of the repeater in use.

Other FAA Frequencies:

162.025 162.050 162.200 162.250 162.275 162.300
 162.325 162.350 162.7625 163.000 164.025 164.050
 164.725 164.825 165.500 165.5375 165.700 166.0875
 166.100 166.125 166.250 167.175 169.2125
 Flight Inspection Frequencies Nationwide:
 135.850 135.950 380.000 380.100
 Lighting Control Systems Nationwide: 165.7625
 Maintenance Nationwide: 408.825
 Scene of an Accident Nationwide:
 165.750 165.7625 166.175
 FAA Private Line Tones: 4Z-136.5 (Primary)/4B-146.2/5A-156.7

◆ **VHF Civilian Aircraft Band**

FAA activity in the VHF civilian aeronautical band will be found in the following two frequency ranges (25 kHz channel spacing AM mode):

117.975 – 128.825 MHz
 132.025 – 136.475 MHz

◆ **UHF Military Aircraft Band**

The military aircraft band (225-400 MHz) has several blocks of frequencies laid aside for FAA communications. Again, spacing is 25 kHz and mode is AM.

239.250-239.450 240.300 251.050-251.150 254.250-
 254.350 255.400 256.700-256.900 257.600-258.100
 263.000-263.150 267.900 269.000-269.600 270.250-
 270.350 272.700-272.750 273.450 273.550-273.600
 276.300 277.400 278.300-278.325 278.450-278.550
 278.300-278.325 278.450-278.550 279.500-279.650
 281.400-281.550 282.100-282.300 284.600-284.750
 285.400-285.650 286.600 287.850-288.350 290.200-
 290.500 291.600-291.750 296.700 298.850-298.950
 299.200 306.200-306.300 306.900-307.375 307.800-
 307.900 309.200 316.050-316.150 317.400-317.800
 319.000-319.300 319.800-319.950 321.300 322.300-
 322.550 323.000-323.250 327.000-327.150 327.800
 335.500-335.650 338.200-338.350 339.800 343.600-
 343.950 346.250-346.400 348.600-348.750 350.200-
 350.350 351.700-352.050 353.500-354.150 357.600
 360.600-360.850 362.300-362.350 363.000-363.250
 369.900 370.850-370.950 371.850-372.100 377.050-
 377.200 379.100-379.250 379.800-380.350 381.200-
 381.650 385.400-385.650 387.000-387.150 388.800
 390.800-390.900 397.850-397.950 398.850-398.950
 399.400 MHz

Apparently, there are some interesting changes going on within the blocks of frequencies mentioned above. Be sure to see this month's *Milcom* column for more details.

That's it for this month's edition of *The Fed Files*. Now it is time to look at this month's federal spectrum scan in Table One. In this issue we continue our detailed look at the reorganized 406-420 MHz UHF federal land mobile service. 73 and good hunting.

Table Two: Federal UHF Land Mobile Service

Frequency	Ch/ Paired Freq*	Agencies	Frequency	Ch/ Paired Freq*	Agencies
413.0000	552/Simplex	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy (No reported activity)	413.5125	593/Simplex	Army, Corps of Engineers
413.0125	553/Simplex	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Labor Department, Navy	413.5250	594/Simplex	Air Force (Nationwide), Army (Nationwide), Corps of Engineers (Nationwide), NASA, Navy
413.0250	554/Simplex	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy	413.5375	595/Simplex	(No reported activity)
413.0375	555/Simplex	Coast Guard	413.5500	596/Simplex	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy
413.0500	556/Simplex	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy	413.5625	597/Simplex	Corps of Engineers
413.0625	557/Simplex	(No reported activity)	413.5750	598/Simplex	Air Force (Nationwide), Army (Nationwide), Navy, Post Office
413.0750	558/Simplex	Air Force (Nationwide), Army (Nationwide)	413.5875	599/Simplex	(No reported activity)
413.0875	559/Simplex	(No reported activity)	413.6000	600/Simplex	FAA-Various Digital Systems (Nationwide), Post Office
413.1000	560/Simplex	Air Force (Nationwide), Army (Nationwide), Navy	413.6125	601/Simplex	(No reported activity)
413.1125	561/Simplex	(No reported activity)	413.6250	602/Simplex	Bureau of Prisons, Drug Enforcement Agency, FBI, Immigration and Naturalization Service (Nationwide), Post Office
413.1250	562/Simplex	Air Force (Nationwide), Army (Nationwide), Navy	413.6375	603/Simplex	Immigration and Naturalization
413.1375	563/Simplex	(No reported activity)	413.6500	604/Simplex	Bureau of Prisons, FBI, Immigration and Naturalization (Nationwide)
413.1500	564/Simplex	Air Force (Nationwide), Army (Nationwide)	413.6625	605/Simplex	Immigration and Naturalization
413.1625	565/Simplex	(No reported activity)	413.6750	606/Simplex	Bureau of Prisons, Drug Enforcement Agency, FBI, Immigration and Naturalization (Nationwide)
413.1750	566/Simplex	Air Force (Nationwide), Army (Nationwide)	413.6875	607/Simplex	Immigration and Naturalization
413.1875	567/Simplex	Interagency Law Enforcement UHF Joint Incident Response Channel <UHF-4> (Simplex-CTCSS As Required-NAC S68F)	413.7000	608/Simplex	Bureau of Prisons, Drug Enforcement Agency, FBI, Immigration and Naturalization (Nationwide), Post Office
413.2000	568/Simplex	Air Force (Nationwide), Animal and Plant Health Inspection Service, Army (Nationwide), Navy	413.7125	609/Simplex	Immigration and Naturalization
413.2125	569/Simplex	Interagency Law Enforcement UHF Joint Incident Response Channel <UHF-5> (Simplex-CTCSS As Required-NAC S68F)	413.7250	610/Simplex	Bureau of Prisons, FBI, Immigration and Naturalization (Nationwide)
413.2250	570/Simplex	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy	413.7375	611/Simplex	Immigration and Naturalization
413.2375	571/Simplex	Corps of Engineers	413.7500	612/Simplex	Drug Enforcement Agency, FBI, Immigration and Naturalization (Nationwide)
413.2500	572/Simplex	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy	413.7625	613/Simplex	Immigration and Naturalization
413.2625	573/Simplex	(No reported activity)	413.7750	614/Simplex	FBI, Immigration and Naturalization (Nationwide)
413.2750	574/Simplex	Air Force (Nationwide), Army (Nationwide), Navy	413.7875	615/Simplex	(No reported activity)
413.2875	575/Simplex	(No reported activity)	413.8000	616/Simplex	Energy Department (Nationwide), NASA, Post Office, Veterans Administration
413.3000	576/Simplex	Air Force (Nationwide), Army (Nationwide), Navy	413.8125	617/Simplex	(No reported activity)
413.3125	577/Simplex	(No reported activity)	413.8250	618/Simplex	Air Force, Army, Energy Department, Federal Reserve System, Navy, Post Office, Veterans Administration
413.3250	578/Simplex	Air Force (Nationwide), Army (Nationwide), Navy	413.8375	619/Simplex	(No reported activity)
413.3375	579/Simplex	(No reported activity)	413.8500	620/Simplex	Energy Department (Nationwide), Federal Reserve System
413.3500	580/Simplex	Air Force (Nationwide), Army (Nationwide), Navy (Nationwide)	413.8625	621/Simplex	(No reported activity)
413.3625	581/Simplex	(No reported activity)	413.8750	622/Simplex	Air Force, Centers for Disease Control, Energy Department, GSA (Nationwide), Immigration and Naturalization Service, NASA, Navy, Veterans Administration
413.3750	582/Simplex	Air Force (Nationwide), Army (Nationwide)	413.8875	623/Simplex	(No reported activity)
413.3875	583/Simplex	(No reported activity)	413.9000	624/Simplex	Agriculture Research Service, Air Force, Census Bureau, Forest Service, Navy
413.4000	584/Simplex	Air Force (Nationwide), Army (Nationwide), Navy	413.9125	625/Simplex	(No reported activity)
413.4125	585/Simplex	(No reported activity)	413.9250	626/Simplex	Energy Department, Federal Reserve System (Nationwide)
413.4250	586/Simplex	Air Force (Nationwide), Army (Nationwide), FBI, HHS (Nationwide), Navy	413.9375	627/Simplex	(No reported activity)
413.4375	587/Simplex	(No reported activity)	413.9500	628/Simplex	Energy Department (Nationwide), GSA
413.4500	588/Simplex	Air Force (Nationwide), Army (Nationwide)	413.9625	629/Simplex	Immigration and Naturalization
413.4625	589/Simplex	(No reported activity)	413.9750	630/Simplex	Drug Enforcement Agency (Nationwide)
413.4750	590/Simplex	Air Force (Nationwide), Army (Nationwide), Corps of Engineers, Navy	413.9875	631/Simplex	(No reported activity)
413.4875	591/Simplex	(No reported activity)			
413.5000	592/Simplex	Air Force (Nationwide), Army (Na-			

Trunking by TETRA

Most scanner listeners have at least heard of Project 25, the digital radio standard promoted by the Association of Public Safety Communications Officials (APCO) for public safety use in the United States. Many state and local agencies are transitioning to Project 25, and a number of networks are already up and running.

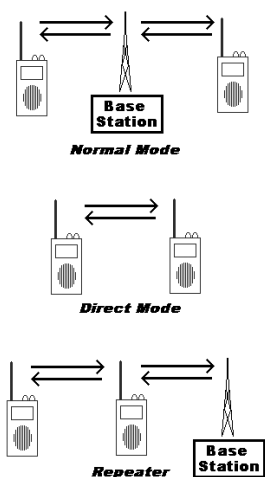
Although Project 25 has received a lot of coverage, there are several other mobile radio standards developed for use by public safety agencies. The leading digital radio standard in Europe is named TETRA and is positioned to eventually replace the older, analog MPT-1327 systems.

TETRA originally stood for *Trans-European Trunked Radio* and grew out of a need for public safety and utility agencies in different European countries to communicate with each other. Major air and sea disasters involving multiple emergency crews from several countries made it clear that a common radio standard was necessary. In addition, the growth of the European Union and the gradual removal of trade barriers highlighted the opportunity for commercial business communication across national borders.

The TETRA standard has the endorsement of the European Telecommunications Standards Institute (ETSI), which plays a somewhat similar role in Europe that the American National Standards Institute (ANSI) serves in the United States. Although the standard is not mandatory, the ETSI endorsement has helped TETRA win more than \$3 billion in orders for nearly 50 proposed networks. Britain has shown a particular interest in TETRA, where several police services and the London Underground are using it. Sales to nations outside of Europe eventually prompted the acronym TETRA to be redefined as *Terrestrial Trunked Radio*.

One of TETRA's major advantages is the combination of features that come in a single package. Traditionally, voice and data required different types of hardware and used different radio signaling. A TETRA platform integrates the capabilities of a mobile radio, a digital cellular telephone, a mobile data terminal (MDT), and a pager into a single device. For instance, a

mobile radio call can be set up in less than one second, either person-to-person or person-to-group. During that call the radio could also connect directly to one of many Internet Protocol-based services including databases and other information sources, easing the burden on dispatchers and reducing delays. The same radio could also connect to the public telephone system, allowing the user to dial numbers just like a cell phone.



TETRA also incorporates a "direct mode" that allows radios to communicate directly with each other without the use of a repeater, just like walkie-talkies. In other systems this is sometimes referred to as "talk-about" and in TETRA is called Direct Mode Operation (DMO). An extension of DMO allows a standard mobile radio to act as a repeater, passing transmissions from one radio to another until reaching a radio

tower. This feature provides a temporary network extension into areas where there might not otherwise be coverage, such as buildings, basements and parking garages.

The TETRA standard supports two types of data connections, a continuous circuit (like a telephone modem) and packetized data based on the common Internet Protocol (IP). These connections are intended for the delivery of everything from short messages to fingerprint data and mug shot pictures, maps, and even compressed camera images.

TETRA uses a technique called Time Division Multiple Access (TDMA) to squeeze four users into a single 25 kHz radio channel. Rather than allowing a single user to transmit continuously on a radio channel, TDMA radios rapidly take turns transmitting and receiving. In a TETRA system each user is assigned one of four *timeslots* that are each exactly 14.167 milliseconds long. The user in timeslot 1 will transmit

for 14 milliseconds, then stop. The user in timeslot 2 then takes his turn, transmitting for 14 milliseconds. The third and fourth users take their turns, and then the user in timeslot 1 can transmit again. Four timeslots together constitute a frame and take a total of 56.668 milliseconds to complete.

In the brief period of time a radio has to transmit, it can transfer data at an effective rate of 7,200 bits per second. The four channels together have a combined rate of 28,800 bits per second, roughly equivalent to a normal dial-up modem you may have connected to your computer. If a particular user needs to move a lot of information and some of the other timeslots are not being used, TETRA can combine timeslots and effectively increase the radio's data throughput.

The information transmitted by the radio may include Internet Protocol packet data, the digitized output of the vocoder (voice encoder-decoder), and security codes for link encryption.

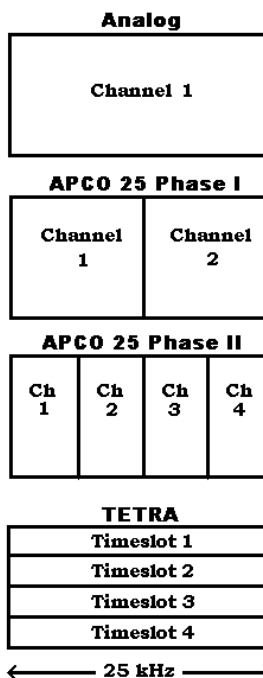
Since the radio can usually only transmit during one timeslot, it can spend the remainder of the time receiving. Just as a user has a transmit timeslot, it also has an assigned receive slot, offset in time so that a radio can alternate between transmitting and receiving. By switching back and forth between transmitting and receiving 18 times every second, a TETRA radio user has the ability to talk and listen at the same time,

just like a normal telephone call (this simultaneous communication is referred to as *full-duplex*). Most analog and even some digital systems limit the user to either speaking or listening at any particular time (this is called *half-duplex*).

TETRA radios usually have built-in ETSI encryption algorithms to secure the radio link. There is also a capability to authenticate radio users, making much more difficult for criminals and pranksters to transmit on public safety networks. Radios may be remotely disabled and specific users can be uniquely identified through the use of Subscriber Identification Module (SIM) cards.

◆ TETRA in the United States

Although Motorola is the primary vendor for Project 25



in the United States, they are also very active in selling TETRA equipment overseas. They market their TETRA standard products under the name Dimetra (Digital Mobile Enhanced Trunked Radio), offering an encrypted air interface (radio link) and direct Internet Protocol connections between mobile data terminals and fixed-location computers. Their sales pitch includes the promise that all voice, data, and signaling information traveling over Dimetra will be fully encrypted.

In December of 1999 the TETRA standard was approved as a phase 2 option for future applications in the Project 25 suite of standards.

Project 25 is defined in phases. Phase 1 specifies a Frequency Division Multiple Access (FDMA) radio interface, which is not directly compatible with TETRA. A number of phase 1 Project 25 systems are already in operation, including installations in Colorado, Connecticut, Maryland, Michigan and Virginia.

Phase 2 holds the possibility of alternative radio interfaces, including TDMA techniques like TETRA. Even if public safety agencies settle on phase 1 systems, TETRA could provide commercial network operators the ability to directly compete against the iDEN network owned by Nextel.

Just as there are currently no scanners that can listen to Project 25 systems, there are no publicly available TETRA scanners. However, like Project 25, the TETRA standard is open and available, so there may come a time when scanner listeners could monitor unencrypted transmissions.

◆ FCC Database

Dan,

In the article you showed how to access the FCC database. It works all right, but my question is how come I can not seem to get any frequencies for the counties in North Dakota? I am looking for Police and Fire. I thought that they had to be listed with the FCC.

Is there any other place that I can look for these frequencies?

Thank you for your time, and keep up the good work that you do for the magazine. It is a great magazine and I look forward to getting it every month.

Sincerely, Dwight

The information is in the FCC database; it's just sometimes hard to find. I had some success locating frequency information for the city of Fargo, North Dakota, and here's how I found it.

1. Go to the main menu of the FCC database search at <http://gullfoss2.fcc.gov/cgi-bin/ws.exe/genmen/index.htm>
2. Click on the "State/County" option in the General Menu Reports - Table of Contents.
3. Enter "ND" for your state and "Cass" for your county. Select the type of radio service you're looking for, or leave it as "All" to retrieve everything. In my search I first selected a Radio Service of "Public Safety Pool, Trunked [YW]" but there were no records found, so I went back and selected "Public Safety/Spec

Emerg, 806-821/851-8 [GP]".
Click the "OK" button.

4. Click on the "ULS DATABASE" selection. (ULS stands for Universal Licensing System.)

5. Select one of the licensees that appear in the result list. I chose the city of Fargo.

6. Click on the "SITE" selection under the "Additional" entry in the upper left corner.

7. You should have two records. Click on the "FREQUENCY" selection under the "Additional" entry in the upper left corner of each record.

8. From this "drill-down" data you can see that the licensed frequencies are 854.9875 and 809.9875, which are the output and input, respectively, of the city repeater. Based on the single frequency and the fact that this is in the GP rather than the YW group, this is a conventional (non-trunked) system.

For other counties in North Dakota, go back to the State/County form in step 3 and enter the name of the county you'd like to search.

◆ Dayton Hamvention

May means that the annual Hamvention in Dayton, Ohio, is almost here. This year the festivities and shopping bargains begin on Friday, May 18, and run through Sunday, May 20. There is always plenty to see and do, and many equipment manufacturers choose to announce and demonstrate new products at Dayton. More important, of course, are the thousands (yes, thousands) of outdoor flea market spots that might just have the electronic bargain you've been searching for. I highly recommend attending!

That's all for this month. You can find more information on my website at <http://www.signalharbor.com>, or send me electronic mail at dan@signalharbor.com. Until next month, happy monitoring!

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Just the Facts on FACSFC

For many years now the U.S. Navy presence on shortwave has slowly been disappearing. The U.S. Navy today relies heavily on UHF military geostationary satellites for the bulk of their long distance communications needs. But there still is some Navy activity that can be heard on HF from time to time if you are willing to be patient and tune around.

One of the more active U.S. Navy organizations to be heard on HF (High Frequency) radio is known as the FACSFC or Fleet Area Control and Surveillance Facilities. These facilities are responsible for providing radar surveillance services to military and civilian units operating in special off-shore warning areas along the US east, west and Gulf coast and around Hawaii.

In this month's Milcom we will feature two of the west coast facilities – FACSFC San Diego, California, and the far west FACSFC located in Hawaii.

The FACSFC San Diego facility is located in Building 93 on the Naval Base Coronado North Complex. This facility controls all of the military off shore operating areas, special use airspace, and provides a variety of services to military units in the San Diego area.

Table 1: San Diego and related call signs

Call Sign	Activity
Baldwin	169 ACWS Hawaii Air National Guard
Beaver	FACSFC San Diego
Burnt Tree	SCORE – SHOBA/NSFS Spotter/Safety Officer
City Hall	MCAS El Toro
Florida 2	Acoustic Explorer
Hassle Base	MCAS Yuma
Hula Dancer	FACSFC Pearl Harbor
Inky Barley	Restricted Area 2512/Target 68
Izod ##	SCORE Range Recover Helicopters
Kitty Baggage	Restricted Area 2512/Target 95
Loom Lobby	Restricted Area 2507/Target 103
Outrider	Pacific Missile Range Control, Barking Sands, HI
Plead Control	NAWCWPNS Range Surveillance Center, Point Mugu
Quebec Control	SCORE Electronic Warfare Reporting
Reliable Partner	San Diego ULM-4 SESEF Range
San Clemente Control Bravo	NALF San Clemente Officer-in-Charge
Sand Box	MCAS El Centro
Shadetree	Restricted Area 2507/Target 101
Sierra 7	SCORE – SCI Range Manager Operations north of SHOBA
Starburst	SCORE – SOAR/Offshore Operations
Starburst 01	SCORE – Range Operations Control
Starburst 02	SCORE – Range Safety Officer
Starburst 03	SCORE – Range Exercise Director
Starburst 04	SCORE – SHOBA Range Coordinator
TWR ##	SCORE Range Recovery Boats
War Wagon	MCAS Miramar
Witch Doctor	SCORE – Electronic Warfare Range Admin

Note: SCORE is the FACSFC San Diego Range Division that supports the Navy offshore operations areas.

Table 2: Southern Ca. Operating Area Freqs

Air Refueling Anchor Tanker Track/AR-651/AR-657	289.9 (Pri)/285.7 (Sec)/118.65 MHz (VHF Pri)
Camp Pendleton Range Control "Longrifle"	301.9/123.2 MHz
Electronic Warfare Range (EWR) High Frequency	10233/16301.4 kHz
Electronic Warfare Range (EWR) "Quebec Control/Witchdoctor"	285.3 (Pri)/263.9 (Sec)/ Coordination on 282.1 MHz or Marine channel 16
FACSFC Pearl Harbor Admin Circuit	3379 kHz (USB)
FACSFC Pearl Harbor Check-in/out "Hula Dancer"	308.1/127.0 (Pri)//280.7/132.4 MHz (Sec)
FACSFC Pearl Harbor Data Systems Administration	380.6 MHz
FACSFC Pearl Harbor Search and Rescue	5681 kHz (USB)
FACSFC Pearl Harbor Tactical	380.6 MHz
FACSFC SD Automatic Terminal Information Service (ATIS)	282.0 MHz
FACSFC SD "Beaver" Check-in/out north (W-291)	120.850/266.9/314.7 MHz
FACSFC SD "Beaver" Check-in/out south (W-291)	118.650/289.9/285.7 MHz
Fleet Tactical/Warning	277.8 MHz
Harbor Operations/Admin Net	271.6 kHz (USB)
HC-85 Line Shack	299.75 MHz
Joshua Approach Control	363.0 (above FL180)/307.2 MHz (below FL180)
Magnetic Silencing Range "Degaussing Control"	356.2 MHz
Marine Corps Position Location Reporting System	279.2 (Pri)/314.750 MHz (Sec)
MINEX Range	352.1 (Check-in)/272.45 (Pri)/265.05 MHz (Sec)
Moving Sands Airspace	290.1 MHz (WISS)
NAOPA – North Air Operating Air	344.1 MHz
Navy ATCOM	268.5 (Pri)/376.8 MHz (Sec)
NAWCWPNS Point Mugu Range Surveillance Center "Plead Control"	280.7/127.55 MHz/5080/3237 kHz
OLF Imperial Beach Tower "Beach Tower"	285.9 MHz
Pacific Missile Range Control "Outrider"	322.0 MHz
Restricted Area 2507/Target 101/Camelot-Bulldog Drop Zones "Shadetree"	283.2 (Pri)/277.2 MHz (Sec)
Restricted Area 2507/Target 103 "Loom Lobby"	305.0 (Pri)/277.2 MHz (Sec)
Restricted Area 2512/Target 68 "Inky Barley"	264.2 MHz
Restricted Area 2512/Target 95 "Kitty Baggage"	265.8 MHz
San Clemente Island ATIS	268.6 MHz
San Clemente Island Tower	278.8 MHz
San Diego Command Early Warning Net	328.2 MHz
Search and Rescue (SAR) Coordination	282.8 MHz
SHOBA – Shore Bombardment Area "Starburst/Burnt Tree"	353.4 MHz
SOAR – Naval Air Station North Island Ground	235.95 MHz
SOAR – Southern California ASW Range Recovery Participants	307.4 (Pri)/299.75 (Sec) MHz
SOAR – Southern California ASW Range Logistics	352.1/307.4 MHz
SOAR – Southern California ASW Range North	229.2 (Pri)/272.45 MHz (Sec)
SOAR – Southern California ASW Range South	348.1 (Pri)/265.05 MHz (Sec)
SOAR – Southern California ASW Range Spares	264.0/352.1 MHz
SOCAL Approach Control	285.2/125.15 MHz
Starburst XX (Secure)	357.9 MHz
UHF Guard (military aircraft distress)	243.0 MHz
UHF Satellite Communications (SATCOM)	306.2 MHz Uplink
ULM-4 SESEF Range "Reliable Partner"	236.2/264.2 MHz
Vessel/Aircraft Underway	5080/3237 kHz (USB)
VHF Guard (civilian aircraft distress)	121.5 MHz
Warning Areas (W-60/61/289/290)	280.7 (Pri)/270.5 MHz (Sec)
Warning Areas (W-260/513)	290.15 (Pri)/353.35 (Sec)/125.825 MHz
Warning Areas (W-283/285)	328.45 (Pri)/282.05 (Sec)/124.125 MHz
Warning Area (W-291 North)	266.9 (Pri)/314.7 (Sec)/120.85 MHz
Warning Area (W-291 South)	289.9/272.6 (Pri)/285.7 (Sec)/118.65 MHz
Western Air Defense (NORAD)	364.2 MHz
Yuma Range Control	274.0/124.15 MHz

Note: Yuma Range Control frequencies above are used in the following military operating areas: Abel MOA/ATCAA, Dome MOA/ATCAA, Imperial ATCAA, Kane MOA/ATCAA, Barry M. Goldwater Gunnery Range/Cactus West (R-2301W), Yuma Tactical Aircrew Combat Training System Range (TACTS), Chocolate Mountain Aerial Gunnery Range (R-2507)

Table 3: FACSAC San Diego UHF Discrete Freqs

Channel	Frequency (MHz)
1	308.1 Tactical Maneuvering Area (TMA)
2	273.1
3	301.1
5	Assigned real time
6	354.9
7	315.3
8	As required

The main tactical call sign used by FACSAC SD and the one most commonly heard by monitors is "Beaver." Some of the other call signs associated with FACSAC SD and other ranges that interface with them are included in Table 1.

Here's a challenge for Southern California monitors: One of the calls frequently heard in the SOCAL area is a total mystery. I am looking for a positive identification for the Navy tactical call, "Happy Hunter." Frequencies on which this call has been observed include: 255.300 267.400 284.900 285.800 304.200 318.700 355.100 MHz. As always, we appreciate your additions, corrections and updates. You can reach me at the email address in the masthead or via snail mail through the *MT* editorial offices.

◆ **SoCal Marines**

Mark Zurovski on the SoCalMilCom group recently attended the El Centro Airshow. He obtained the following frequency list from a U.S. government support vehicle parked next to the static display AV-8B Harrier from VMA-513. The UHF blade antenna on top of the truck caught his eye and the frequencies below were on the frequency card taped to the radio inside the vehicle.

1	ATIS	118.800 (Yuma MCAS-LVH)
2	RANGE	274.000 (Yuma Range Control-LVH)
3	GND	315.700 (Yuma MCAS-LVH)
4	TWR	382.200 (Yuma MCAS tower is 382.8 so this could be a misprint-LVH)
5	DEP	281.000 (Yuma Approach/Departure-LVH)
6	APR	374.800 (Yuma Approach/Departure-LVH)
7	TAC 1	382.925
8	TAC 2	318.925
9	TAC 3	326.925
0	BASE	242.200

	VMA-211	VMA-214	VMA-311
BASE	328.100	269.700	262.900
TAC 1	273.800	314.850	293.100
TAC 2	318.700	299.500	352.300
TAC 3	382.100	281.900	322.150
TAC 4	316.950	302.900	320.575

Mark says he knows some of these frequencies well and he assumes channels 7, 8, 9 and 0 are for VMA-513; I agree. Our thanks to Mark and the entire SoCalMilCom newsgroup for this fantastic update. If you are interested in the SoCalMilCom group, you can find out more about them by checking out the <http://www.yahogroups.com> website.

◆ **A New Trend in FAA Frequency Changes?**

Regular Milcom reporter Jack NeSmith sent along the following recent frequency

changes in the UHF military aircraft band for the southeast United States.

Pensacola, Florida Approach/Departure Control

351.825 replaces 398.950 MHz
 263.125 replaces 281.800 MHz
 269.375 replaces 286.000 MHz
 291.625 replaces 265.100 MHz
 317.475 replaces 309.800 MHz
 348.725 replaces 358.000 MHz
 285.625 replaces 344.400 MHz
 284.650 replaces 393.000 MHz

Moody AFB, Georgia

257.625 Tower
 310.825 Single Frequency Approach Channel 18 replaces 258.000 MHz
 387.025 Single Frequency Approach Channel 19 replaces 387.025 MHz

Mike Agner also reported a new **Baltimore Washington International** Approach/Departure frequency of 291.625 MHz via the Scan-DC newsgroup. On the same group Ron Perron reported 348.725 MHz as a new **Ronald Reagan Washington National Airport (DCA)** Approach/Departure frequency. He also recently reported 317.425 MHz as a new BWI Approach/Departure channel.

Aaron Giles also on the Scan-DC group reported the following approach/departure frequency changes into the DCA.

346.725 replaces 267.900 MHz
 348.725 replaces 396.100 MHz
 350.275 replaces 286.600 MHz
 270.275 replaces 294.500 MHz
 279.575 replaces 301.500 MHz
 281.475 replaces 316.700 MHz

My thanks to all of the above and the Scan-DC group for updating us on what now appears to be a nationwide trend by the FAA to move their approach/departure frequencies in the UHF military aircraft band to 25/75 kHz discrete channels within their own allocation blocks (see this month's *Fed File* column). This trend appears to be happening nationwide, so we will be watching closely to see if this assignment will continue to show up in other parts of the country. Reports on this are heartily encouraged and appreciated. You can find out more about the Scan-DC group at <http://www.qth.net>

◆ **Alaska Military Trunk System**

Our old friend Larry Ledlow, KL7/N1TX passes along a report on the trunk system used at Fort Wainwright, Alaska. Thanks, Larry, for the first look at this military trunk system.

Ft. Wainwright, Alaska

System: EDACS
 Frequencies in LCN order
 01 406.350 Control Channel
 02 407.150
 03 407.950
 04 408.750
 05 409.550

Talk groups:
 0331 Fire
 0348 Law enforcement

0353 Range safety
 0364 Unknown (command staff?)

Larry reports that most or all routine of the base's routine operations may have moved off the VHF channels to the trunk network above. He has not observed any activity on the VHF (138 and 173 MHz) channels for some time.

That wraps it up for this edition of *Milcom*. Until next time, 73 and good hunting.

Table 4: A FACSAC Glossary

ARPA	Advance Research Projects Agency
ASW	Anti-Submarine Warfare
ATCAA	Air Traffic Control Assigned Airspace
EWR	Electronic Warfare Range
FACSAC	Fleet Area Control and Surveillance Facilities
FLETA	Fleet Training Area
MOA	Military Operating Area
NALF	Naval Auxiliary Landing Field
NAWCWPNS	Naval Air Warfare Center Weapons Division
NSFS	Naval Surface Fire Support
SCI	San Clemente Island
SCORE	Southern California Offshore Range, Range Operations Center Building 1479 on the Naval Base Coronado North Complex.
SESEF	Shipboard Electronics Systems Evaluation
SHOBA	Shore Bombardment Area
SOAR	Southern California ASW Range
USB	Upper Sideband

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Radio Graveyard

If you hang out with AM DXers long enough, you'll run into the term "graveyard" or "GY." DXers seem particularly proud of their "graveyard" loggings; the National Radio Club's newsletter has a separate column just for these loggings. Are people actually DXing from cemeteries?!

No, the term "graveyard" refers to six specific frequencies on the AM dial: the frequencies 1230, 1240, 1340, 1400, 1450, and 1490 kHz. These frequencies contain an unusual number of stations, between 150 and 180 each, as opposed to approximately 60 stations on nearby frequencies like 1250 and 1380. Because of the unusual number of stations, there is also an unusual amount of interference. DXing these frequencies can be a real challenge.

In the earliest days of AM broadcasting, all stations were lumped together on the same frequency. It didn't take long for interference to become intolerable. It became necessary to split stations into several classes, eventually arriving at a four-class system. Class I stations were completely protected from interference. They were intended to serve much or all of the country. Class II stations shared frequencies with each other and with Class I operations. Class II stations often delivered extensive coverage across several states. Class III stations had their own frequencies; these stations covered cities and their surrounding rural areas with powers up to 5,000 watts.

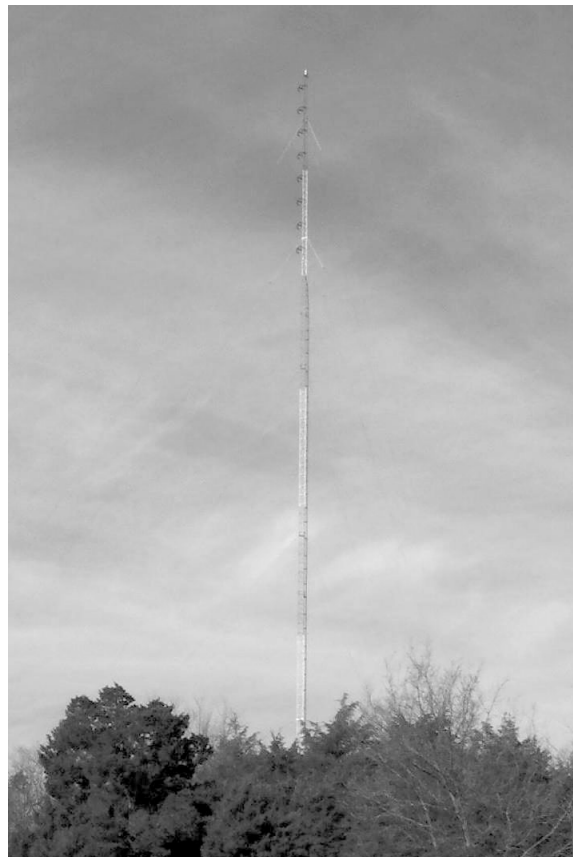
These three classes provided significant coverage. But, they also left many smaller cities without any available frequencies. A fourth class of station was provided to allow the establishment of local stations in these smaller locations. These Class IV stations also had their own frequencies, and were originally authorized 250 watts daytime and 100 watts at night. These are the "graveyard" channels.

Because of the relatively low power and limited protected coverage area, these stations could be packed close together. While the coverage may have been limited, there might be no other opportunity for a station to get a channel that permitted nighttime operation. Over the years, the number of "graveyard" stations grew;

today, there are over 1,000 of these in the United States.

A few years ago, the FCC redesignated AM channels. Class I stations became Class A; Class II and III stations became Class B; and Class IV stations were renamed Class C. The power levels authorized for Class C/IV stations have crept up over the years. For many years, they were authorized 1,000 watts daytime and 250 at night; about 20 years ago, this was increased to 1,000 watts fulltime. As you might imagine, with over 150 1,000 watt stations on a frequency, the interference is ruinous!

Adding to the challenge of DXing these stations, these are small stations, far more likely to be satellite-fed. Still, the persistent DXer can make some interesting loggings here. Persistence is the most important thing.



WHOP-1230 Hopkinsville, Kentucky, is a "graveyard channel" station. The eight circles protruding to the left are the antenna of WHOP-FM.

Just pick a frequency and keep listening. You're only going to hear brief bursts from any particular station, but if you're lucky the station will give some kind of identifying information during one of those bursts. It's the baseball season; you can count on being within range of five or six stations carrying different games. Stations often identify between innings. When you do get an ID on one of these frequencies, be proud. These truly are the "dead zones" of most DXer's dials.

Mailbag

- Here in the USA, most radio stations have been privately owned for decades. Such is not the case in Europe. While France has had privately-owned FM stations for years, it received its first privately-owned AM station in January. "Ciel AM" operates on 981 kHz with 5 kW from the Paris suburb of Romainville. Jean Yves Camus says the station carries mostly music for the city's Jewish community, with information programs at noon and 5pm. Reports have already been received from Finland; U.S. DXers in coastal locations may be able to hear this one later this year.

- James Henderson wrote from northern Alabama, sending a copy of a note he'd sent the FCC asking for help identifying some FM stations in his area. Unfortunately, he's unlikely to get much useful information from the Commission. The government doesn't keep track of stations' slogans or the type of music/programming aired. Your best bet for identifying FM stations probably remains Bruce Elving's *FM Atlas*, available through Universal Radio (800-431-3939).

James also comments "Some FM stations will identify as being in several cities as much as 60 miles apart, which makes it hard to pinpoint a location for the station." True! FCC regulations require that the "city of license" be given first. You will find the station in the FCC's records under this city.

Years of trying have brought me only ten loggings on the "graveyard" AM channels. Are you doing any better? Write me at Box 98, Brasstown NC 28902-0098, or by email to w9wi@w9wi.com. Good DX!

Allen Weiner Acquires Another Ship Transmitter

Allen H. Weiner of **WBCQ** radio in Maine, well known as the most prominent shipboard broadcaster of the late 20th century, is heading back to the high seas. At the Winter SWL Festival in Kulpsville, PA, he announced a deal that will convert the *m/v Katy* to a floating shortwave transmitter site. The boat, currently being renovated in Boston harbor, will be licensed as an international broadcaster in Belize.

Weiner's most famous maritime transmitter, **Radio New York International** from the *m/v Sarah* off the coast of Long Island, was the site of a historic confrontation with the USA Coast Guard and FCC. Weiner tells *MT* that things will be different this time. The operation will be licensed, and is designed as a "positive and upbeat promotion of shortwave broadcasting." He anticipates that the ship will be operational sometime during the summer of 2001.

If legalities can be worked out, it is likely that the ship may transmit from other rare shortwave countries during its journey from Boston to Belize. If so, there will be intense interest in the project on a worldwide basis. Watch this space!

◆ Kentucky Militia

A new domestic USA clandestine startled everybody in early March. **Kentucky State Militia Radio** materialized on 90 meters using 3260 kHz in upper sideband mode at 0300 UTC. (Some loggings noted them on 6890 kHz). Their format of patriot programming is not unlike some of the shows on licensed USA broadcasters such as **WWCR**, but the new one appears to be a genuine clandestine transmitter.

Numerous loggings and information sources quickly established that the Kentucky State Militia claims responsibility for the station. This armed group opposes various policies of the USA federal government. Their web site at <http://www.freekentucky.com/ksm/contents.htm> clarifies the group's views. An announced address of 245 Elrod-Martin Road, Somerset, KY 42503 is worth a try for QSLs.

This operation is the first clandestine broadcast in history from an armed right wing militia group in the United States. It thus is the hottest clandestine log in quite some time from a DX perspective. At press time for *MT* it remains to be seen if the FCC will try its luck with enforcement of transmitter licensing regulations against an armed militant group.

◆ What We Are Hearing

MT readers heard every one of these sta-

tions this month, all between 6940 and 6955 kHz. Most operate on weekends, two to four hours before or after local sunset.

Blind Faith Radio- Dr. Napalm's classic rock says it's your "millennium pirate radio station." (Uses blindfaithradio@yahoo.com e-mail)

Crunch Radio- Their mix of tunes uses a slogan of "music that makes sense" from the 30s and 40s. (None, but has verified Free Radio Network web postings)

KIPM- Alan Maxwell continues to fascinate and repel DXers with elaborate psychological dramas. (Elkhorn)

KMUD- Probably the longest running west coast pirate; they are tough DX in the east. (Belfast)

Melvin Malfunction Radio- Another new pirate, they have featured oldies so far. (Uses melvinmalfunction@yahoo.com e-mail)

Numbers Imitation- This guy never got past the number five on Sesame Street. (None)

Pirate Radio Central- Modern rock with a male and female announcer are noted here. (None)

Radio Bingo- The bingo games are now more elaborate, with pirate cameo appearances, but John T. Arthur still wins every game. (Uses radiobingo@chek.com e-mail)

Radio Neptune- Rock music, QSL commentary, and a fart competition aired on Joe Mack's last show. (Blue Ridge Summit)

Radio Three- Sal Amoniac usually plays insipid oldies, but lately he's expanded to a more lively rock mix with a "3 Rock" slogan. (None; QSL's ACE logs)

Sycko Radio- Pop music and alien dramas are their recent staples. (Still none)

Take It Easy Radio- Comedy and light rock are the staples at this veteran station. (Belfast)

Voice of Captain Ron Shortwave- Captain Ron editorializes about whatever he pleases, between rock tunes. (Uses captainronswr@yahoo.com e-mail)

Voice of the Angry Bastard- "Various songs, ID's, and the maildrop" is the format on this new one. They sometimes relay other pirates. (Belfast)

WHYP- When he's not giving the weather for metro Erie, James Brownyard has some of the most creative original fare in pirate radio today. (Uses whyp1530@yahoo.com e-mail)

WLIS- Jack Boggan hosts the world's only interval signal hit music station. (Blue Ridge Summit)

WMFQ- Rock and QSL promotion remains the fare here. (Providence)

Z-100- Their format imitates commercial oldies radio stations, lately including singing



IDs. Ben Loveless acquired their QSL that we see this month. (Uses biz100fm@yahoo.com e-mail)

◆ Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. This finances postage for a souvenir QSL to your mailbox. Send your letters to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; and PO Box 69, Elkhorn, NE; 68022. A few pirates, as listed, prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. Reports to the *Free Radio Network* go to <http://www.frn.net/> on the web. *Free Radio Weekly* loggings go via niel@ican.net e-mail. Sample copies of *The ACE* are \$2 via the Belfast maildrop.

◆ Thanks

Your input is always welcome via PO Box 98, Brassstown, NC 28902, or via my e-mail address atop the column. This month we heard from all of these DXers: John T. Arthur, Belfast, NY; Artie Bigley, El Paso, TX; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Mike Csorbay, Toronto, Ontario; Joe Filipkowski, Providence, RI; Bill Finn, Philadelphia, PA; Steve Foehner, Rochester, NY; Harold Frodge, Midland, MI; Captain Ganja, Belfast, NY; Jorge Garcia, Santiago, Chile; William T. Hassig, Mt. Prospect, IL; Harry Helms, San Diego, CA; Jim Keeling, St. Charles, MO; Chris Lobdell, Stoneham, MA; Ben Loveless, Bloomfield Hills, MI; Greg Majewski, Oakdale, CT; Alan P. Masyga, Winona, MN; Bill McClintock, Minneapolis, MN; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; DJ Stevie, Basel, Switzerland; Richard Weil, St. Paul, MN; Allen H. Weiner, Monticello, ME; Niel Wolfish, Toronto, Ontario; Andrew Yoder, Blue Ridge Summit, PA, and Dave Zacek, Lafayette, IN.

The Way It Was

I always enjoy hearing from veterans of the longwave band. While I've been tuning into radio's "basement" since the late '70s, the changes I've seen pale in comparison to what many maritime operators have experienced over the years. Back in the 1960s, for example, the frequencies below 530 kHz were humming with marine communications. Virtually every ship on the high seas was equipped for longwave operation.

I recently received a letter from retired marine operator John A. Wrafter (KC4ABC) of Naples, Florida. John was responding to comments from an earlier column regarding the lack of today's activity on 480 kHz. He drew a comparison with the early '60s when he was beginning a career on the high seas. A portion of John's letter follows:

"Back some 40 years ago, when I started my career as a ship's Radio Officer, this entire band was a hive of industry. In areas of heavy shipping traffic such as along the U.S. East Coast, the Mediterra-

"40 years ago, when I started my career as a ship's Radio Officer, this entire band was a hive of industry."

nean or approaching the English Channel, pandemonium reigned day and night on the band as hundreds, thousands perhaps, of ship Radio Officers struggled to catch the attention of the local Coast Stations in order to pass-on or pick-up their messages. It could be, and often was, a nightmare situation for the poor old 'rusty freighter' Radio Operator (RO) with his nominal

100 watt transmitter which more than likely never put out above 50W from its salt-encrusted antenna. That message at WCC/Chatham or GLD/LandsEnd could well be a change of orders

requiring the ship to proceed to a totally different discharge port from the one presently being steered towards, and the Skipper wanted it now!

"In those pre-synthesizer days of course most ship radio stations were fitted with crystal controlled transmitters. The standard ship crystals were 410 kHz (direction finding only), 425 kHz, 454 kHz, 468 kHz, 480 kHz, 500 kHz (distress and calling) and 512 kHz (miscellaneous usage but mostly given over to inter-ship chat). Coast Stations had a fixed working frequency somewhere in the range 420 to 490 kHz. Needless to say QRM could be horrendous, but of course the beauty of CW lay in that ability of the RO to pick out just his signal from the many competing adjacent ones.

"Little did we think, in those busy days of long ago, that within a generation it would all be gone and CW consigned to history. Not even the U.S. Coast Guard tunes an ear nowadays to the once mighty (and chaotic) 500 kHz!"

Thanks for the insight, John. It illustrates just how important the band was to the success of shipping and the safety of crews. Although newer technologies have replaced the activity once heard on longwave, the band will be long remembered as the place where it all began. I invite other readers to share their radio experiences on the high seas. Drop me a line at Below 500 kHz, P.O. Box 98, Brass town, NC 28902, or send an e-mail to lowband@gateway.net.

◆ Loggings

This month's loggings are excerpts from The BeaconFinder, a directory of longwave signals audible North America (see listing elsewhere in this issue). This month, we'll focus on signals at the very bottom of the beacon band, from 190 to 203 kHz.

◆ End Notes

The snow is gone in most parts of North America, and now is a good time to check your antennas and feedlines for possible damage from winter's mix of ice and wind. It is also wise to check

your grounding system for the inevitable thunderstorms that lie ahead.

In the next two issues, I am going to discuss three types of antennas that are popular for longwave reception: Random Wires, Active Antennas and Loops. We'll look at the advantages and disadvantages of each, and discuss ways of getting the best performance from them on the frequencies below 500 kHz.

Table 1. Selected Beacon Loggings

191	4U	Sable Island, NS
194	TUK	Nantucket, MA
196	4Z	Sable Island, NS
198	DIW	Dixon, NC
198	XBB	Cartwright, NF
200	5M	Sparwood, BC
200	AOC	Arco, ID
200	CC	Dease Lake, BC
200	HXF	Hartford, WI
200	UAB	Anahim Lake, BC
200	UAB	Anaheim Lake, BC
200	YAQ	Kasabonika, ON
200	YDL	Dease Lake, BC
200	YJ	Victoria, BC
201	APF	Naples, FL
201	BV	Bartlesville, OK
201	CE	Crestview, FL
201	CZE	Clarksville, AR
201	CZM	Cozumel, Mex.
201	DED	Deland, FL
201	EDX	Edna, TX
201	ETO	Evadale, TX
201	FFS	Forrest, MS
201	GL	La Grande Riviere, QC
201	GV	Greenville, TX
201	H	Winnipeg, MB
201	IP	Mobile, AZ
201	M	Ft. McMurray
201	MNE	Minden, LA
201	MNN	Marion, OH
201	N	Sydney, NS
201	N	Winnipeg, MB
201	PEN	Astoria, OR
201	RI	Riviere Du Loup, QC
201	TCY	Tracey, CA
201	U	London, ON
201	U	Montreal/Dorval, QC
201	X	Edmonton, AB
201	X	Saskatoon, SK
201	YIF	St. Augustin, QC
201	YKX	Kirkland Lake, ON
201	YZV	Deer Lake, ON
203	AB	Aberdeen, SD
203	AVK	Alva, OK
203	BXR	Siren, WI
203	DMZ	Dickson, TN
203	KL	Schefferville, QC
203	MGC	Michigan City, IN
203	MWM	Windom, MN
203	NSI	San Nicolas Island, CA
203	PVB	Platteville, WI
203	RED	Red Lodge, MT
203	SFQ	Suffolk, VA
203	T	Thompson, MB
203	YBL	Campbell River, BC
203	ZKI	Terrace (Kitimat), BC



Ever wonder how electrical power is supplied to tower warning lights? Alex Wiecek (ON) took this photo showing the transformer-coupled arrangement at Beacon "A" 266 kHz (Hamilton, ON). This scheme provides isolation from the AC mains in case of a lightning strike.

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The Bearcat 895XLT is superb for intercepting trunked communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; MB001 Mobile mounting bracket \$14.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.



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versatile multi-function band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, configurable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no

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PSK31 On a Budget

In case you haven't been paying attention there is a revolution going on in Amateur Radio. The digital mode PSK31 has taken off with an energy well beyond previous attempts to marry the computer hobby with the radio hobby to one another.

Many hams, sometimes myself included, are a bit wary of new modes. In the past they required a significant outlay of disposable income to get a taste of something that might not catch on in the long run. (If anybody remembers the Narrow Band Voice Modulation debacle of the '70s raise your hand.)

Convinced data mode operators such as the RTTY crowd jumped into using home computers with both feet. Anything was better than waking up the spouse at two in the morning with a clattering Model 50 or Model 33. But RTTY always remained a specialized mode.

Packet radio flowered and faded a couple of times, losing out for all but specialized uses to the Internet.

PSK31, on the other hand, shows no sign of stopping for a number of very good reasons: the software is usually free, the interface is fairly simple, it works with very low power under abysmal conditions, and you can squeeze literally dozens of PSK31 signals into a single SSB signal.

Almost any personal computer with a sound card can be made to serve as the interface and most modern single sideband transceivers can be adapted to the task of getting a signal out to the PSK31 community.

Interestingly enough, though, the very things that make getting into PSK31 so interesting can also stand in the way. Interfacing your computer with your main station rig is easy enough but it often means disconnecting the rig from its normal duties. You'd be surprised how many folks have not tried new modes simply because it means unplugging a few cables and plugging in a few different ones. "What? I have to unplug my mike every time I want to do this?!"

Well, some of the folks who have become deeply involved in PSK31 have taken steps to eliminate the standard arguments by giving people an alternative to trying out PSK31 with their primary stations. They also throw in the fun of building a simple transceiver.

Amateur radio designer Dave Benson NN1G, perhaps best known for his classic "40-40" transceiver, put his mind to the task of coming up with a simple, low parts count, dedicated PSK31 circuit. The result of his efforts combined with the kitting skills of the New Jersey QRP Club are the Warbler, a low cost 80 meter PSK31 kit.



The Warbler is a simple kit that gets you started on 80 - meter PSK31 – NJQRP Club

The Warbler is a simple, single board kit that can be used in lieu of a primary station rig to give anyone a taste of all the fun of PSK31. This design has garnered quite a following, especially on both coasts of the United States, where nightly gatherings of Warblers can be heard. With over 500 of these boards on the air in the vicinity of 3580 kHz you will find many folks to communicate with.

A complete kit of parts can be ordered from the NJQRP. The cost is \$45 including shipping in the US and Canada. Foreign orders must add \$5 for additional shipping. Make your check or money order payable to George Heron N2APB, 2419 Feather Mae Ct. Forest Hill, MD 21050. You can also get more information about the kit from the NJQRP Website at <http://www.njqrp.org>

The preferred software for running with The Warbler is a package called DigiPan. This is available for free download from the Website <http://members.home.com/hteller/digipan/>. This program, along with a number of others can also be found at <http://www.psk31.com>. Needless to say, this site contains tons of useful information about getting rolling with the PSK31 mode.

◆ PSK31 Awards

World Radio Magazine has jumped into this whole PSK31 thing with both feet. They are now offering a couple of PSK31 awards. One award is for having PSK31 QSOs with hams in all 50 states. The second award is called 31 on 31 and it signifies PSK31 QSOs with hams in 31 countries other than your own. Web on over to <http://www.wr6wr.com/departments/awards.html> for all the details.

I would expect that many of the other major awards from organizations such as the Ameri-

can Radio Relay League (ARRL) and *CQ Magazine* will soon have PSK31 specific endorsement. We'll keep an ear to the ground and let you know.

◆ Are You Ready for Field Day 2001?

The weekend of June 23-24 is not far away. No doubt if you are a member of an active club you are already well on your way to making your plans for this annual event. I have often been amazed at the complexity of some of the stations that clubs set up. For instance, last year I was monitoring a local club repeater while driving to the Field Day site of the group I was operating with. I heard members of this club (obviously running Class A) talking about setting up a 15 station computer network to maintain logging! I mused to myself that my club's entire operation (All homebrew - All the Time) probably cost less than one of those PCs that this club was using as part of their LAN. But if you are not part of an organized effort, it is still possible to join in all the fun.

First of all, if you're not into mosquito repellent and overcooked hamburgers, any ham can participate as a Class D "Home Station" entry. This would be anyone operating from permanent or licensed station location using commercial power. There is one trick when it comes to logging and scoring, though. Class D stations may only count contacts made with Class A, B, C and E Field Day stations. In other words you cannot count contacts with other Class D home stations in your log. This is a great way to get into all the fun of Field Day even if it is inconvenient to get out in the field.

If you want to get even closer to the meaning of Field Day, that is, demonstrating how Amateur Radio can help out in troubled times, you might want to give a go at Class E. This is still a home station but it is one that makes use of emergency power for all its Field Day contacts. You also get the benefit of being able to talk to those Class D stations you couldn't use as a Class D operator. Couple operating Class E with some of the possible combinations for bonus points such as low power and you might just win your section!

But, if you want to have all the fun of heading out away from home but don't have a club affiliation, you can participate at what I have always found the most exciting level of Field Day operations...Class B – Battery. A Class B- Battery station consists of no more than two hams operating from the field (as described to the FD



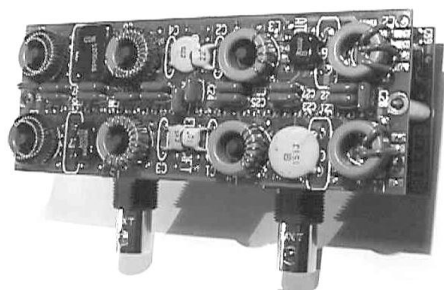
A simple station set up can still be a lot of fun - N2CQ and NJQR Club

rules), operating at a power level of no more than 5 watts, using a power source other than commercial power or motor driven generator. This is your basic backpacker station: a great way to combine two hobbies at once. When you look at all the additional multipliers available to someone setting up a Class B - Battery station, you can really get very competitive with very little money. I've driven to a local park and set up a small QRP rig with a gel-cel and a longwire and only operated a few hours and still turned in a respectable score as a Class B - Battery station.

For a complete look at all the rules and all the possible permutations for your station, browse over to <http://www.arrl.org/contests> for more details.

◆ New at N2EI

I recently had the opportunity to add the KAT2 Automatic Antenna Tuner option to my Elecraft K2 transceiver. I bring this up because it was my first experience with an ATU circuit in my shack. All I can say is I have no idea how I ever did ham radio without an ATU. I've blown more than a few fuses, tripped more than a few SWR "crowbars" and even melted a final or two over the years. The ability to quickly and safely show my RF amplifier stage a 50 ohm load is just short of magic.



The KAT2 ATU installs inside the Elecraft K2 - AB7MY and Elecraft

You don't need to be a K2 owner to enjoy the effects of an ATU. ATU units are available for many of the newer commercial rigs. A source for an ATU unit that can be used with any transmitter is LDG Electronics. They market a number of ATU units that operate from 5 watts through 150 watts and are available as either kits or assembled units. You can learn a lot more about these units at their Website <http://www.ldgelectronics.com>.

Now I didn't bring this topic up just to get you excited about automatic antenna units. I wanted to tell you what I discovered about tra-

ditional tuners, antenna switches, and outboard SWR bridges. The weak link in most station setups can be the jumper cables that go between any transmitter, its various above-mentioned accessories and the antenna itself. Face it, PL-259 connectors are a bear to solder under the best conditions. It's hard to bring in sufficient heat and this results in the classic "cold solder joint." After a period of use it is not unusual for these poor connections to begin to cause weird things to happen. Odd SWR readings are often the first sign.

Related to the above is the need to check out the overall condition of things inside antenna tuning units and SWR meters. This is even more critical when purchasing used gear. Maybe that great deal you got on a tuner sat in somebody's damp basement for a couple of years where its internal were subject to corrosion. Further, maybe a few critters set up housekeeping in the coils and switches. I once knew a guy who threw a full gallon at a used roller inductor transmatch. He heard a loud crack and smelled smoke. The smoke was the distinctive odor of cooked cockroaches! The creatures in question had cause things to arc over inside the tuner. Always "lift the lid" on used gear before turning it on or tuning it up. Some one's or some thing's life may depend on it. And your finals will be happier too.

See you on the low end of forty. 73 DE SKIP N2EI

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Our Next Restoration - The National SW-54

Before we get to the business at hand, I do want to add a postscript to the Philco *Transitone* realignment we completed last month. As is true of most old receivers I go through, realigning the i.f. channel made a dramatic difference in receiver sensitivity. And as an extra bonus, the “birdies” (warbling squeals) that had appeared in a few places on the dial when the set was first turned on were now all but gone.

Most newcomers to radio restoration tend to suspect tubes as a cause of weak or otherwise unsatisfactory reception. Though I always check tubes at the beginning of a restoration, I have rarely found a set that required a tube change – other than in a.c.-d.c. sets where burned out tube heaters are a common problem, or in cases where tubes are missing or physically broken. On the other hand, I have NEVER worked on a vintage set where the i.f. channel had *not* drifted out of alignment and which did not benefit substantially from a realignment. A word to the wise...

◆ Our New Restoration Project

When I started this column a year ago last January, I promised *MT*'s editors that I would first spend some time giving our readers a good

orientation to the hobby of antique radio and then move on to actual restoration projects – beginning with very simple ones. I think I've fulfilled my mandate, and I hope you've found the first couple of projects to be interesting and educational. But now I want to raise the bar a bit!

To my mind, the Philco *Transitone* and Triplett r.f. generator projects may have seemed a little dull to you because both sets looked pretty good when we started out and quite possibly would have worked reasonably well if I had just plugged them in. However, they both illustrated the housekeeping steps that I feel must be completed before bringing the a.c. plug of a piece of equipment anywhere near a wall socket!

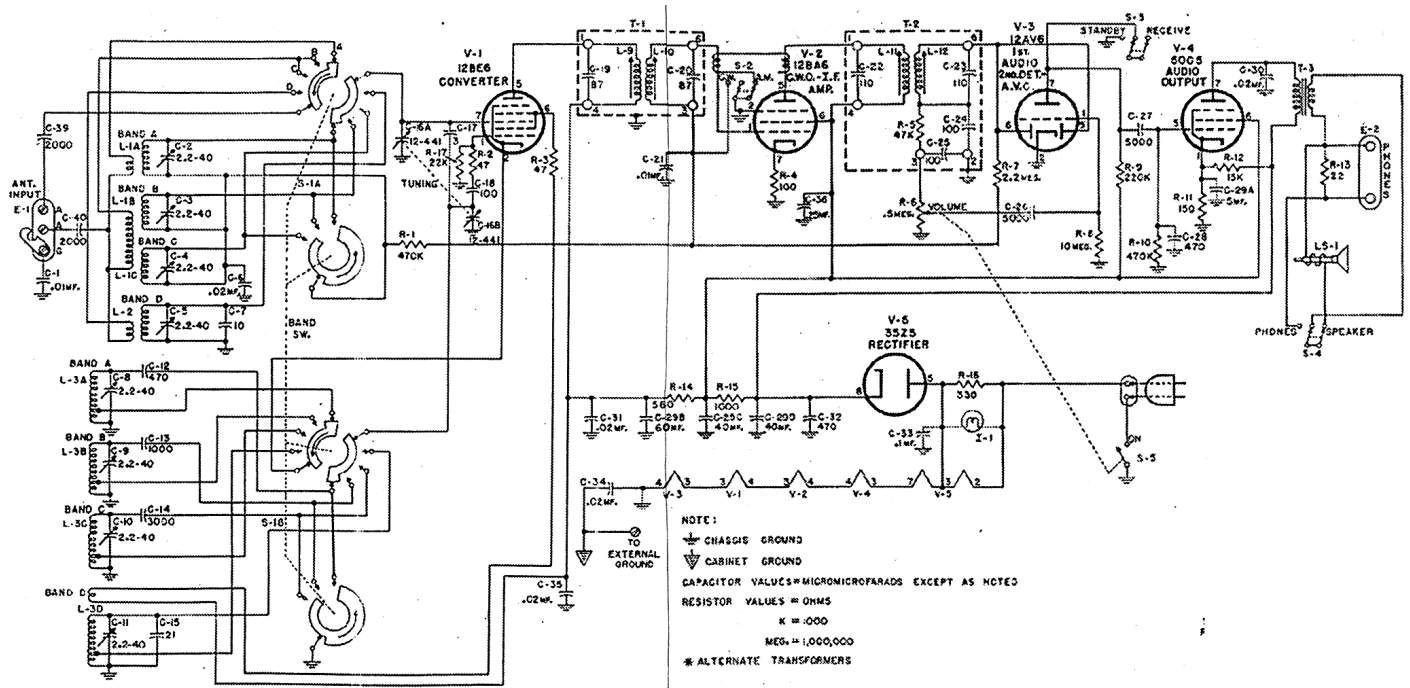
Methinks we need a little more excitement and romance in the column now – and so let me introduce you to our latest project, a National SW-54. This was a “starter set” for shortwave listeners (and perhaps young hams with very limited budgets). Not even National Company, the manufacturer, really wanted to market the set as a ham radio (hence the prefix “SW” instead of the “NC” used for all other sets in the varied National line). The SW-54 was sold against the much better-known Hallicrafters S-38, a roughly equivalent design.

I'm having trouble dating the “introduction year” of the SW-54 for you. The Kon-Tiki expedition referenced in the undated ad I'm running with this column took place in 1947. Explorer Thor Heyerdahl sailed a reproduction of a prehistoric South American balsa-wood raft on a 101-day, 4300-mile journey from Peru to Polynesia just to prove that the primitives could have done it. But I doubt that the National gear he carried would have included a SW-54!

The film about the expedition, referred to in the ad, won an Oscar in 1951. The set is also mentioned in an undated Newark Catalogue (No. 58) that I estimate to be circa 1957. I suspect that the set's number suffix (54) may indicate the year of introduction. Certainly the earlier NC-46, with which I'm more familiar, did appear in 1946.

I figured that *MT* readers might relate well to this little radio because it is an “allwave” set with a communications receiver look and not just another broadcast receiver. Yet we won't be venturing into advanced technology as we work with the set. As you'll see from the schematic I'm including, it has a five-tube a.c.-d.c. circuit not too different from the Philco we've just finished.

Of course, there are extra sets of coils to



Schematic of the SW-54. Take away the shortwave coils and a couple of controls and you are left with a standard a.c.-d.c. broadcast set.



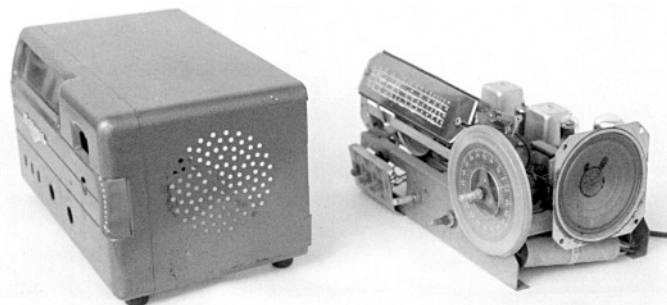
Early SW-54 ad sought to trade on the romance of the 1947 Kon-Tiki expedition (see text).

cover the radio's additional bands and a few extra controls. And it's worth mentioning that the five tubes used in this radio, while performing the same functions as the five Loktal tubes in the Philco, are from a later series of all-glass miniatures. The octal-based 35Z5 rectifier – which was used in countless a.c.-d.c. sets of a slightly earlier vintage – is the lone exception.

Besides having a little more sex appeal than the Philco we just finished, this set is interesting because it comes to us in not very good condition – just one step above junk, really! My plan is to restore the SW-54 to like-new operation and to upgrade its physical appearance from dirty to decent. (Don't expect real miracles in the cosmetic department!) All this, I'm hoping, will be fun for you to watch.

◆ More about the SW-54

As you see from the "Kon-Tiki" Ad, the little radio was priced at \$49.95 in the early 1950s. Its four tuning ranges are: 0.54 to 1.6 MHz; 1.6 to 4.7 MHz; 4.6 to 14.5 MHz; and 12 to 30 MHz. This was standard coverage for an allwave receiver of the period. Besides the volume and tuning controls found in any home radio, the SW-54 boasts a four-position bandswitch, a "Receive-Standby" switch that is used to silence the radio while leaving it warmed up, an "AM-CW" switch that acts to



Just removing the set from its haphazard installation in the cabinet and posing it for the camera makes it look 100% better! However, in its present condition, this radio is one step above junk.

make code signals audible as tones, a "Speaker-Phones" switch that transfers the set's audio between the internal side-mounted speaker and the phone jacks on the rear chassis apron.

Looking at the schematic diagram, you'll notice that the "Receive-Standby" switch mutes the radio by the harsh expedient of shorting the plate of the 12AV6 first audio/avc/detector tube (V-3) to ground. Wonder why they chose that method! The action of the "AM-CW" switch is also interesting. In more sophisticated radios, there is a special "beat frequency oscillator" circuit generating a signal that mixes – or "beats" – with the i.f. signal to superimpose a whistle or "beat note" on the received code signal. But, in the SW-54, turning the switch to "CW" simply adds a little feedback, or regeneration, to the i.f. channel at V-2 – giving the same effect. Of course, with this simple method, there is no way to adjust the pitch of the received CW signal.

A further refinement is the bandspread dial that allows pin-point setting of the main slide-rule tuning scale at positions between its very close-together calibrations. This is not an electrical bandspread as in the competing Hallicrafters S-38 models – nor is it a mechanical vernier drive. It is simply an extra rotary scale that makes the position of the main tuning knob easier to estimate. A thumbwheel marked "bandspread" is also provided, but this is not a vernier drive either. It is simply another way of moving the main tuning knob.

◆ Taking Stock

The hammertone grey finish of the SW-54's cabinet is quite dull and is scuffed down to the metal in a few places. There are polishing marks that suggest someone's effort to bring the finish back with something a little too abrasive. In a couple of places there are small dots of corrosion. The white pigment in the engraved lettering of the switches and dials is yellowed and dirty, and the cabinet's matching metal back is missing, as are the volume control and bandswitch knobs. I'm reasonably sure the dim labels can be restored with lacquer in paint or stick form. I also feel that some careful and informed polishing will do a lot towards making the cabinet look presentable.

The missing knobs and back, plus the fact that two of the four chassis retaining screws had been left loose, suggests that an earlier attempt to repair this radio had been abandoned in disgust. Removing a Masonite access "plate" from the bottom of the cabinet gave me a complete view of the underside of the chassis – which looked fairly clean. A careful inspection revealed no burned or charred parts and no sign of those obvious owner modifications or botched repair attempts

that can be so disheartening.

Removing the chassis from the cabinet revealed no further surprises, except that the chassis' upper surface was coated with grime and corrosion that was (thankfully) absent below. The chassis appears to be made of copper, or a copper-colored alloy of some sort. However, if the corroded areas don't come clean easily I may be able to find a metallic copper paint that will provide a cosmetically decent finish.

After I purchased the little National at a radio meet a few years ago, I was carrying it back to the car when I heard a cheery voice calling, "How about a parts set for the SW-54?" I looked up and saw a smiling gentleman holding the same model in absolutely wretched condition. The chassis, though very dirty, was electrically complete – even to the tubes. The cabinet was filthy, scratched and rusted beyond belief. But – rusted as it was, the back was there – and so were the missing knobs! I gladly purchased it for five bucks, and it now waits in the wings, ready to supply any hard-to-find parts I may need in restoring the original set.

I've been able to obtain parts sets for several of the communications receivers I have in storage waiting to be subjects for restoration. In many cases, the parts set is almost as good as the original – and I know I'm going to hesitate to sacrifice it if it is necessary to strip off a crucial component. In this case, though, there will be no guilt pangs! The parts set is truly shot beyond redemption!

However, in one of those "good news-bad news" scenarios so common in the confusion of a busy radio meet, one of the knobs I acquired with the parts set disappeared on the way to my car! It was loose on its shaft and must have slipped off and rolled away under someone's table in the crowded parking lot. I only hope someone found it who can make use of it! I kept my eyes open for replacements during the rest of the meet and was fortunate enough to find a pair that was physically almost a perfect match but a little too greenish in color. I hope to resolve that problem with a dash of the same gray spray paint I'll be using to refinish the cabinet back!

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Antennas Across the Radio Spectrum Part Three: VHF, UHF, and Microwave Bands

In this third and final “Antennas Across the Spectrum” column we move on to wavelengths where the longest are something like 30 feet (just over 9 meters), and the shortest are measured in inches, or centimeters. Antenna elements on these bands are much smaller than on the lower bands, so the overall physical size of the antennas can be much smaller than on lower frequencies. This decrease in element size also allows a very significant increase in the complexity of practical antenna designs which can be constructed for these higher frequencies.

◆ The Importance of Wave Propagation on Antenna Design

Whereas groundwave propagation is the dominant propagation mode at MF and lower frequencies, and sky waves are the major mode on the HF band, line-of-sight (LOS) communication becomes ever more prominent as we progress upward in the VHF band and on to the microwaves. This is because as frequency increases, ground wave strength diminishes, and the ionosphere becomes more and more

transparent to radio waves. Thus ground waves cover progressively less distance as frequency rises, and fewer and fewer sky waves are returned to earth.

Although at times communication will occur via sky waves at the lower VHF frequencies, such paths do not have the relatively-predictable, relatively-dependable nature found lower on the HF band. Most antennas at these higher frequencies are designed for LOS communication out to the radio horizon, air to ground communication, and space-probe and communication satellite up and down links.

Non-LOS paths at these frequencies include aurora reflection, meteor scatter, sporadic-E, and ducting; these modes are based on unreliable conditions, and are little utilized compared to LOS.

Reliable, non-LOS communication paths of several hundred miles can be achieved by tropospheric scatter propagation. When RF energy encounters the troposphere the energy scatters, and a small portion of this energy returns to earth beyond the radio horizon. This mode requires very high power levels, very sensitive receivers, and very-directional, high-

gain antennas. Troposcatter is utilized primarily by the military.

Terrestrial repeaters extend the local LOS by having their antennas on high sites such as tall buildings or mountains so that they can “see” for long distances. These repeaters thereby supplant the LOS of a repeater-user on lower ground with their own more extended LOS. Mobile and pedestrian stations for repeater-based communications usually employ small, non-directional, low-to-modest gain antennas. Repeater base-stations often utilize larger, directional or non-directional antennas with substantial gain. Chains of mountain-top repeaters are utilized to support transcontinental communication links.

Communication satellites are extreme examples of repeater extension of LOS allowing communication paths covering large portions of a continent. Highly-directional, high-gain beam antennas are needed for both uplink and downlink for satellites.

Passive-repeater antennas, essentially large, conductive surfaces much like a large billboard, can be used to simply reflect signals around obstacles, such as buildings or hills, which obstruct the LOS.

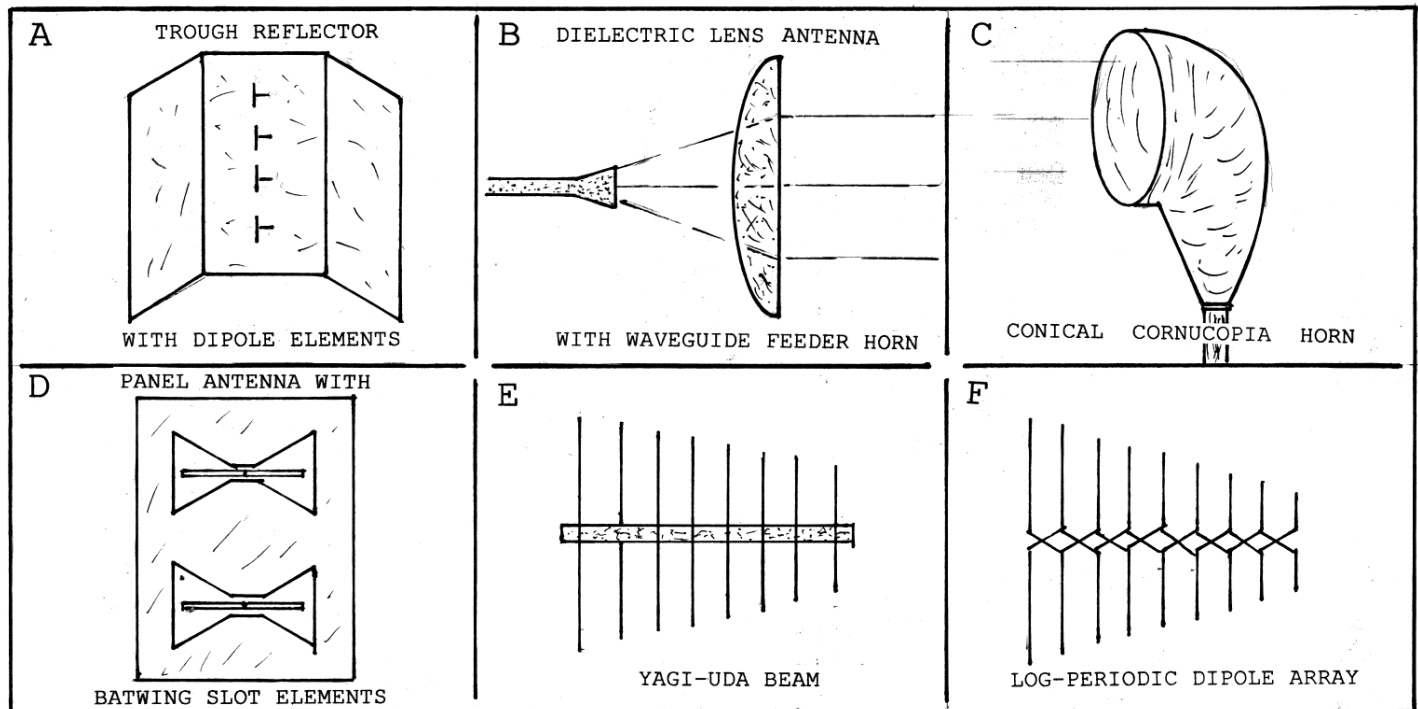


Fig. 1. A few of the many antenna designs utilized at VHF and higher frequencies.

This Month's Interesting Antenna-Related

Web site:

What is a "smart" antenna? Check http://www.arraycomm.com/Technology/Smart_tech.html for an interesting tutorial to find out. Send in your suggestions for inclusion here as an interesting antenna-related web site to: clemsmall@hotmail.com.

◆ Transmitting Antennas for VHF and Higher Frequencies

Base stations which must communicate in many directions typically have a non-directive, vertical antenna. Depending on requirements they may be simple groundplane or J-antennas, a groundplane antenna with gain such as the collinear, other multi-element groundplane antennas, or a vertically-polarized dipole or non-directional dipole array. Base stations working specific directional paths often utilize Yagi, or Yagi-Uda beams, log-periodic arrays, corner-reflector, trough-reflector, or directional dipole arrays.

At UHF, and particularly microwave frequencies, the various dish-reflector antennas are common. The feeder antennas utilized at the focal point of these reflectors range from simple dipoles to tiny Yagi-Udas, to the various open-ended wave-guide type antennas. Vertical antenna-polarization is generally the de facto standard on these frequencies. Circular antenna-polarization for satellite antennas, and horizontal polarization for television broadcasting are notable exceptions.

In the microwave region in particular the tiny wavelengths support design of antennas such as horns, slots, planar, and helical antennas. For radar installations highly-directive beams are needed; often very-large reflector antennas are utilized for this. A variety of very complex microwave, radar antenna designs have been developed, some with many elements which can be electronically phase shifted to control the antennas directional characteristics.

Mobile and pedestrian antennas range from the short, loaded, very-low gain, "rubber-duck" type or whips mounted on the transceiver, through the various levels of gain and vertical directivity offered by the different groundplane antenna configurations on mobile units. For more demanding situations Yagi, Yagi-Uda, LPDA (log-periodic dipole array), dish-reflector, or other beams may be employed on mobile units. In small transceivers such as cell phones, pagers, and cordless phones the antenna is sometimes merely a small component on the circuit board, and entirely contained within the phone case.

◆ Receiving Antennas for VHF and Higher Frequencies

In many installations the transmit antenna is also used as the receive antenna, and so the antenna information in the preceding section describes the receiving antenna as well as the

transmitting antenna for many applications. In simple receive-only installations, vertical whips or rubber duck antennas installed on the receiver itself are common. Active, desktop antennas, while not as common as on the lower bands, find some application. Where more gain or directionality is needed for greater coverage, outdoor groundplanes, dipoles, or beams may be utilized.

The antennas used in radio astronomy are typically some type of beam. These range from axial-mode, helical antennas to monstrous reflector antennas with very-high gain and directivity.

◆ In Closing

A wide variety of designs have been developed across the more than a century during which antenna technology has existed. We have necessarily dealt with only the more common ones in this survey. The interested reader can find many more types covered in detail in comprehensive antenna-engineering handbooks such as *The Antenna Engineering Handbook**, or *The Handbook of Antenna Design***.

◆ You Might be the Winner!

Do you know of an antenna that is quite different in appearance or function from the ordinary antennas we see everyday in the cities and countryside. One highly unusual or even weird? If you do send me a photo or sketch of it, any information you have on the antenna, and your reasons for choosing this antenna for entry in our contest. We'll publish the entry I judge most appropriate in this column, and award an antenna book to the winner!



Last Month:

I said: "Who first convincingly demonstrated to scientists the electromagnetic waves we now call "radio waves?" As you may know this was "Henrik Hertz." In the early days of wireless, electromagnetic waves were called "Hertzian Waves" in his honor. The measurement of frequency in hertz, kilohertz, megahertz, and so on similarly pays tribute to this great scientist.

Another scientist, Amos E. Dolbear, actually preceded Hertz in displaying the action of electromagnetic waves to scientists, but the learned men of those days convinced Dolbear that he was displaying induction rather than radiation. Thus he did not pursue the matter. Hertz, working with predictions from Maxwell's equations on electrical and magnetic phenomena, produced a more convincing demonstration than Dolbear, and thus Hertz is remembered while Dolbear is all but forgotten.

This Month:

Marconi is generally considered to be the inventor of the wireless communication which we now call "radio." But successful wireless communication systems other than radio were developed prior to Marconi's. What electrical phenomena were the basis of these various earlier wireless systems?

You'll find an answer for this month's riddle, another interesting, antenna-related web site, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

**Antenna Engineering Handbook*, Henry Jasik. 1961. This book has gone through several editions. McGraw Hill, New York.

***The Handbook of Antenna Design*. Rudge et al, 1982, Peter Peregrinus Ltd., London, UK. This handbook probably also has several editions.

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What's After ACARS?

Boy, I remember when ACARS (Aircraft Communications Addressing and Reporting System) was state of the art avionics communications. It was the mid 1970s and the PC revolution was in its infancy; and so was digital communication in commercial aviation. As an avid and very active pilot, I often flew through the crowded New York City airspace. One day around this time, I was about to return to my home airport after spending a weekend in the New York area. I was shocked to hear the air traffic controller (ATC) at New York Center tell me I could not proceed into the New York TCA (Terminal Control Area)! In other words, I could no longer travel in the air space around New York City. While my aircraft was tied down and I was partying, the age of digital data communications had come to all US aviation.



The author hugs his mother before departing the Republic Airport, Long Island, circa 1976.

◆ The Roots of Aviation Digital Communications

In high traffic airspace, radar is used by ATC to locate and insure separation of air traffic. I'm sure you would agree that this is a very critical operation. Radar operates by transmitting a signal and then "listening" for its reflection from aircraft. However, as aircraft traffic became heavier, air speeds increased, and large building construction blossomed, these reflection radar returns became less reliable. With hundreds, thousands, of lives at stake, civil aviation took a page out of the military aviation book for more reliable aircraft tracking.

In the waning years of World War II, the military developed a method to identify the good guy aircraft from the bad. Instead of receiving the radar reflection or the echo from the target aircraft, the new IFF (Identification Friend or Foe) system looked for a different

signal. Good Guy aircraft were equipped with a receiver which listened for the initial ground-based transmitted radar signal. Once the ground radar signal was detected, the aircraft would transmit a signal encoded with a simple digital number manually set by the aircrew. Each day before their mission a valid "friend" number would be given to the aircrew by headquarters. The system not only provided positive identification of friendly aircraft, it also provided an aircraft return signal which was much stronger than a radar reflection. Therefore, it was found that reliable tracking range was increased and ground reflections became less of a problem. The piece of equipment listening for the radar signal and transmitting the resulting coded transmission was called a transponder.

During the 1970s the radar transponder became a mandatory piece of avionics for aircraft that wanted to fly into the area of many large US cities. The military transponder of 1950 was the APX-6 – a sixty-pound, huge, expensive, rack-mounted monster. By the 1970s the transponder evolved to the size of an aircraft transceiver, at about the same cost.

The number codes (assigned to the aircraft by ATC) dialed in by pilots were used by ATC to uniquely identify the aircraft. The air traffic controller manually "attached" the code to the transponder return on their radar screen display. Not quite digital data or automated communications, but a great advance over simple radar.

◆ But Why Couldn't I Fly Home?

By the 1970s, the aircraft industry realized that some voice messages could be replaced by digital data communication. ATC's most critical information, after position, was altitude. So, inexpensive encoding altimeter-

transponders were developed. This equipment converted the aircraft's altitude reading into digital data. This was then sent to the transponder and transmitted to the ground as a digital word along with the aircraft's assigned transponder numbers. Thus, one quick transmission reliably replaced lots of voice transmissions.

That weekend, while I was enjoying friends and family, encoding altimeter and transponders became required for flying in the New York TCA.

ACARS was launched in 1978 for communications between commercial aircraft and their company's operations center. This enabled the airline companies to modify and update schedules and aircraft utilization. ATC centers found that this information was also valuable to their routing controllers. Thus ACARS became a hit with the companies and ATC.

◆ What is ACARS?

ACARS transmissions can be heard near the top end of the VHF airband around 130 MHz. ACARS utilizes amplitude modulation and a two-tone shift keying. Its tones are centered at 1200 and 2400 Hz. The ACARS bit rate is 2400 bps. The data is transmitted as ASCII characters using 7 data + 1 parity bit configuration. Software is available from a number of sources. Some utilize dedicated serial port decoders connected to the audio output of a radio. Other software only requires that the audio be connected to the computer's sound card. AOR even has a calculator-size unit that decodes and displays ACARS messages without the need of a computer. Check out this site for VHF ACARS decoder program link and lots of ACARS information: <http://patriot.net/~acars/index.htm>

Shortwave ACARS-like data bursts have been reported in the HF aeronautical bands on 8912, 11312, 17919 and 21934 kHz. However, VHF ACARS decoders have not been successful in decoding them. Also, it has been noted that a constant tone sometimes precedes the data. These are part of the GLOBALink network.

Aeronautical Radio Inc., (ARINC), responsible for managing many aircraft communications sites, has introduced an ACARS service without the limitation that is associ-



Pre-flight routine in preparation for one of many New York to Syracuse flights – before ACARS.

ated with VHF transmission. This service, GLOBALink, utilizes a network of satellites and VHF/HF ground stations to obtain near-global ACARS coverage. So, the twenty-three year old ACARS is growing in popularity. Even the military has recently shown interest in ACARS.

ACARS has proven to be very successful; perhaps too successful. The main problem with ACARS today is QRM. That is, lots of aircraft transmitting ACARS simultaneously. The result is frequency crowding with multiple transmissions required from each aircraft in order to get through the ACARS "pile-up."

◆ Enter the 21st Century & VDLs

A number of new data communications methods have been proposed by various companies. It appears at this time that VHF Data Link (VDL) systems will be adopted in the near future. Currently, VDL has four different modes of communications. Modes 1 and 2 have gone through their testing phase and are being readied for use. Mode 2 is what ACARS data is destined to become.

Mode 1 and 2 solve the crowded frequency problem by utilizing a method which greatly reduces QRM. These modes listen to all users of a channel *before* transmitting. This will minimize "step-ons" and retransmissions. Using this CSMA (carrier sense multiple access) method Mode 1 has a 2400 bps data rate, while Mode 2 zips along at 31,500 bps. Therefore, the VDL Mode 2 replacement for the current ACARS greatly decreases the need for multiple transmissions by reducing simultaneous transmissions, while greatly increasing data rates.

VDL Mode 2 will not only be used for ACARS aircraft reporting data, it will also provide a data link between controllers and pilots. VDL Mode 2 will begin testing and

certification in Miami, Florida, in 2002 by American Airlines and the Federal Aviation Administration (FAA). The first test program will be limited to four message types similar to the current ACARS: Initial contact, Controller-handoffs, Altimeter information and Text. If all goes well, the plan is to have it operational throughout the US in 2005 with more than 18 message types and 170 US ground stations.

◆ Total Digital Air Communications

The aviation world will have to wait for Mode 3 development for complete digital voice and data communications. This 31,500 bps mode is capable of full voice and data communications, utilizing the more spectrum-efficient time division multiple access (TDMA) method.

Mode 3 uses a modified eight phase shift keying method with differential encoding. This method allows up to five TDMA voice channels to occupy the same bandwidth that a single voice channel requires today. Since Mode 3 is voice *and* data capable it is also being readied as a contingency in the event that Mode 2 does not live up to its expectations.

These VDL modes will be used for so much more, including GPS updates, linking ground radar to in-cockpit displays and collision avoidance, to name a few.

Of course, the US is not alone in evaluating and deploying these digital networks. The European Union, along with companies in France, Sweden, UK and Germany, are working on similar digital communications systems for commercial aircraft.

Look for Mode 3, the complete digital aircraft communications system, to totally phase out analogue voice in six years, around 2007.

◆ Radio Shack's Air Digital Mode Scanner

...Only kidding! It's too soon to say exactly how the whole aircraft communications will look in the future. It is evolving quickly, but nothing can substitute for real world testing. Although VDL Modes are undergoing testing, alternative methods have been proposed and fielded by competitive companies.

What is sure is that ACARS' time is coming to an end. Wow! Those twenty-three years sure went fast!

Coming up, I have a whole stable of new products and software that I'm sure you will find inventive and useful – from something as simple as being able to plug lots of wall wart power cubes into a single power strip, to saving money on your second Internet dedicated phone line. See you next time.

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Create your own "Old Time" memories with MFJ'S 8100 Shortwave Regenerative Receiver

Not many of us were around in the early days of broadcast radio, but we've all heard stories about the regenerative receiver and the impact it had on the fledgling radio industry. The thrill of listening to the local radio station on a crystal set soon gave way to the urge to hear distant stations. It was discovered that, using an amplifying tube and feeding the detected signal back into the tube's input, and controlling the ensuing *regeneration*, the receiver became much more sensitive. Now it was possible to tune in stations from far away, and the never ending search for DX began.

However, just as with today's computer engineers, yesterday's radio engineers were not happy with the regenerative receiver. Before long there was the Regenerative Receiver 1.1: The Superheterodyne receiver. The general radio industry never looked back. But, because of its simple design – basically an amplified crystal set – the regenerative receiver retained a place among radio hobbyists who enjoyed building and using them throughout the decades.

One of the reasons for the regenerative's popularity today is that it's the easiest way to receive CW and SSB transmissions used by amateur radio operators. This is in addition to being able to pick up the powerhouse AM broadcasters on the shortwave bands. In short, the old regenerative receiver is still the simplest, all-purpose radio for today's listener which also happens to be the smallest and cheapest radio of its kind on the market.

◆ The MFJ-8100

Virtually buried in its amazing inventory of products lies MFJ's 8100 World Band Shortwave Radio. This unassuming radio, with its tiny footprint and homespun look, gets overlooked by most radio enthusiasts because it's, well, too simple. Sporting just four knobs and one button, this radio is easy to miss. Who would believe that with just twenty feet of wire attached to the back, this radio could

bring in the world's shortwave voices on the 49, 31, 21, 19, and 16 meter broadcast bands and the 80/75, 40, 30, 20, 17, and 15 meter ham bands? It's amazing.

With its simple, silk-screened, semi-circle dial and plastic slide rule indicator attached to a 6:1 vernier tuning knob, surfing the shortwave bands is incredibly easy. The five position band switch allows you to quickly jump from 80 meter CW to 16 meter shortwave broadcasts with little effort. Yet the precision of the knob and clean separation in the tuning circuit makes distinguishing individual CW transmissions on the congested ham

bands a breeze.

Of course, the main attraction of this radio is the regeneration knob, and I'll admit it took me a few minutes to get the hang of it. My wife had to come in and ask what all the howling and squealing was for, "Does it have to make that noise?" she asked. Well, no. With a little practice it's possible to set the regeneration once in one band and tune all the broadcasters in that band without retouching the regeneration dial – no more howling.

At only 7" x 6" x 2-1/2" and just under 2 pounds, the 8100 takes up very little desk space. In fact, it could be an excellent travel radio. Powered by an in-board 9 volt battery, this radio would take up very little luggage or backpack space as well. With 10 or 20 feet of hook-up wire and a clothes pin you can still tune in the BBC World Service in the middle of nowhere with no access to power.

◆ What's Missing

You're missing the point if you're looking for bells and whistles from this little rig, but I'll detail the shortcomings anyway. It doesn't have a signal strength meter (Who cares? You can tell whether or not you can hear the signals), no digital tuning indicator (Well, we're all spoiled by knowing exactly where we are at all times, big deal!), no AM broadcast band (So? Don't you already have one?), no FM band (Are you kidding?), no speaker (That's right, you have to plug in your own Walkman style headphones or small speaker), and no power supply (It doesn't need one, it runs for hours on one 9 volt battery).

I also found that this unit was susceptible to interference from nearby computers, so it's not a good candidate for tuning in digital transmissions such as WEFAX, RTTY, or SSTV. But, that's alright because you would need a much better receiver for that anyway. And, while you can run a small Walkman style speaker set from the audio output, you'll be much happier using a pair of amplified speakers for non-headphone listening.

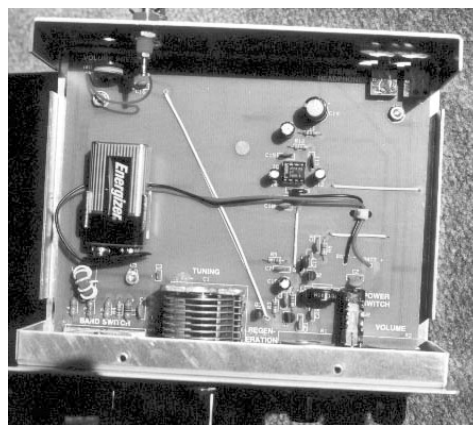
◆ Using the 8100

Once I got the 8100 out of its box, I scrounged up a pair of headphones, opened the 8100's enclosure and slipped a fresh 9 volt battery into the convenient holder. It's recommended that, for extensive use, you mount the battery holder on the back of the receiver. Taking off and replacing the 8 screws on the cabinet just to change the battery is inconvenient.

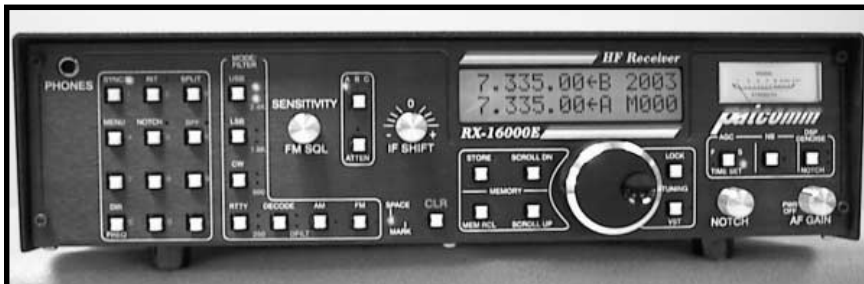
Now to put this little receiver through its paces. For indoor test purposes I used a Grundig AN-03 Compact Antenna and for outside antenna testing I used a 137-ft. all band ham antenna. Reception was obviously better on the large outdoor antenna, but I was impressed with what



The MFJ 8100 World Band Shortwave Radio: small, simple to use and inexpensive it tunes 49-16 meters broadcast bands and 80-15 meters on the ham bands. (Courtesy MFJ Enterprises)



Inside the MFJ 8100 as wired by the pros. Tempted by the small number of parts and easy layout? You can wire it yourself with the kit version and save \$20! (Courtesy Ken Reitz)



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I was hearing on the AN-03. There was plenty of action on the ham bands and good listening on the broadcast bands as well. Still, even with the outdoor antenna the 8100 could not match the capabilities of the receiver portion of my Kenwood TS-140, nor should we expect it to. The 8100 costs hundreds less.

There's a little bit of a knack to tuning a regenerative receiver. It takes a steady hand making very small adjustments to zero in on the signal. Once you get used to it, it's actually kind of fun. You'll notice that the print on the dial is very small and you may have to invest in a pair of reading glasses to see where you are.

◆ 8100's Two Options

One of the great things about the 8100 is that it's offered by MFJ as a fully wired and tested unit or as a kit. The big advantage of the kit is that it's \$20 less. The big disadvantage with the kit is that it's a kit. If you're not handy with a soldering iron; can't tell which end is up in a pictorial diagram; have difficulty picking up tiny little components with big fingers; are prone to confusion or have poor eyesight, my advice is to let MFJ do the wiring. Give them the extra \$20 with a smile on your face. This is not the kit on which a raw beginner should start out.

If, on the other hand, you enjoy putting kits together this is a great radio to add to your collection. This is especially true if you are a ham and have already put together one of the numerous QRP transmitter kits available today. You will need a transmit/receive switch to avoid damaging the receiver when keying up.

Either way, the 8100 comes with a well-written 20-page 8-1/2 x 11-in. instruction manual which explains in complete detail how the regenerative receiver works. Receiver controls and connections are thoroughly explained as is exactly how to use the regenera-

tion feature on this radio. There's an informative description of the various bands tuned by this radio for the shortwave newcomer as well as a sample SWL logging page which can be duplicated to keep track of your own DX journeys. A complete parts list, parts diagram, and schematic diagram are also included. For advanced experimenters there are tips on modifications for adding the 12 and 10 meter ham bands to the unit.

◆ The Last Word

Innovations in electronic communications have taken amazing twists throughout the last 100 years. At a time when stand-alone Internet radio and satellite-delivered radio wow the techno-savvy crowds at the Consumer Electronics Show, here's a radio brandishing 80 year old technology and doing an amazing thing: delivering the voices of the world in real time, 24/7, with no user fees, and it's even wireless! You get all this for about the price of a couple of months on your local ISP.

If you've been looking for a radio to get started in the shortwave listening hobby, the MFJ 8100 is a great place to start. Compact and easy to use, the 8100's ability to tune CW and SSB make it a versatile receiver. At \$89.95 for the prewired version (MFJ-8100W) and \$69.95 for the kit (MFJ-8100K), this radio represents an excellent listening value. You could easily spend much more for a radio with AM/CW/SSB tuning capability. Yet, the 8100's size and weight easily lend it to portable operation for SWL or in an amateur radio station configuration. That makes it a great little radio for the beginner and old hand alike.

For more information on the MFJ-8100 visit their web site at <http://www.mfjenterprises.com>, call 800-647-1800 or write MFJ Enterprises, Box 494, Mississippi State, MS 39762.

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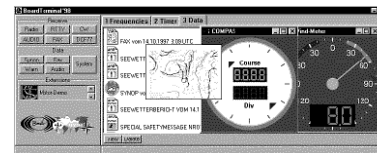
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Yaesu VR-5000

Yaesu's wide spectrum multimode VR-5000 receiver is in the same price class as the AOR AR8600 reviewed in February and April *MT*. Both radios are built in Japan and tune frequencies from VLF to over 2400 MHz. Both models receive AM, FM, SSB, and CW signals and support three AM bandwidths. The AR8600 provides three FM bandwidth selections versus two for the VR-5000.

Like the AR8600, the VR-5000 is powered by 12 - 14 VDC or from the AC mains using the provided wall wart power supply. A telescoping antenna is included, but no mobile mounting bracket is supplied or mentioned in the user manual.

Extra cost options include a digital signal processor (DSP-1), voice recorder (DVS-4), and a speech board (FVS-1A). We tested VR-5000 serial number 0L040004, but have none of the options to evaluate.

The VR-5000 operating manual leaves out so much information, we had to learn how to use the radio by experimentation. For example, there's no explanation of the screen icons so we had to guess at their meanings. The Yaesu customer service representative we contacted was aware of the deficiency and expects an updated manual to be forthcoming.

◆ VFOs, Memory, Scanning, and Searching

The VR5000 has two VFO-controlled receiver sections which provide dual receive capability. It can receive AM or FM signals on two different frequencies simultaneously, as long as they are within 20 MHz of each other. The AR8600's tuning step may be selected from factory presets between 50 Hz and

999.95 kHz, including the new European air band channelization of 8.33 kHz. The VR-5000 provides several step size choices, but they are restricted depending on mode. It lacks an 8.33 kHz step and provides no way to program a custom step size.

Our VR-5000, like the AR8600, often stops a few kHz away from a signal's center frequency during VFO and limit searches. Frequencies may be skipped, but the VR-5000 manual doesn't discuss this. There are 50 pairs of search limits available. They can be linked together and the attenuator, rescan parameters, steps, and mode settings can differ for each one. We have trouble programming the search limits without overwriting them with the VFO frequency but don't know if this is due to a firmware bug or mistakes in the operating manual.



A silent Auto Store (Smart Search) facility searches between limits and stores active frequencies into a special memory bank.

The VR-5000's memory capacity is enormous. Its 2000 memory channels are divided into 100 banks, designated 00, 01, 02 etc. Each bank holds 20 channels and cannot be expanded.

An alphanumeric label can be programmed for each memory channel, memory bank, and search bank. Banks can be scanned individually or in combination. Band switching relays make a clickety-

click noise while scanning a mixture of frequencies in different bands, reminiscent of the ICOM IC-R8500. We found the VR-5000's band switching boundaries at 622, 1240, and 1850 MHz.

◆ Physical

The VR-5000 is well built in a metal cabinet with sculpted plastic front panel. The tuning knob has a detent action and is easier to use than the AR8600's smaller knob. The black on white LCD display is brightly lit, and you can adjust the LCD contrast to suit, though the white background is harsh on the eyes. The small keys are close together and are not backlit.

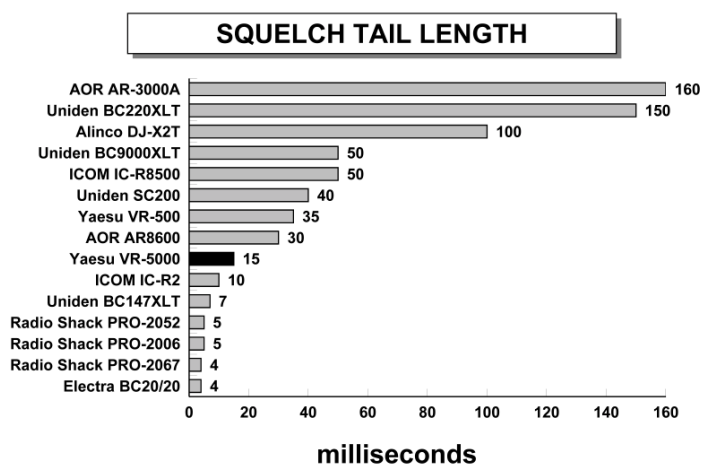
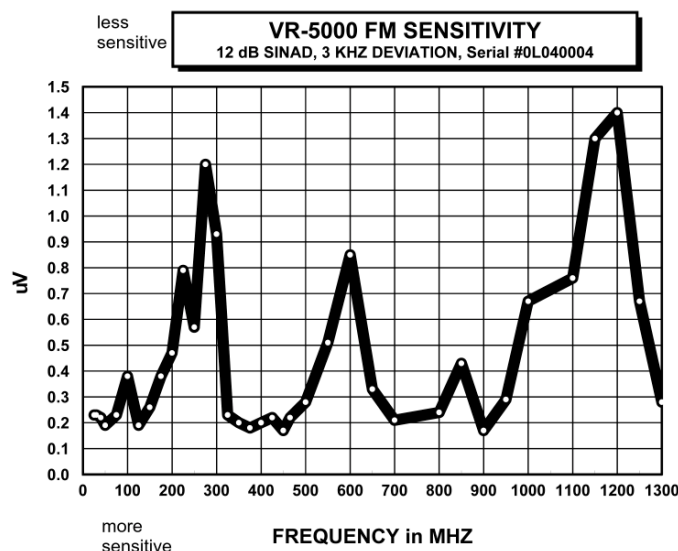
The rear panel holds two antenna connectors and a tiny slide switch to choose between them. One jack is a 50 Ohm SO-239 and the other is a pair of spring loaded terminals intended for a high impedance antenna. Most VHF/UHF receivers use a BNC or N connector instead of an SO-239.

The VR-5000 is fitted with a standard DB9 connector intended for cloning or connecting a computer to control frequency and mode. The operating manual documents the computer commands, a refreshing change from the undocumented VR-500 interface.

A 10.7 MHz IF output jack provides a 250 kHz (@10 dB) wide view, as verified by connecting an HP spectrum analyzer. Jacks for external speaker, low-level audio output, and mute control also adorn the rear panel.

◆ Performance

Our VR-5000 performs better below 30 MHz than the AR8600 we reviewed. That said, both radios experience intermod from AM broadcast sta-



Notes:
One sample of each model tested.
Produced by a 155 MHz, 1uV unmodulated signal.
Squelch control set beyond threshold in NFM mode.

Copyright 2001, Bob Parnass, AJ9S

tions. The VR-5000's AGC decay time is too fast for normal sounding SSB reception, permitting background noise to be heard in between syllables.

Video signals from television channel 38 (615.25 MHz) enter our VR-5000's 1st IF, causing loud buzzing sounds when tuning frequencies at 5 MHz multiples above 300 MHz. The obnoxious noise is almost 500 kHz wide, so we hear it in the ranges of 300 - 300.5, 305 - 305.5, 310 - 310.5 MHz, to well above 900 MHz.

The VR-5000 employs a variable 1st IF of 610 - 615 MHz, which coincides with frequencies used by UHF television channels 37 and 38. Our VR-5000's IF rejection measures only 12 dB at 460 MHz and 6 dB at 860 MHz. The channel 38 transmitter is located on a building 36 miles away. If you live in an area served by television channels 37 or 38 and experience the same problem, try add-

ing a single channel wave trap between the VR-5000 and the antenna.

Other VHF/UHF reception glitches include intermod from a 162.4 NOAA weather transmitter in the VHF-high band and 930 MHz range. The nearest cellular phone base station is one mile away and a few cellular phone signals break through the 903 - 908 MHz range. Strong FM broadcast stations appear 13.65 MHz above their assigned frequencies and this interferes with our aircraft monitoring.

We measured a scan rate of 13 channels/sec for the VR-5000 and AR8600. Our VR-5000 searches at about 15 steps/sec. Measurements show the VR-5000 20 dB attenuator to be consistent across a wide range of frequencies and this is unusual for a consumer grade receiver.

While it cannot compare with the quick sweep of an authentic spectrum analyzer, the VR-5000's

bandscope is the best we've seen. It's fast, easy to use, and the audio is not muted during operation. You can tune the main receiver VFO while observing neighboring signals on the band scope.

◆ Wrap-up

Our VR-5000's performance is commensurate with its price. Pundits who predicted that the VR-5000 would be as good a performer as the ICOM IC-R8500 for less money were only half-right. The ICOM cost us dearly, but its intermod immunity and AGC action are head and shoulders above our VR-5000.

Our VR-5000 is fun to use except for the television channel 38 interference. This model is full of features and we find it easier to operate than the AR8600.

Measurements

Yaesu VR-5000 Receiver S/N 0L040004

Retail price \$900

Yaesu USA, 17210 Edwards Rd., Cerritos, CA 90703

Frequency coverage (MHz):

0.100 - 2600 with gaps
at 824 - 849 and 869 - 894

Modes:

USB, LSB, CW, NAM, AM, WAM, FM, WFM

Steps:

USB/LSB/CW: 20, 100, 500, 1000, 5000 Hz
NAM/AM/WAM: 1, 5, 9, 10, 20, 25, 50, 100, 500 kHz
NFM: 5, 6.25, 10, 12.5, 20, 25, 50, 100, 500 kHz

NFM modulation acceptance: 10 kHz

Attenuator:

19 dB @ 14 MHz
19 dB @ 40 MHz
19 dB @ 155 MHz
20 dB @ 460 MHz
17 dB @ 860 MHz

Intermediate Frequencies, main receiver (MHz):

1) 610 - 615
2) 45.75
3) 10.7
4) 0.455 (except WFM)

IF output jack:

10.7 MHz, 250 kHz bandwidth
at 10 dB down

IF rejection at 1st IF:

89 dB @ 40 MHz
40 dB @ 155 MHz
12 dB @ 460 MHz
6 dB @ 860 MHz

Audio output power, measured at speaker jack:
more than 1.1 W @ 10% distortion

Squelch tail near threshold (1 μ V @ 155 MHz): 15 ms.

Practical memory scan speed: 13 channels/sec.

Search speed: 15 steps/sec.

Band switching relays at (MHz):

622, 1240, 1850

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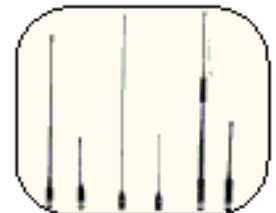
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The Coleman CR-411 FRS Handitalkie

You would have to have been (a) living in a cave, (b) cryogenically snoozing on a deep space mission, or (c) consorting with the tribes of the New Guinea highlands to not know that Family Radio Service (FRS) is becoming a Big Deal, at least in the United States.

Step into almost any discount store, and you'll find FRS handitalkies for sale, sometimes for as little as \$39.95 a pair. That's a far cry from the \$100-200 apiece of just a few years ago. FRS brands and models are proliferating like rabbits. It reminds me of the CB radio boom of the 1970s. When CB became hot, suddenly all kinds of unknown brands of CB equipment popped up – "Arlo's CBs" – and faded away just as quickly when the boom died down.

And that's a pretty good analogy, because where I sit, as a radio writer of some years experience, FRS is replacing CB – at least what CB was originally intended to do. CB, you'll recall, was intended for short-range communications to help people stay in touch as they were out and about doing their thing. It became a "hobby band" because it was located in the 11-meter DX band that had formerly belonged to ham radio. The possibility of unexpected long-range contact became both a curse and a blessing for CB.

Much of the intended function of CB – people staying in touch from automobiles with their homes and businesses – has now been taken over by cellular phones. But cell phones are an expensive solution for some communications tasks – like maintaining contact between two automobiles on a trip or keeping a scattered group of people in touch with each other at an amusement park or campsite. Recently I was involved in planning for a church conference, and we'll be using FRS radios to maintain a flow of information among team members scattered through three buildings.

Established in 1996, FRS operates on 14 frequencies:

Channel	MHz
1	462.5625
2	462.5875
3	462.6125
4	462.6375
5	462.6625
6	462.6875
7	462.7125
8	467.5625
9	467.5875
10	467.6125

11	467.6375
12	467.6625
13	467.6875
14	467.7125

Communications are limited by FCC rules to 1/2-watt maximum power in FM mode, with no external antennas.

The Coleman CR-411 is a perfect example of why FRS is becoming so popular. First, this FRS handitalkie is small, measuring just 3-3/4 inches high by 2 inches wide by 7/8 inch deep, excluding antenna and belt clip. You can slip it into your pocket or pack or clip it to your belt, and it will provide communications all day long, powered by four AAA alkaline batteries.

The CR-411 is very unimposing in its design; it almost looks like a toy, but it sure doesn't perform like one. On the front of the CR-411 is a speaker grill, a small liquid crystal display, four pushbuttons, and a tiny opening for the microphone. On the top of the radio is a stubby antenna that protrudes about an inch and an half from the top of the case.

On the left side of the case is a push to talk button and a monitor button that momentarily turns off the auto-squelch. On the right side of the case there is a jack for plugging a speaker microphone or headset. On the bottom, you'll find two contacts for use with rechargeable batteries and a drop-in charger. On the back of the radio is a detachable belt clip and a hatch for installing the batteries. That's it. This FRS unit could hardly be simpler.

But looks are deceiving. The CR-411 is loaded with performance features like Continuous Tone Coded Squelch System tones for screening out unwanted transmissions, a signal strength meter, auto channel scan, voice-activated transmission, battery level indicator, key lock, and even dual watch. Various features are accessed by pressing the F button the appropriate num-

ber of times and then using the UP and DOWN buttons to turn functions on and off.

The performance of the CR-411 is excellent. Audio on transmit and receive are exceptionally clear, and the communications range, over my standard test course, was within a few yards of the very best FRS units. The features and performance make the CR-411 worth the suggested retail price of \$79.95.

The units that I tested were packaged with a "deluxe backworn headset." With the built-in voice-activate transmission feature, it ought to be a Cool Thing. When I got it out of the package, I found I could not get this headset – which consists of bent vinyl-covered wire, a small earphone, and a smaller microphone on a flexible stalk – to fit my head. There were no adjustments. I called Wireless Marketing, the company that manufactures the CR-411, and complained.

They explained that this is a "backworn" headset – it goes around the back of the head and wraps around the front of yours, a bit like eyeglasses in reverse. It's the latest thing, they said. I tried it. It sort-of fit. There was no explanation of how it was to be worn, no photograph, no diagram. Even the front of the package shows a bicyclist talking into the handitalkie without using the headset.

The bottom line: I give the Coleman CR-411 my highest recommendation despite the cheesy headset. This is a terrific, durable radio that ought

to give years of satisfying service. (I managed to drop one from waist height and it never even whimpered. No, this is not part of the normal test routine). And if the "deluxe backworn headset" fits your noggin, consider it a bonus.



The Coleman CR-411 is a top-notch performer and excellent value despite the cheesy headset.

MT REVIEW

PAR AM Broadcast Filter & MON-3 VHF/UHF Antenna

by Bob Grove

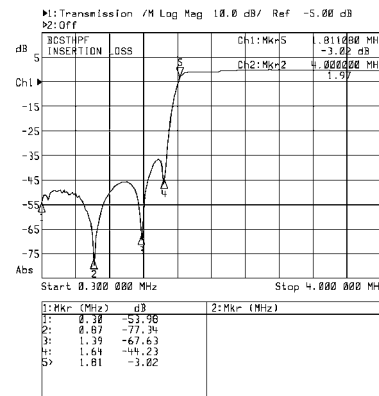
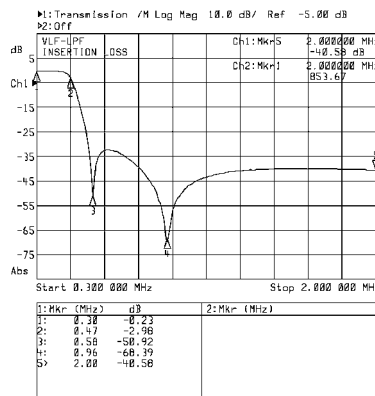


Strong-signal interference not only plagues scanner and shortwave listeners, but medium wave, tropical band, and 160 meter ham operators as well. Now PAR Electronics has come to the rescue with their new BCST-HPF AM broadcast filter.

As the product code suggests, this is a high-pass

filter designed to attenuate medium-wave AM broadcast signals; it is inserted in line with the antenna cable. Equipped with SO-239 bulk-head connectors, it's ready for attachment to PL-259-equipped coax.

With a razor-sharp cutoff at 1.8 MHz, the high-pass filter has an incredibly low 3 dB attenuation at 1.8 MHz, but a steep 50-80 dB swath is taken out of the medium-wave broadcast band and below. AM broadcasters don't stand a chance of causing problems with this filter! A handy toggle switch allows the filter to be bypassed entirely.



Does it Work?

You bet! We were bothered by a spurious intermod product right in the middle of the 160 meter ham band coming from two local power-house broadcasters. A flip of the switch and it was gone, with nothing remaining but pure, unattenuated 160 meter signals! A low-pass filter BCST-LPF is also available. Attenuation by each filter is as shown in the network analyzer plots.

PAR MON-3 VHF/UHF Antenna

Other than a new receiver, nothing seems to spark more interest among radio addicts than a new antenna! And PAR's new MON-3 is worthy of the attention. Using heavy-gauge aluminum elements and stainless steel screws, washers, and nuts, the MON-3 comes as a kit, requiring 15-30 minutes set aside for assembly. Only pliers are required.

Claiming 50-ohm-impedance center frequencies in the 144-174, 430-470, and 800-900 MHz bands, the MON-3 actually receives well outside those bands.

Test Results

One of the nicest antennas we've seen in quite a while is the AOR DA3000 discone, reviewed last year in *MT*. Since it was still in place in



our test fixture, we decided to compare the two. Numbers indicate S units of signals received on an Icom R8500 test receiver.

FREQ. MHz	DA3000	MON-3
27.185	6.5	7
49.69	0	2.5
72.745	6	5
88.1	3	6
109.8	9.5	8
144.390	5.5	5
152.91	trace	4
154.465	5	5
162.4	4.5	5
171.025	7	7
253.55	(trace)	(trace)
406.175	same	full quieting, no S reading
411.550	weak, no S reading	Very weak, no S reading
453.4	3.5	2
462.775	9	9+10 dB
499.7375	5	3
864.7375	(trace)	full quieting, no S reading
880.320	9	9
996.0125	good	(trace)

For further information and pricing on these products, contact: Par Electronics, Inc. PO Box 645 Glenville, NC 28736-0645. Voice: 828-743-1338 Fax: 828-743-1219 Email: par@parelectronics.com

Considering variables such as different cables and lengths, slight pattern differences, and time delays between switching out the antennas, we considered their performance to be very similar. A user would be hard pressed to choose between one or the other based upon signal reception.

What's NEW

Tell them you saw it in *Monitoring Times*

Hamtronics Low-Noise Receiver Preamps

Hamtronics, Inc., has been making preamplifiers for 38 years. Their new LNK series preamps are designed to use either by the receiver or at the antenna without extra wiring. The LNK series uses a new low-noise MOS FET which is specifically optimized for best performance at VHF and UHF frequencies. The FET has built-in diode protection and very low feedback capacitance, resulting in good stability and rugged performance.



Models are available for all popular bands from 28MHz to 470MHz, and alignment for your frequency is very easy. Gain ranges from 18 to 26dB, and noise figure ranges from 0.6 to 0.8dB, depending on frequency range.

Preamps are \$59 for a factory wired and tested unit. For more details, you can request a data sheet for the LNK preamp by writing to Hamtronics, Inc., 65-F Moul Rd, Hilton NY 14468-9535, or call 716-392-9430, or email jv@hamtronics.com. You can view the catalog at <http://www.hamtronics.com>. Please mention *MT* when you contact them.

Battery in a Bag

When you need long-term power away from the power grid, and cranking up the generator from the back of the pick-up truck isn't your idea of getting away from it all, Cutting Edge Enterprises has a number of solutions. Its latest offering is a simple 7.5 amp hour gel cell battery in a heavy duty nylon case and adjustable strap handle. The buckle-down lid has extra room in it for



accessories. The battery in a bag is only \$33.95 from CEE, 1803 Mission Street, Suite PMB-546, Santa Cruz, CA, 95060; 800-206-0115 or email info@powerportstore.com

Alinco FM Mobile/Base Transceivers

Two new models have been added to Alinco's amateur radio line, the DR-235 (222 MHz) and the DR-435 (440 MHz) FM mobile/base transceivers.

Both transceivers have a large, 7 character alphanumeric display, 100 memory channels, ignition key on/off feature, theft alarm feature, CTCSS and DCS encode/decode and DTMF encode functions. The new units can be ordered in either traditional black or classic pewter color schemes to blend with newer car interiors. Each unit is constructed in massive heat-sink chassis assemblies, negating the need for a cooling fan.

Digital operators can order the optional EJ-41U packet board that fits inside either transceiver. Operation requires no modifications to the radio and no need to remove the microphone.

The radios will also work with external TNC units connected to the



rear panel serial port. "This is important news for packet operators," said Mr. Nakata. "We are aware many packet networks use 222 and 440 MHz for linking digital systems. The DR-235 also has the ability to operate in the special 219~220 MHz allocation set aside for forwarding operations."

Another digital feature is a front panel Data Port that can be used for GPS input, cloning, or as part of the unit's anti-theft operation. The GPS input can be used for Automated Packet Reporting System operations.

The DR-235T features include 25/10/5 watt power output settings, extended receive from 216 ~ 280 MHz, transmits from 222 ~ 225 MHz, and has the ability to operate on MARS frequencies as well as the special digital allocation from 219 ~ 220 MHz. The memory channels can operate in any split frequency configuration, with transmission limited to the ham frequency allocation.

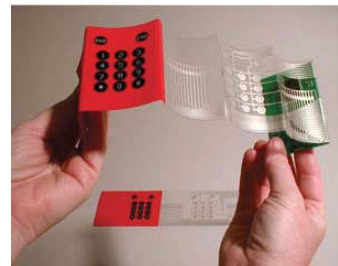
The DR-435T operates from 430 ~ 450 MHz, with extended receive from 350 ~ 511 MHz (FM) 35/10/5 watt output settings and the ability to operate odd repeater splits on any memory channel (transmits only 430 ~ 450 MHz).

Included with the new models, Alinco is also introducing a new feature-packed microphone, the EMS-57. In addition to basic microphone operation, the operator can use the backlit keypad to enter frequencies, and perform many transceiver functions.

Mr. Nakata added, "While the technology is impressive, Alinco has worked very hard to make the new transceivers affordable. We certainly hope the Amateur Radio community will take notice of the significant value found in these new offerings and use this opportunity to get active on these bands, particularly 222, where valuable spectrum was lost once before." MSRP for the DR-235 is \$335.95 though dealers are free to sell for less, and the DR-435 price was yet to be announced.

The Phone Card Card Phone!

Don't want to commit to the purchase of a cellular phone service but you'd like to have one just for emergencies or while traveling? A feisty entrepreneur named Randi Altshul is very close to production on the world's first disposable cellular phone – a tiny, prepaid phone that will support the four major global standards. Her new company, Dieceland Technology Corp (DTC) produced a working model of the Phone-Card-Phone(tm) early this year, within four months of receiving funding.



The Super Thin Technology used in the new concept also requires a special battery (4A) which is being designed by Duracell. Altshul expects the phone to sell for around \$10. For more information, go to <http://www.dtcproducts.com>

Never-fail battery backup

While disposable cellphones could become a staple in the car glove compartment, a brand-new product that's already on the market is the disposable mobile phone battery. When your battery loses its charge, you forgot to bring your charger, or for the rare emergency, Electric Fuel Corporation has invented a foil-wrapped, zinc-air battery that will last in storage as long as two years.

These batteries work with a large number of cellphone models. Talk time is longest with digital





phones – up to three to five times longer than with a standard rechargeable battery. Best of all, the battery is

completely recyclable with no hazardous components. The disposable battery can be found in the \$17 to \$22 price range from WalMart, Circuit City, CompUSA, and other retailers as well as online from <http://www.electric-fuel.com>.

Midland GMRS

According to Midland, their G-30 is currently the world's smallest and lightest full power 2 watt GMRS radio, providing up to a 5 mile transmission range over 15 channels and 38 sub-codes. Since the GMRS service



shares seven frequencies with FRS radios, you won't be out of touch with friends or family using standard FRS radios, but you'll have the added convenience

of extended range. Available individually in an eye-catching clam pack, suggested retail on the G-30 is \$149.95, including the free battery pack and desktop charger. An annual FCC license fee is required for operation. See their web site at <http://www.midlandradio.com> or call Midland at 816-241-8500 for a dealer near you.

Old Timer's Bulletin on CD

The Antique Wireless Association (AWA) is probably the largest organization of antique radio enthusiasts in the country. Formed in 1952 and first issuing a regular



newsletter in 1960, their current 4000 members enjoy a professionally-published 68 page magazine. Now, all the earliest volumes, from the first hand-printed sheets of

1952 through the larger editions of 1996, are available on two CD-ROMs.

Readable with Acrobat 4.0 (included), text and graphics are available in sharp 300 dpi detail. A complete index is included to cover the OTB and other AWA publications through February 2000. Volume 1 covers January 1960 through March 1985, and Volume 2 covers June 1985 through November 1996.

Check or money order made out to "AWA Museum" for \$49.95 each or \$89.95 for both will bring the disc(s) postpaid in the U.S. and Canada. Send to "CD Offer, AWA Museum, 187 Lighthouse Rd. Hilton, NY 14468." Checks should be made out to "AWA Museum."

New Online Scanner Database

Founded on January 1, 2001, *Cityfreq* is a comprehensive database of scanner frequencies for thousands of cities across the country, making it a great resource for scanner enthusiasts. The database currently consists of more than two million frequencies and is updated weekly. *Cityfreq* at <http://www.cityfreq.com> is a project of CJB Management.

PerCon Goes Online

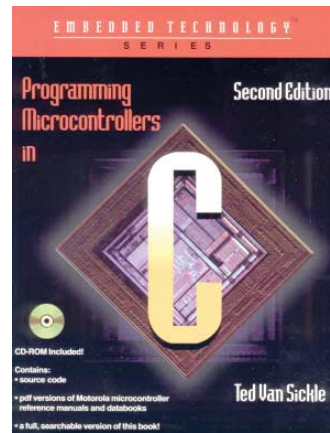
PerCon Corporation announced plans to retire its line-up of hobby/entertainment CD-ROMs at the end of March. In April, PerCon was to launch Spectrum:Online, a new Internet-based search system for the hobby market. Go to <http://www.perconcorp.com> for more information.

Programming Microcontrollers in C

By Ted Van Sickle

Computer programmers will find this second edition an excellent reference for embedded systems designing. C is a high-power, standardized language that is easily understood by engineers, yet is still applicable to the current list of microprocessor chips on the market.

Initial chapters provide a tutorial on C's most useful applications, while subsequent chapters cover everything from rudimentary 8-bit



chips all the way up to RISC microcontrollers. Useful codes, tips and techniques are harvested from the author's own years of experience.

A companion CD in a Windows environment contains source codes for all the text programs, searchable PDF files of Motorola microcontroller manuals and databooks for all devices cited in the text, several sample C compilers, a fully-searchable version of the accompanying text, and many software tools for designers of embedded architecture.

Programming Microcontrollers in C is \$59.95 from LLH Technology Publishing, 3587 Old Rail Road, Eagle Rock, VA 24085; phone orders (800) 247-6553, email carol@LLH-publishing.com, or visit their Internet site at <http://www.LLH-publishing.com>.

New MA Scanner Guide online

The new version of the *Eastern Massachusetts Scanner Guide* by Gary Saffer is now available online. You can get it as a free ZIP document at <http://lynx.dac.neu.edu/s/stjohnso/ematrunk/index.html>, the Eastern MA Trunking System Information page. The unzipped document contains the guide in Word (.doc), Rich Text Format (.rtf), and Adobe Acrobat (.pdf) formats.

Business News

Watch for Cobra Electronics to expand its product lines and reach into the global market. Cobra is a leader in citizens band and family radio services, and in radar detection units. Cobra recently acquired Lowrance Electronics, a major provider of marine radio, and recreational SONAR and GPS navigation units.

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mteditor@grove-ent.com.

ANTENNA CHART CORRECTION

Correct layout of comparison chart from April review (p.87) of WiNRADiO AX-31B active antenna.

Table 1: A Comparison of Indoor Antennas

FREQ. MHZ	ORIGINAL WHIP	CONDOR	AX-31B
27.185 (CB)	Undetectable	Some signals	*Much stronger
49.845 (Baby monitor)	Undetectable	Good, some hiss	*Full quieting
88.1 (FM broadcast)	Trace	Good, some hiss	*Full quieting
88.5 (FM broadcast)	Undetectable	Undetectable	*Receivable
109.8 (Airport VOR)	(Equal)		
151.550 (VHF hi)	*Good, some hiss	*Good, some hiss	Weaker
162.400 (NOAA weather)	Readable, hiss	*Full quieting	*Full quieting
171.025 (IFLOWS)	Very weak	*Full quieting	*Full quieting
407.225 (Mil trunking)	Very weak	Undetectable	*Moderately strong
411.550 (Hydratelemetry)	Strong, some hiss	Strong, some hiss	*Full quieting
453.075 (UHF mobile)	Weak	Weak	*Full quieting
462.750 (UHF mobile)	(Equal)		
475.050 (UHF carrier)	Undetectable	Undetectable	*Receivable
499.750 (UHF TV)	Noisy	Noisy	*Full quieting
855.7375 (UHF trunking)	(Equal)		
864.7375 (UHF trunking)	(Equal)		
996.000 (VOR)	(Equal)		
1090.000 (Aircraft DME)	Weak, receivable	*Receivable	Undetectable

NOTE: Results will vary with signal direction and propagation, placement and polarization of the antenna, and location of the installation. Directivity is present at the higher frequencies only, becoming omnidirectional (nondirectional) lower, and will be influenced by nearby metal masses.

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- Charles (Chuck) Boehnke
Keaau, Hawaii

"You and the MT staff that put this project together have done a FANTASTIC job. You would seem to be the leaders in the field presenting material in this manner so it can be archived so easily. This is the way to receive a magazine."

- Don Nauer

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Monitoring Times assumes no responsibility for misrepresented merchandise.

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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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By Bob Grove,
Publisher

The Loss of Another Friend

Just as we were going to press we learned of the passing of Stu Gurske, age 75, on March 9, 2001. Founder of SWAGUR Enterprises, manufacturer of SWAGURSAT INMARSAT/GOES WEFAX reception equipment, Stu was a strong supporter of *Monitoring Times* and our former *Satellite Times*. He had been actively involved in satellite reception for nearly three decades – his “Apartment Dweller’s Special” dish antenna a perennial favorite in the monitoring industry.

Many of our *MT Expo* conventioners will remember Stu’s displays of the simple, affordable dish/LNA setup which expanded the horizons of so many communications listeners.

A resident of Lodi, Wisconsin, Stu served aboard the *USS Ticonderoga* aircraft carrier during the Pacific action of World War II. Holding the amateur call sign K9EYY, Stu spent much of his 46 years in ham radio as an active Air Force MARS (Military Affiliate Radio System) operator.

The passing of Stu Gurske leaves a technical void in our hobby, as well as a personal loss to all who knew him. Our warm thoughts and best wishes are extended to Lois, his wife of nearly 53 years.



Spies Like Scanners, too!

When veteran FBI agent Robert P. Hanssen was caught dropping off secret documents to the Russians a few weeks ago, a number of interesting factors were released to the public. He was a ham radio operator, he had a mobile scanner, he had a hand-written list of radio frequencies used by FBI surveillance operations, and he had two pictures of actress Catherine Zeta Jones.

Officials felt that knowing the FBI’s radio frequencies, and being able to tune them in with a scanner would greatly assist Hanssen in evading surveillance. I guess the FBI’s Washington office hasn’t heard of digital scrambling yet. And, if captivation by Catherine Zeta-Jones’s beauty is indictable, they might as well arrest me now!

FCC Commissioners Bail Out

It is no secret that the Clinton years fueled a constant war between the Republican-dominated Congress and the Democratic-appointed Federal Communications Commission. Spectrum auction sales, FM microbroadcasting, reduced budgetary allotments, and many other issues kept the two domains at each other’s throats.

All four incumbent commissioners are leaving, and replacements are being selected by the new administration. A totally new focus is expected. While former Chairman William Kennard’s commission paid special attention to consumers, new Chairman Republican Michael Powell (the son of Desert Storm hero Colin Powell) will attempt to pay more attention to big business, a general trend expected from the entire Congress and a growing concern among the electorate who feel their legislators are for sale to the highest bidder.

ARRL: “Another Regression Regarding Licensing?”

I see that the American Radio Relay League (ARRL) has flip-flopped on the Morse code requirement again...again...again.

For many years, the League has steadfastly maintained that proficiency in sending and receiving Morse code is of paramount importance to amateur radio testing. It has been considered a rite of passage by many, but increasingly as an obsolete relic of early communications limitations by others.

Several years ago, there was considerable controversy in amateur circles as to whether the speed requirements should be lowered. 20 words per minute – or even 13 – can be pretty steep for many hams, especially those that don’t give cat’s whisker about sending dits and dahs, but would rather communicate using their natural voices – or even keyboards.

But when the FCC enacted lower speed requirements, the League said they were in favor of that all along, perhaps counting on the short retention span of their supporters.

Now a new affront to the ARRL: the virtual certainty of deleting all Morse code requirements by the forthcoming World Administrative Radiocommunication Conference in Guatemala in 2003. In anticipation of this, the League in January voted 9 to 6 to endorse the extinction of the archaic Morse code requirement from the international rules.

While this progressive move by the ARRL would have earned the respect of the majority of American amateurs and signal a move at least into the second half of the 20th Century, they decided to leave this resolution: “Morse code should be retained as a testing element in the U.S.” And they’re raising dues \$5. Oh, well, one step forward, and two back.

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