Volume 18, No. 7 July 1999

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Can. $6.25
Printed in the United States

Monitoring Times

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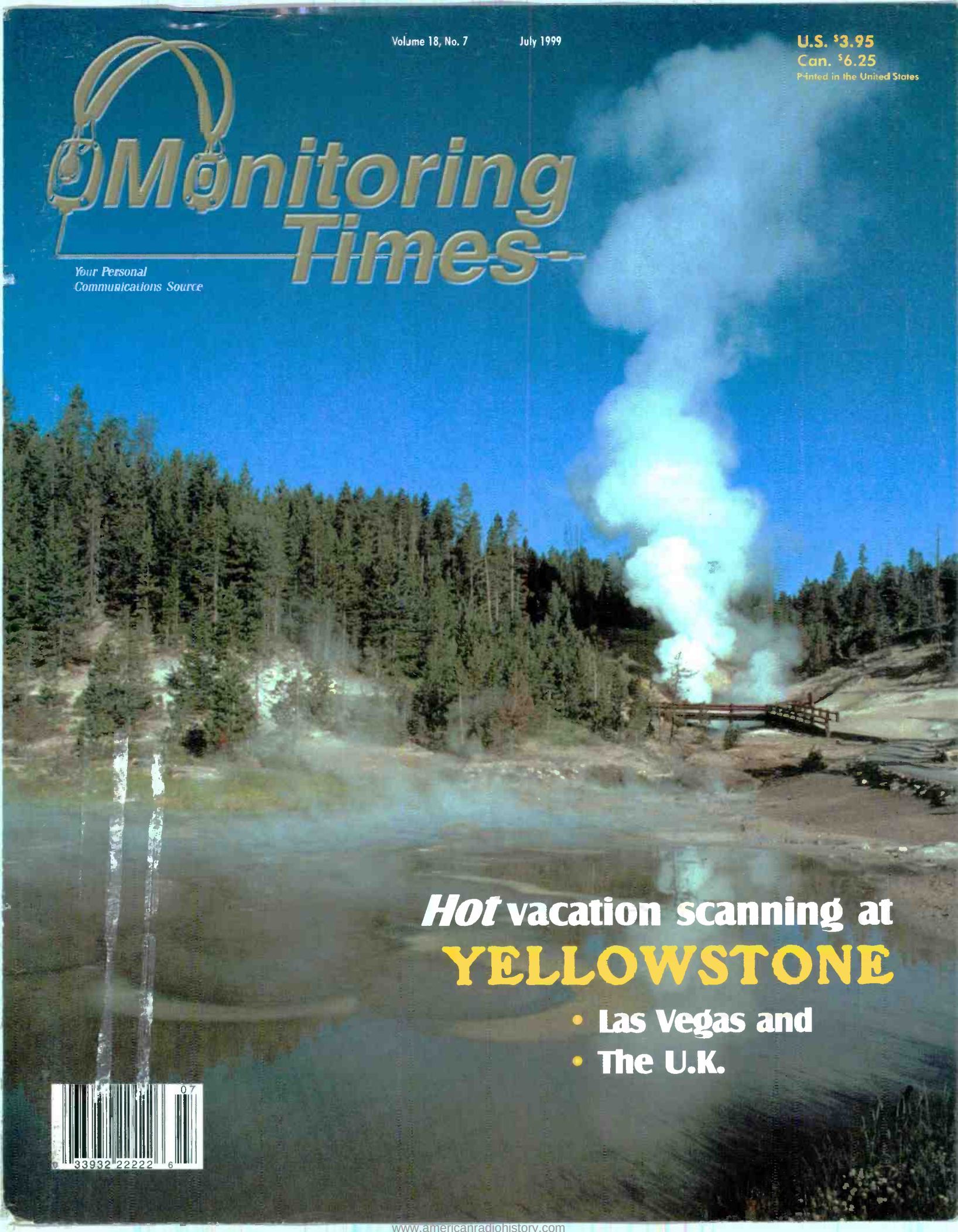

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Optocom, R11
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Patent No. 5,471,402 AR8200 Not Included

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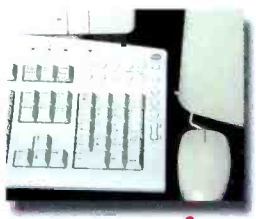

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Monitoring Times

Vol. 18, No. 7 July 1999

Cover Story

Vacation Scanning at Yellowstone

***By* Jon Van Allen**

If you're one of the more than two million annual visitors to Yellowstone National Park, be sure to bring your scanner. The activity in this reserve, which is larger than some states, isn't just from the free-roaming wildlife. It's from the tourists who crawl over barriers, ignore wildlife warnings, go hiking without proper equipment, don't listen for weather reports, and gawk at the scenery while driving too fast.

Rangers in both Yellowstone and nearby Grand Teton National Park are called on to fight fires, drive the ambulance, provide law enforcement, rescue stranded or injured tourists, patrol highway and lake traffic – whatever's necessary to protect the tourists and preserve the park. You won't miss the action if you take along this comprehensive scanning guide to America's first national park.

Story starts on page 8. Cover photo by John Bailey.

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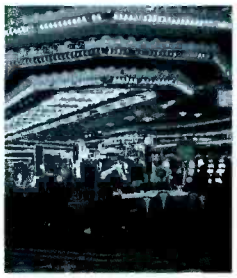
Scanning in Las Vegas 14

By Ed Muro



Vacation time is 24 hours a day, 12 months a year in this city that never sleeps. If you're headed for any of the national parks in the area, we'll "bet" you still make a stop in Vegas. Bring along your scanner and you'll hit the jackpot for around-the-clock action. Ed shares his frequencies for the area, including Hoover Dam and Lake Mead.

Vacation Scanning Across the Pond 18

By Pat Martindale

If "have scanner, will travel" is your motto, you would do well to study the local laws before venturing into foreign territories with your favorite monitoring device. All laws are not equal, not even in jolly old England. Here are some insights from a resident hobbyist.

A Weather Satellite Primer 21

By J.S. "Stu" Gurske

If *MT*'s "View from Above" column means nothing to you but a bunch of pretty pictures, and APT, HRPT, and TIROS may as well be Greek, don't despair! Weather satellite reception is not as hard as you think. This article clearly defines the territory and outlines what you need to get in on the act.

Reviews:

After testing two earlier units, Magne has returned to try **Japan Radio's NRD-545** DSP receiver one more time – and determines that some new rules of measurement need to apply (p.90). Parnass found he enjoyed using the **Racing Electronics RE2000 Alpha** scanner which Relm built with a number of important strengths (p.92). **Drake's FRS Sport 110** raises the ante with great performance for as much as $50 less than the price of similar family radios (p.87). Catalano comes closer to his "total monitoring environment" nirvana with **RadioCom 3.52**, which he says "leads the pack in 1999 for monitoring software" (p.88).

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

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Editorial e-mail: mteditor@grove-ent.com
Subscriptions: order@grove-ent.com

Subscription Rates: $23.95 in US; $36.50 Canada; and $55.45 foreign elsewhere, US funds. Label indicates last issue of subscription. See page 63 for subscription information.

Postmaster:
Send address changes to *Monitoring Times*, P.O. Box 98, Brasstown, NC 28902-0098.

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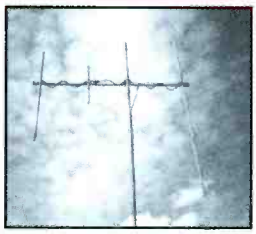
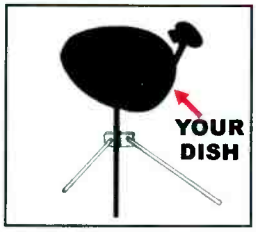


HD-SCANNER-WB-OMNI-F



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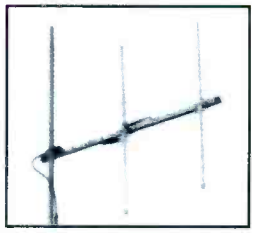
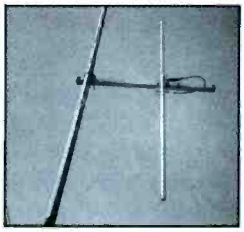


HD-146-V3-U



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CATEGORY/MODEL	FREQ/COV	DESCRIPTION	CONN.	dB GAIN	DIMENSIONS BOOM	DIMENSIONS LG EL	WEIGHT (LBS)	WINDLOAD (SQ FT.)	POWER RATING	SHIPPING WEIGHT	OUTSIDE OHIO	OHIO (7% SALES TAX INCLUDED)
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HD-SCANNER-WB-OMNI-F	25-1300 MHZ	Long Range, ***Continuous Coverage*** Top or Side ### Mount to Mast/Tower *### no add'l hardware needed (Still Omnidirectional)*	F	Nominal 6.2 dB	67"	90"	7.5	1.9	N/A	12.5 LBS.	$154.95	$165.75
HD-TV/FM-S.OMNI-F	TV CHNL'S 2-69 FM-Stereo	Unique 'Steerable Omnidirectional'! Mount Almost Anywhere onto Wall or Mast (***) [On/In Rooftop/Attic/Existing Satellite Dish Mast Mount/Side of House/Closet/Etc.!]	F	Nominal 5.2 dB	N/A [ant.19"(h) x 40"(w) x 3"(d)]	30"	1.0	0.2	N/A	3.0 LBS.	$93.95	$99.47
									***HD-TV/FM-S.OMNI-F CLAMP KIT		$24.95	$26.35
HAM-VHF YAGI												
HD-146-V3-U	142-150 MHZ	End Mnt, 3 ele. Vert. using mast/tower for reflector Detailed, easy to follow, stacking instructions included for even higher gain!	U	12 (15 dB if stacked!)	36"	36"	3.5	0.4	600 W	6.5 LBS.	$134.95	$143.35
HAM-WB-OMNI VERTICALS — SIDE ARM MOUNT WITH HARDWARE INCLUDED												
HD-10M-WB-OMNI-U	26.9-30 MHZ	Top or side mount 3.1 (HAM) dB: 10.6 ("CB LINGO") dB	U	3.1 dB	72"	204"	5.5	1.6	1000 W	10.5 LBS.	$149.95	$160.45
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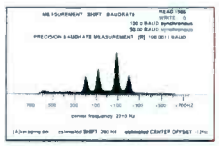

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The FCC Comes Knocking

Since 1997, the FCC has identified 430 pirate stations; of these, more than 75 percent shut down voluntarily once confronted. Here are a few of the ones who didn't – and who consequently received an unwelcome visit from the FCC: La Maquina Musicale FM 95.9 near Detroit (Oct), Free Radio Seattle on 87.9 FM (Mar 23), an unnamed station on 88.5 FM in Brooklyn, NY (Mar 23), Radio Free Montrose, Houston, TX, on 94.9 MHz (Apr 27), Radio Vida on 106.3 MHz in Southeast Lancaster, PA (May 3). The Spanish Pentecostal station – whose broadcast could be heard 20 miles away according to the FCC – had filed a preliminary injunction under the First Amendment and Religious Freedom Restoration Act and had asked for a waiver of FCC regulations.

No one has a First Amendment right to use the airwaves, says the FCC, because it is a limited resource.

Power to the people

"This is community radio that the state should take on as a project instead of harassing us," says the director of The Whole Truth – one of a dozen or so ultra-Orthodox pirate stations in Israel. Israeli Parliament passed a bill legalizing pirate stations that had been broadcasting for at least five years, but it was held up by a challenge in the Supreme Court.

A long-running pirate station in Brazil is Radio Favela, broadcasting since the late 1970s. It was started – using a car-battery from instructions in *Popular Science* magazine – to give local youths an alternative to drug trafficking, for which it was honored by the United Nations. It tries to help the residents of the shantytowns surrounding Belo Horizonte sort the facts from the pervasive rumors in Brazil's roller-coaster economy.

With a strong focus on call-in shows, educational programs, and alternative music, community radio – whether focused on religion or ethnic group or physical neighborhood – is often about helping people cope with life. The FCC's Richard Lee confessed surprise at discovering most unlicensed station owners in the U.S. are not militants. "Many of them are just the average citizen wanting to serve their community."

The National Association of Broadcasters and others oppose the FCC's proposal to license qualifying low power stations (microbroadcasters). Some fear that US microbroadcasters will add legitimacy and an audience to extremist and hate groups. No one would argue that many pirates outdo the "shock jocks" in foul language and controversial topics, but these aren't likely to qualify for the proposed licenses.

Government and established media distrust of independent broadcasters seems to be a pretty global phenomenon. Consequently, a number of stations decided in 1983 to create a World Association of Community Radio Broadcasters (AMARC) for mutual support. See their website at **www.amarc.org**.

Sferics a Winning Science Project

Very low frequency (VLF) radio waves emitted by electromagnetic activity in the earth's atmosphere turned out to be an award-winning science project for Nina Mejias, a junior at the alternative Another School in Meriden, Connecticut. After making recordings, Nina processed the audio signal using a computer program that helped to visually distinguish chorus, whistlers and other sferics from background noise.

Radio replacing bar codes?

Usually printed as a bar-code and read with a laser scanner, the26-year-old, 12-digit, universal product code (UPC) has become so popular that soon it will no longer be able to handle the more than 200,000 businesses that use it worldwide. January 1, 2005 , the 12-digit UPC is to be replaced by the 13-digit European Article Numbering code.

However, by then the bar-code laser gun may be outdrawn by an even faster technology – radio frequency identification (RFID). Imagine passing through the grocery checkout and being presented with an itemized total

BULLETIN BOARD

(See www.grov-ent.com/hmpgmt.html for more events and club info)

July 4: Harrisburg, PA
W3UU 27th Annual Fire Cracker, Harrisburg RAC hamfest and computer show at Emerick Cibort Park, Bressler (near Steelton,Harrisburg) Talk-in 146.16/76 &146.52 simplex. Look for signs on Hwy 441. 8a.m.; $5 donation. Contact Richard Bordner, W3NJB, 717-939-4825 or *n3njb@aol.com*

July 10: South Milwaukee, WI
30th annual Swapfest at American Legion Post #434 grounds at 9327 S. Shepard Ave, Oak Creek, Wis, 6:30 a.m. - 2p.m. CDT. Talk-in 146.52 simplex. $5 admission includes "Happy Time" free refreshments. 414-762-3235 for more info.

July 16-18: NW New Jersey
World TV/FM DX Association convention is being hosted by Rick Shaftan, one hour from the Newark airport. Suggested lodging is Days Inn/Ledgewood,1691 Route 46 West; call 973-448-1100 for reservations. Convention registration $25. Contact Rick at *shaftan@ptd.net* for more information.

July 17: Loveland, CO
The Northern Coloradio ARC will host Superfest99, 8a.m.-2p.m. at the Larimer County Fairgrounds, 700 Railroad Ave. Talk-in 145.115 (-100Hz offset) or 146.85 (-) Table reservation from Michael Robinson N7MR (970-225-7501); general info 970-352-5304.

July 18: Stratford, NY, Special Event Station
Fulton Co Dr. Mahlon Loomis Committee will operate W2ZZJ to commemorate the 173rd anniversary of the American radio pioneer who was born at Oppenheim, NY. Operation 1400-2000 UTC on the General Class phone portion of 75, 40, 20 meters, Novice 10 meter band, and area 2-meter FM repeaters. For certificate and literature, send QSL, contact # and #10 SASE (55 cents) to George Sadlon, W2ZZJ, 5738 St Hwy 29A, Stratford, NY 134570. 315-429-9976

July 24: Cincinnati, OH
OH-KY-IN ARS hamfest at Diamond Oaks Career Development Campus, 6375 Harrison Ave (I-74 to Harrison Ave Exit; E on Harrison less than 1 mi.) Talk-in 146.67; opens 7a.m. Seminars, noon transmitter hunt; free flea market space with admission ($5 at door). VE session. Contact Dana Laurie WA8M, 513-761-7388, *wa8m@arrl.net*

July 30-Aug 1: Oshkosh, WI, Special Event Station
Fox Cities ARC operates W9ZL Special Event station from the world's biggest fly-in, EAA Airventure '99 held at Wittman Regional Airport. SSB and RTTY operation in the general portion of the phone bands. Operators of the club will man the station from 9 a.m. to 4p.m. daily. 8"x10" certificate for contact with proper QSLs to Wayne Pennings, WD9FLJ, 913 N. Mason, Appleton, WI 54914.

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without having to unload a single purchase! Merchandisers may be willing to pay the extra cost of the system because of the information it can also glean about consumer habits.

To complete the consumer cycle, "smart" trashcans like NCR's "intelligent bin" may even tell the retailer when you discard the food container. It can also tell you when it's time to reorder a regularly-used product and even find who has the lowest price on it by surfing the internet.

RFID is already being used to track livestock, charge tolls to commuters, and track inventories. Attached to sneakers, they can time marathons. They can store important information inside implants or prosthetic devices. One promising application is in helping airlines track your luggage for increased speed and security.

Automatic identification manufacturers say there's room for both bar and radio identification technologies. After all, says NCR's Craig Maddox, it doesn't make sense to put a 50-cent RFID tag on a 25-cent pack of gum.

Tag, you're it!

Is it a far step from carrying a radio-encoded tag with your airline ticket information that can be instantly scanned, and RFID bracelets which tag Alzheimer patients, parolees, or children at a daycare center, to implanting a tag under one's skin with all those endless bits of identifying information we repeatedly have to recite? It's already being done experimentally.

Would such an ID tag epitomize the loss of individuality and privacy? Or, could it actually *protect* our individual identity – proving we are who we say we are and that other person who has stolen our social security number, credit card, checking account, etc. is an imposter? I'm sure there's a movie script in this scenario ...

Motorola moving into "managed care"

In recent months Motorola has contracted to provide next-generation digital Astro systems to the Federal Bureau of Investigation and to the National Security Agency. Although these are APCO 25 compatible, they also provide the highest level of encryption available.

Now Motorola is offering a way to make Astro SmartZone digital communications systems available to counties and municipalities who otherwise could not afford the purchase price – or who often find the state-of-the-art system completely outdated by the time it's finally paid for.

Larimer County, Colorado, will be the first in the country to receive a system built, managed and maintained by Motorola. Each participating agency will pay Motorola a fee based upon the number of mobile and portable radios used. The system is scheduled for completion in August, starting with around 600 radios and five sites, though it has a capacity for 4,000 and 25 sites.

A 1997 flood pointed out Larimer County's lack of interoperability between agencies, but none of them could afford to finance an area-wide radio system. Now, says Loveland Police Captain John Walker, "we'll operate at peak level efficiency, but we won't have to invest our own resources to manage and maintain the system."

Time running out for Cincinnati

Hamilton County, Ohio, voters rejected for the third time a levy to help pay for a county-wide emergency communication system. The county has paid $6 million to reserve 20 channels in the 800 MHz range to replace their 40-year old analog system and has twice received extensions from the FCC for more time. A third extension is unlikely, said an FCC engineer. Cincinnati can reapply for a new license if the frequencies have not already been allocated to another community.

No disasters in Columbia, SC?

Lexington County initiated a digital system in February, and neighboring Richland County is considering a joint system to allow better coordination.

"The conversion to digital is a waste of ... taxpayers' dollars," protests George Chisenhall on his web page, which asks the "Lexington County Secret Police" what they have to hide.

Sheriff James Metts told the Associated Press the object is to keep criminal from listening, not to keep secrets from the public. He said if the public wants to know what is going on, police reports are public information.

Rob Cooke, a ham who volunteers for the Red Cross and Skywarn, said the system reduces his ability to help in disasters, but Metts discounted disaster preparedness as a reason for public access. Disasters are too infrequent to be a part of the debate, he said.

Inmarsat goes private

The assembly of 84 member governments which control the Inmarsat satellite system, became a public limited company April 1st. The new commercial company is located in London and is governed by a Board of Directors. A second intergovernmental body ensures that Inmarsat meets its public service obligations, including the Global Maritime Distress and Safety System (GMDSS).

Milstar satellite total loss

An $800 million military communications satellite that failed to reach its intended orbit after its launch April 30th has been declared totally useless by the Air Force. It is the third straight failure for the Titan IV rocket booster; *Aviation Week & Space Technology* reported the cause in this case may have been inaccurate computer software in the rocket's upper stage.

Another satellite was grounded temporarily because of rain that leaked onto it while in a protective room at the launch pad. The Air Force has convened a review board to investigate the problems.

Bail-out for Iridium?

Motorola's Iridium satellite-based phone and paging service has hit a major stall with far fewer sign-ups than anticipated. Lenders have given Iridium until May 31 to meet its growth targets. Some analysts doubt Iridium can recover.

Chief Executive Edward Staiano is still optimistic: "Operationally, the network is performing better than expected," he said of the system which became operational in November 1998. He said the system has been reliable, call quality is high, and Iridium's complex billing system is working.

A big boost could come from the U.S. Air Force. It expressed strong interest and has tested the phones in Bosnia under various mock scenarios. The phones could conceivably be placed in every cockpit, allowing commanders anywhere in the world to talk directly with the pilots.

"As the Iridium and other commercial systems come online, we will have to rethink the way we do business," said 1st Lt Timothy Oran of the USAF Space Battlelab.

"Communications" is composed of news stories sent in by our readers and condensed by Rachel Baughn, editor. Thanks to these recent contributors: Anonymous, Albany, New York; Harry Baughn, NC; Robert Brossell, Pewaukee, WI; Robert Burdick, Meriden, CT; Steve Douglass, email; Paul Forel, email; Greg, email; Kenneth Hydeman, Xenia, OH; Gerald Kercher, Quaker Hill, CT; Maryanne Kehoe, Atlanta, GA; Harry Marnell, Scan-L; Tim Martin, email; Ed Muro, Cedarhurst, NY; Greg May, Richwood, KY; Doug Robertson, Oxnard, CA; William McConnell, Clover, SC; Michael R, email; Mike Roth, Chicago, IL; Richard Sklar, Seattle, WA; Larry Van Horn, Brasstown, NC; JT Ward, email; Susan Wilden, Noblesville, IN; Greg Wodynski, email; John Young, Butte, MT

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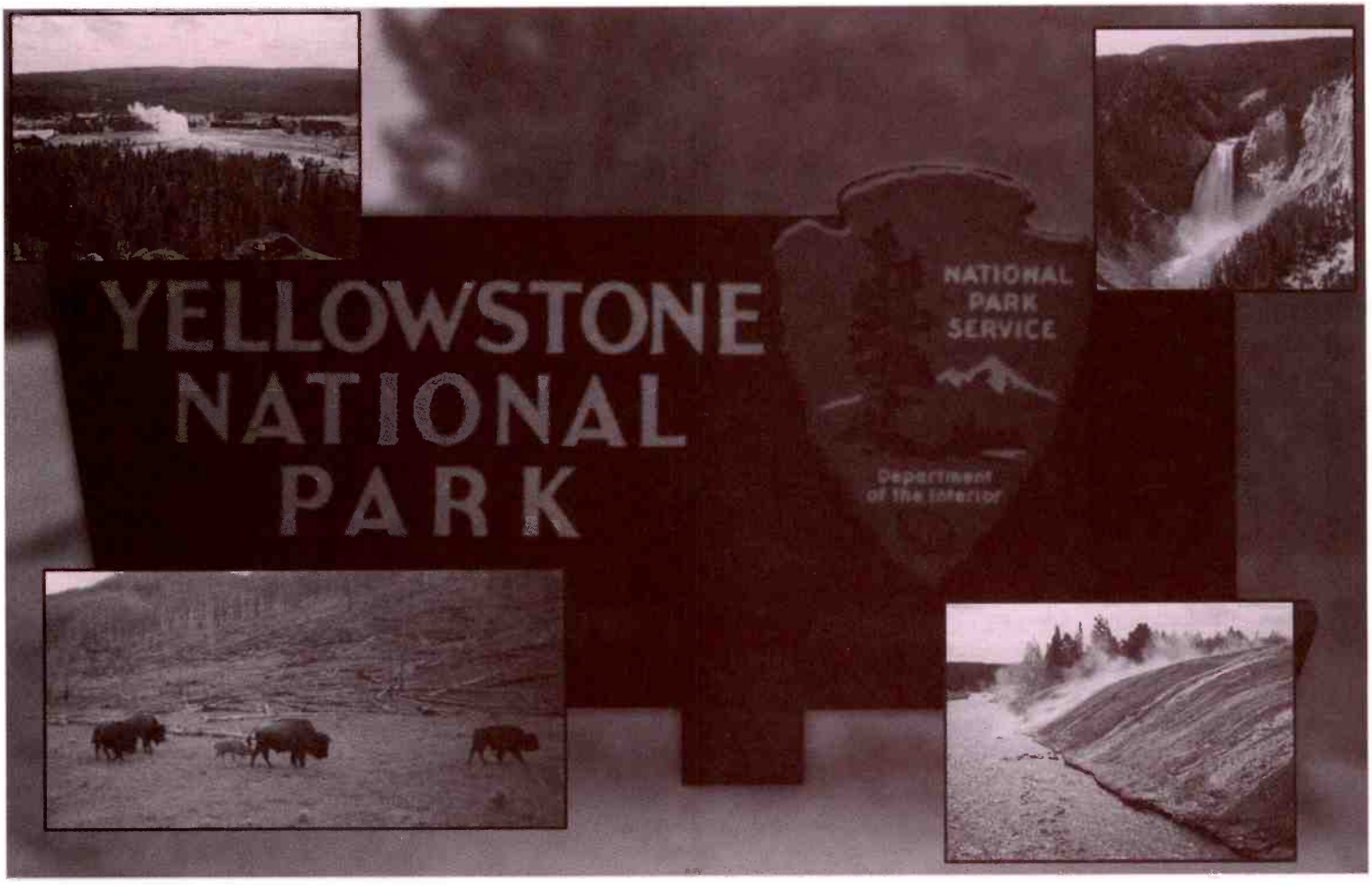

Vacation Scanning

YELLOWSTONE and GRAND TETONS

By Jon Van Allen - KF7YN

If your vacation hasn't taken you to Yellowstone National Park yet, the chances are good that it will. This diverse ecosystem contains the largest concentration of free-roaming wildlife in the lower 48 states, approximately 10,000 thermal features and 250+ active geysers. Yellowstone, the world's oldest national park, hosts over 2 million visitors every year, and if you're one of them, don't forget to take your scanner along for some monitoring you're not likely to hear at home.

Occupying some 3,472 square miles (2,221,823 acres), Yellowstone National Park (YNP) is larger than Rhode Island and Delaware combined, stretching 63 miles north to south and 54 miles east to west connected by 370 miles of paved roads. Communications over such a large area is by means of a complex system of mountain-top remote bases and repeaters. The communications center is located at Park Headquarters in Mammoth at the extreme north end of the park. It is simply referred to as the "comm center." All dispatching is done from the comm center, and all 911 calls in Yellowstone are routed to the comm center, including cellular phone calls. Yes, even Yellowstone has cellular coverage (albeit very spotty).

Being one of the top-10 visited parks in the national park system makes keeping order a real challenge. Park rangers wear several hats, from full-fledged police officers to medical technicians, fire fighters, wildlife specialists and naturalists. Each ranger has his or her specialty in addition to being a police officer.

Some are back-country rangers who patrol the 300 back-country campsites and 1,200 miles of trails through the park. They're also specialists in wildlife and/or forestry. Rangers who patrol the developed areas such as roads, campgrounds, lodges and stores are also trained as medical technicians and firefighters. For instance, rangers at Grant Village also drive the ambulance and fire engine which are all kept at the Grant Ranger station. Some rangers also patrol the various lakes and streams, using power boats and even kayaks or canoes.

Of course, communications are required to keep everything running smoothly, and scanning in YNP is interesting and exciting. There is always something going on, whether it's animals causing a

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Park Ranger 4x4, Park HQ Mammoth

traffic jam, or a back-country ranger calling for a medevac helicopter to take out an injured hiker.

Who's Who at YNP

YNP is divided into two main comm groups, north and south. North includes Mammoth, Indian Creek, Tower-Roosevelt, Lamar, Pebble Creek, Slough Creek, the northeast entrance, Canyon Village, Old Faithful, the west entrance, Madison, Norris, Tower and the northwest sector which is referred to as Gallatin.

South includes the Lake area (Yellowstone Lake), Bridge Bay, Fishing Bridge, the east entrance, West Thumb, Grant Village, Lewis Lake, the south entrance, Thorofare and Bechler.

North Gate at Gardiner, MT, reads "for the benefit and enjoyment of the people. Created by Act of Congress, March 1, 1872."

Three-digit communication numbers are assigned by districts:
100 - Headquarters staff
200 - Mammoth, Indian Creek, Tower-Roosevelt, Lamar, north and northeast entrances.
300 - West entrance, Madison, Gallatin
400 - Old Faithful
500 - Grant Village, West Thumb, Lewis Lake, south entrance
600 - Lake, Bridge Bay, Fishing Bridge
700 - Base stations (see below)
800 - Canyon, Norris
900 - Misc., research, aircraft, etc.

A Canyon Village ranger would be 811, Mammoth ranger 221. A suffix on the end of the three-digit call is the person's last name. 811-Bell is Canyon Village Ranger Bell, for instance. 494 to 499 are Gardiner, Montana sheriff's deputies, and communications with 700

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on channels 1 and 2.

Base Stations - Dispatch is KOF700, or simply "700." Other departments and base stations use 700 plus a suffix (700-Fox, 700-Bravo) or another 700 series number. See Table 2 for the callsigns. Fire lookouts are posted on Mt. Sheridan, Mt. Holmes and Mt. Washburn from about July 1 through late September. Lookouts on Mt. Holmes and Sheridan call in their daily fire weather reports via radio. Mt. Washburn lookout calls in by landline telephone unless landlines are down.

West Yellowstone emergency services

Water sports

There is plenty of VHF marine activity around Yellowstone Lake and Lewis Lake. YNP operates the Bridge Bay Marina and Grant Village Marina; rangers patrol the lake from both marinas. Bridge Bay communicates with private boats and YNP operates research vessels on VHF marine band, but rangers use their normal 6XX or 5XX callsigns when aboard patrol boats.

It's interesting to note that YNP radio shop programmed radios with certain VHF marine freqs, but not in the official channel number scheme. For instance, I heard the research vessel *Cutthroat*, who was on YNP Ch 4, ask Dive Team to switch to Ch 9. I was astonished to discover their Ch 9 is actually VHF marine channel 18. For some unknown reason the radio shop programmed this frequency in the channel 9 spot.

YNP operates a radar equipped patrol boat on Yellowstone Lake based at Bridge Bay Marina. There is also a smaller patrol boat based at the Grant Village Marina government dock. These vessels use normal 5XX and 6XX callsigns. YNP also operates the research vessels *Cutthroat* and *Whaler*, which conduct water quality surveys, fish surveys, underwater thermal activity using dive teams, etc.

Bridge Bay Ranger Station

One major project over the last few years has been surveying lake trout populations. These large trout were introduced illegally into Yellowstone Lake and are a serious threat to the much smaller native cutthroat trout. YNP research vessels are surveying and destroying spawning areas and running deep nets in an attempt to eliminate the lake trout.

This has created a fishing bonanza on the lake because there is no catch limit and all lake trout caught must be kept. TW Recreation Services operates several charter fishing boats out of Bridge Bay and business is booming with eager anglers coming from all over North America to fish Yellowstone Lake. All one has to do is listen in on the VHF marine channels to learn where the hot spots are.

TW Recreation Services at Bridge Bay, WSU9234, operates eight fishing tour boats and two scenic tour boats. The Bridge Bay Marina callsign is WQZ399 for general boating. Of course, Ch 16 is always monitored.

Every morning between about 8:30 and 9:30 and every afternoon between 16:30 and 17:30, Mammoth issues morning and afternoon reports via radio dispatch and fax to the various ranger stations for distribution to campground offices and stores. Reports begin with "Attention all stations, please stand by for the morning (or afternoon) report." The reports contain ATLs (attempt to locate), BOLOs (be on the lookout) and Idents (attempt to identify), followed by special announcements, special incidents, and finally the daily weather forecast and extended forecast.

Remote weather station antennas at Mammoth, Wyoming (Park HQ)

Weather forecasts in YNP are a godsend because the weather can change drastically in a very short period of time. These forecasts and special weather alerts make scanning a must, especially for anyone hiking in the back-country or out on the lakes and streams. Yellowstone's lakes have an average temperature of approximately 40 degrees F. and sudden storms can turn a tranquil lake violent with large waves that have capsized many an experienced boater — sometimes taking lives, even of park rangers. One cannot be cautious enough in these waters.

TABLE 1: 1610 KHZ TRAVELERS INFORMATION SERVICE

KOD710	Indian Creek	KOP716	Biscuit Basin
KOD711	Mt Washburn Road	KOP717	Steamboat Point
KOD712	Firehole Lake Drive	KOP718	Fishing Bridge
KOD713	Artist Point	KOP719	Fountain Flats
KOD714	Artist Paint Pots	KOP720	Canyon
KOP707	East Entrance	KOP721	Grant Village
KOP708	North Entrance	KOP722	Bridge Bay
KOP709	Mud Volcano	KOP723	Fire Exhibit
KOP710	West Entrance	KOP724	Mammoth
KOP711	South Entrance	KOP725	Lamar Valley
KOP712	Tower Junction	KOP726	Norris Geyser Basin
KOP713	Old Faithful	KOP727	Moose Exhibit
KOP714	Madison Junction	KOP728	Roadside Bridge
KOP715	Midway Geyser Basin	KOP729	Hayden Valley

Danger on and off the highways

Driving in YNP is an experience! Most of the 370 miles of paved roads are in poor condition because of budget constraints, road construction, and endless frost heaves producing pot holes from hell. Federal Highways is rebuilding some of the roads in YNP, with the east entrance road being the major road project over the last few years.

Road construction makes for interesting monitoring. Federal Highways supervisors monitor the main park channels, and flagmen use low-power handhelds that have been heard

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TABLE 2: YELLOWSTONE BASE STATIONS

Dispatch is KOF700. Base stations use the callsign of the station or office.

KOF prefix callsigns:	
700 Alpha	Radio Shop
700 Bravo	Back-country Dispatch Desk
700 Charlie	Chief Rangers Office
700 Delta	North District Ranger HQ
700 Echo	Chief of Maintenance & Engineering Office
700 Fox	Fire Cache Desk
700 Golf	Garage/repair Shop
700 Juliet	Maintenance Shop
700 Lima	Law Enforcement Office
700 November	Chief Naturalist Office
700 Papa	Special Projects Office
700 Sierra	Park Superintendent's Office
700 Tango	Forestry Office - Mammoth
700 Whiskey	Warehouse
700 Yankee	Communications Supervisor
700 Zulu	Accounting Office
701	East Entrance
702	West Entrance
702 Papa	West Yellowstone, MT Police Department
703	Beartooth Road Camp
704	Lamar
705	Sportsman Lake
706	Trail Creek
707	Norris Ranger Station
707 Victor	Norris Visitor Center
708	Bridge Bay Ranger Station
709	Buffalo Lake
710	Heart Lake
711	Shoshone Lake
712	Shoshone Point
713	Thorofare
714	Cabin Creek
715	Cold Creek
717	Upper Miller Creek
718	Mt. Holmes Base Ch 2
719	Elk Creek
720	Upper Lamar Creek
721	Mt. Sheridan Fire Lookout
722	Canyon Ranger Station
722 Victor	Canyon Visitor Center
723 Delta	South District Ranger HQ, Lake
723 Fox	Fish & Wildlife
724	Old Faithful Ranger Station
724 Bravo	Old Faithful Back-country Office
724 Victor	Old Faithful Visitor Center
725	South Entrance
726	Bunsen Peak remote base & link repeaters
727	Grant Village Ranger Station
727 Bravo	Grant Village Back-country office
727 Golf	Grant Village Maintenance
727 Victor	Grant Village Visitor Center
728	Mt. Washburn Fire Lookout, remote base & link repeaters
729	Lower Blacktail
730	Madison Ranger District
730 Delta	Madison District HQ
730 Golf	Madison Maintenance
731	Bechler Ranger Station
732	Tower Ranger Station
733	Northeast Entrance Ranger Station
734	North Entrance Station - Gardiner
736	Buffalo Pit
737	Cache Creek
738	Lower Miller Creek
739	Howell Creek
740	Pelican Cone
742	Fox Creek
743	Harbil Creek
744	Travis Junction
745	Lewis Lake
748	South River
749	Fawn Pass
KOP283	Inter-agency Jump

on itinerant frequencies 151.625, 151.995, 154.540, 154.570 and 154.600 MHz.

Park rangers are especially concerned about speeding and unsafe driving; citations and warnings are issued by the gross. Because most of the roads are narrow and winding, there are ample pull-outs to view wildlife and other points of interest. No matter; many motorists decide it's a good idea to stop in the middle of the road to view wildlife with no concern for the danger they are putting themselves and others into. There are collisions, vehicles off the road, and people and wildlife hit by motor vehicles.

Ignoring warnings posted everywhere, visitors are attacked or gored getting too close to wildlife, injured or burned by going off marked boardwalks and falling into thermal features or ignoring barriers and falling into canyons and rivers. Without fail, at least a few people a month are seriously injured, burned or killed from ignoring posted warnings.

Life-flight helicopters from Idaho Falls and Billings are frequently called into YNP to take the injured to hospitals as far away as Salt Lake City, Utah. Air Idaho operates out of Idaho Falls, Idaho, and LifeFlight-1 is out of Billings, Montana. Because of the distances from these cities to Lake Hospital (Idaho Falls 120 miles, Billings 150 miles) waiting time for a life flight can be anywhere from 1/2 to 2 hours.

I recall two incidents last summer where people died because they couldn't get to a hospital soon enough. One such incident was a head-on collision at Duck Lake near West Thumb (see photo) that claimed the life of a Montana woman who died in the ambulance waiting for a life flight helicopter. The other was a motorcycle accident on the east entrance road. Lake Hospital has a staff of doctors, nurses and medical technicians on

The driver of this car was fatally injured when it collided head-on with a Park 4x4 at Duck Lake.

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Mammoth Clinic sports a Yagi beam at the apex of the eaves.

call, but it is a small hospital with limited capabilities and resources.

Keeping the Peace

Mammoth dispatch center contains state-of-the-art computers and has law enforcement information available from every US state and territory, Canadian provinces and territories, and many other countries. Mammoth also has the NCIC (National Crime Information Computer) database access available as well as other federal agency databases. The professional level of law enforcement in Yellowstone is impressive.

Just about everything in YNP requires a permit, from hiking in the back-country or camping to boating and fishing. Out of bounds camping, fishing and boating are common offenses despite ample warnings. It's truly amazing how serious YNP is about preserving the park and protecting wildlife and humans alike. All of these aspects is what scanning is all about, and Yellowstone offers plenty of scanning excitement. See Table 3 for YNP's frequencies and linked repeaters.

UHF linked control/base stations are located at the Mount Washburn Fire lookout. Two primary repeaters and the base units on Mount Washburn cover most of the park. The north and west areas operate on 166.375 with a repeater input of 166.975 MHz. The primary repeater is located on Mount Holmes, and a second repeater on the same frequency pair is located near the northeast entrance. The east and south areas operate on 165.5875 with a repeater input of 164.800 MHz. The primary repeater for this pair is located on Mount Sheridan.

Another repeater pair, 167.150/163.125 is used as needed for a carrier squelch for special incidents. Grand Teton National Park has also been using this channel in their comm center plus a new repeater on the same pair. It appears to be a common aid channel between the two parks. During the cleanup after the 1988 fires, the Student Conservation Association (SCA) volunteers used several repeaters on this frequency pair using different CTCSS tones. Those repeaters are apparently no longer being used.

Other Area Frequencies

Amphitheater wireless microphones are on 203.400 MHz (NFM). There are likely other wireless mic frequencies being used as well; check 174.000 to 210.000 MHz.

Not surprisingly, Family Radio Service (FRS) frequencies are very active in Yellowstone and Grand Teton. It seems everyone has FRS transceivers these days. VHF and UHF itinerant frequencies are also used for personal comms; don't overlook these for interesting conversations. Of course citizens band (CB) is widely used, and monitoring CB channels is helpful in finding out what's going on in the immediate area.

Most hams monitor 146.520 MHz simplex in YNP. One of the fire lookouts also monitors 146.520 from Mt Washburn, Mt Sheridan or Mt Holmes. His name is George, WA7GSN, and he monitors whenever possible. His mountaintop vantage point gives him coverage throughout most of the park. Several times, I have called George to report traffic accidents and other incidents which he relayed to "700" dispatch, saving valuable time.

Table 4 includes some other business and public safety frequencies of interest to visitors.

TABLE 3: YELLOWSTONE NATIONAL PARK FREQUENCIES

	Mobile Rx	Tx	
Channel 1	166.375	166.375	North, West areas simplex
Channel 2	166.375	166.975	North, West areas repeater
Channel 3	165.5875	165.5875	East, South areas simplex
Channel 4	165.5875	164.800	East, South areas repeater
Channel 5	167.150	167.150	Special (car to car)
Channel 6	167.150	163.125	Special incident frequency
Channel 7	168.350	168.350	Maintenance
Channel 8	168.650	168.650	Air-Net*
Channel 9	168.550	168.550	Fire Ops
Channel 10	168.550	163.225	Fire Ops (not confirmed)

* The old air-net frequency of 167.950 was allocated as an air-to-air tactical channel in 1996 and the new air-net channel is the new standard national flight following channel on 168.650.

VHF/UHF link repeater scheme: (Mt Washburn)

Channel 1 & 2 remote base/remote control station:

166.375	411.675	CS	Base Mt Washburn KOF728
166.975	411.675	114.8	Control Station
417.375	166.375	CS	Link

Channel 3 & 4 remote base/remote control station:

164.800	411.775	162.2	Control Station
165.5875	411.775	CS	Base
417.475	165.5875	CS	Link

Air-Net remote base:

168.650	411.875	CS	Air-Net Base
417.575	168.650	CS	Link
166.375	166.975	DTMF	Repeater control
167.150	163.125	CS	Special Incidents
451.100	456.100	100.0	Montana Power
463.450	468.450	Multi	Community repeater used by TW Services, US West and YNP Dispatch on occasion.
164.825	411.275	100.0	Remote Base Gallatin N.F. KLC236
415.275	164.825	CS	Remote Base Gallatin N.F.
155.280	467.450	CS	EMS Remote Base for Lake Hospital & Mammoth Clinic KNBA918
462.450	155.280	CS	
462.450	467.450	CS	

It's a good idea to program in all UHF link and remote base frequencies in addition to the VHF frequencies to help close gaps in signal coverage in some areas. For example, at Madison Junction, I often hear the remote base freqs better than the VHF channels.

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TABLE 4: OTHER YELLOWSTONE AREA FREQUENCIES

152.420	TW Services (lodge and campground employees)
164.600	Forest Service Supply Net
158.250	Montana Power
164.825	Gallatin N.F.
169.125	Targhee N.F.
169.175	Targhee N.F.
154.740	West Yellowstone, MT, Police Dispatch
155.790	West Yellowstone, MT, Police Car to Car
158.790	West Yellowstone, MT, Police Tactical
154.235	West Yellowstone, MT, Fire Dept
154.385	West Yellowstone, MT, Fire Dept
155.580	Montana Highway Patrol
154.160	Island Park, ID, Fire Dept
462.950	Island Park, ID,m Search & Rescue
155.160	Search & Rescue Mutual Aid
166.660	Possibly being used by Lake Rangers, referred to as "Gold"

TABLE 5: GRAND TETON NATIONAL PARK

Park Headquarters and Dispatch are located in Moose, Wyoming

	Mobile RX	TX		
Channel 1	171.675	171.675	CS	Simplex
Channel 2	171.675	172.425	CS	Signal Mountain repeater
Channel 3	165.5875	165.5875	CS	(same as YNP Ch 3)
Channel 4	165.5875	164.800	CS	(same as YNP Ch 4)
Channel 5	168.550	168.550	CS	Fire Ops (same as YNP)
Channel 6	167.150	163.125	CS	New repeater 9/94 (same as YNP Ch 6)

Call Signs:

KOD700	Park HQ - Dispatch
KOD700E	Entrance station
KOD701	Jenny Lake Ranger Station
KOD701R	Jenny Lake Rescue Cache
KOD702	Signal Mountain repeater
KOD703	Buffalo Fork
KOD704	Colter Bay Village
KOD705	Jackson Hole
KOD707	Flagg Ranch

Monitoring Equipment

Antennas: A good antenna is required because of the mountainous terrain of YNP. For my handheld scanners, I use a telescoping antenna which makes a significant difference in weak signal areas over the stock rubber duck. A good mobile antenna helps, too. I use a magnetic mount and a glass mount antenna in my truck. The glass mount antenna does not perform as well as the mag mount antenna because of its capacitive losses.

In my trailer, I use a Grove signal splitter between the RV's AM/FM radio and my Bearcat BC9000-XLT. The antenna is on the roof and works fairly well. I also use the crank-up amplified TV/FM antenna with good results above 50 MHz despite it being a horizontally polarized antenna. A collapsible or folding mast for a colinear gain antenna would be ideal.

Power and batteries: Unless you are at Fishing Bridge RV Park with full hookups or at a lodge or cabin with electrical power, you will need a way to keep batteries charged or use dry cells. I have a 75 watt solar panel on my trailer which keeps the batteries charged. If you have an RV or trailer, you either need a solar panel or generator, but generators are restricted by quiet hours (8:00 pm - 8:00 am) or not allowed at all in some campgrounds.

If you need alkaline cells for your scanner, cameras, handhelds, flashlights and all the other gadgets that require batteries, keep in mind batteries are expensive in and around YNP. I buy a 40-pack of AA alkaline cells at Sam's Club for $8.99 (under 23 cents per cell). I also use two 6-volt alkaline lantern cells wired in series to run my Pro-90, which lasts for a few weeks straight.

The Pro-90 can also be charged overnight using the 12 volt cigarette lighter plug in my car or RV, which is a real life saver when the internal NiCds go dead. I use an amplified speaker with the Pro-90 which requires four C-cells.

Bring *plenty* of batteries and plan ahead for every device that requires them. After all, even if you're traveling as a "radio tourist," you sure don't want to pay tourist prices for the power to listen. There's too much else to see and do in this grandaddy of all national parks.

Ready for action with a Pro-90, HTX202, good map, and a hot cup of coffee.

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LAS VEGAS, NEVADA

Photo by Judy Grove

They say New York is the city that never sleeps. While this may be true, I recently had the opportunity to spend some time in another of the world's true 24 hour cities, Las Vegas, Nevada, or (as a friend of mine puts it) "Lost Wages."

As I was preparing to depart New York's JFK Airport (Tower 119.100) my dad predicted that once there I would say to myself, "I'm coming back." Well, once I arrived I did exactly that. There is lots *to do and see in Las Vegas and the surrounding area. The combination of the bright city lights and the awesomely picturesque desert / mountain ranges leaves memories that will last a lifetime. Likewise, there are just as many things to monitor on your radio. So come with me in my journey through Nevada.*

By Ed Muro, KC2AYC

What is there for the scanner listener in Las Vegas? The most obvious thing that would come to mind in a city of this nature is the local public safety frequencies. The Las Vegas Police Department (LVPD) was very interesting to listen to, with almost as much excitement and activity as the police department in New York or Los Angeles.

Photo by Judy Grove

Bob Grove tested a prototype of his (now-discontinued) spectrum analyzer from the safety of his Vegas hotel room.

While I was there I monitored several bank robberies, as well as the exploits of, let's say, "people looking for love in all the wrong places." See Table 1 for the frequencies I monitored. Be aware, though, that many of the area public safety agencies are in the process of shifting to Motorola and GE Ericson trunked radio systems.

One of my local correspondents also made a recent trip to Las Vegas. Here is some of what he monitored: "I was out in Vegas for a week and, while I didn't win, I had a great time. I brought my scanner with me and on 159.210 (Northeast Dispatch) I heard a unit calling for Crime Scene on a burglary arrest. They wanted some evidence photographed. On 159.150 (Warrants/DMV) I heard an Adam unit run a driver's license check and get a hit. The driver was wanted on a felony drug charge. There was also a lot of action on the hotel frequencies."

Casinos on the air

This leads me to the next obvious monitoring target: casino hotels. There is plenty to monitor on the frequencies, such as casino operations, housekeeping, security, concierge services, valet parking, and hotel maintenance. I even monitored room service in my hotel. (See frequencies for a couple of the hotels in Table 1.) However, there are two things I would like to point out.

Stratosphere Casino

First of all, many hotels have in-house paging capabilities. This wreaked havoc on my BC-235 and I was bombarded by radio frequency interference (RFI). Secondly, I strongly suggest you do your scanning in the privacy of your room. The casinos probably would not appreciate your enthusiasm for the hobby, and if caught in the casino with a scanner you will probably be escorted out.

For you aviation buffs out there, you can monitor all of the activity in and out of McCarren Airport as well as military activity out at Nellis AFB. See the July '97 *MT* article on Area 51 for these frequencies; the entire article is also posted on *MT*'s web site at **http://www.grove-ent.com/area51.html**.

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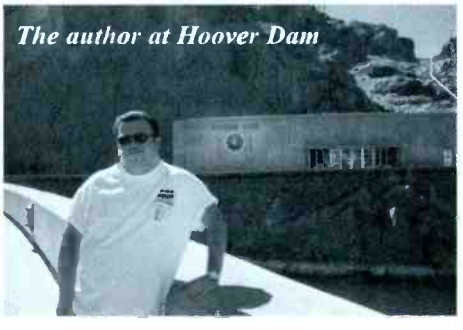
TABLE 1: LAS VEGAS AREA FREQUENCIES

159.15	LV PD* F1 Info 154.77 In	150.79	Metro County PD Swat Port	452.8	Strip Trolly
159.09	LV PD F2 SE 154.71 In Strip	154.83	Metro County PD Swat Vice Narcotic	453.3	Gaming Bd. Surveillance
158.97	LV PD F3 SW Strip 154.74 In Narcotic & Vice	154.965	Nevada Hwy Patrol Region 1 161.325	466.3	Wet & Wild
158.745	LV PD F4 Downtown 154.98 In East	151.07	Nevada Hwy Patrol Region 1 161.325	463.45	LV Convention Center
159.21	LV PD F5 NE 155.73 In Car-Car	150.995	Nevada Hwy Patrol Region 1 161.325	453.15	F1 City FD East**
159.03	LV PD F6 NW 155.55 In	161.325	Nevada Hwy Patrol Region 1 161.325	453.1	F2 County FD West**
158.79	LV PD F7 Admin 154.65 In	151.1	Local Disp. Apex Peak 161.535	453.7	F3 County FD East**
156.21	LV PD F8 Car-Car 154.89 In	151.025	Local Disp. Downtown B of A 161.385	453.4	F4 City FD West**
156.03	LV PD F13, F14, F15 S&R	150.775	Tactical Ops - Excaliber & Sahara 160.965	453.9	F5 Special 131.8 PL**
153.98	LV PD Prostitute Chasers	155.145	Emerg. Manag. Sunrise Mtn. 155.715	462.95	CMED
155.145	LV PD Special Events	154.905	Reno Local 154.905	462.975	CMED
155.94	LV PD Surveillance 155.115 In	155.61	Elko Local 159.105	461.45	Paramedics
158.85	Rural Dispatch	155.655	NV LE Mutual Aid 155.655	464.225	Air amb.
154.34	Rural Fire Disp F7 153.77 In	155.475	Nat. Mutual Aid 155.475	453	Metro County PD*
154.4	F8 Indian Springs 153.95 In	154.92	Mobile Extenders Amargosa Vly	453.25	Metro County PD
154.37	Fire TAC	159.15	LVMPD Ch. 1 154.770	453.45	Metro County PD
154.43	Paging	156.21	LVMPD Ch. 12 156.210	453.65	Metro County PD
158.94	Flight 4 Life	460.8	America West NV	460.2	Metro County PD
158.98	Lifeguard	460.85	America West NV	460.525	Metro County PD
155.28	Lifeguard	461.8125	America West NY, NV	460.4	LV Aux. PD
123.3	Air Amb.	133.95	Tower West / Depart North	856.7375	No. LV PD***
155.16	Air Amb	119.9	Tower Main	857.7375	No. LV PD***
155.88	Airport Sub Station	127.75	Tower East	858.7375	No. LV PD***
158.745	McCarran Airport	118	Clearance - Taxi	859.7375	No. LV PD***
158.805	McCarran Airport	132.4	Depart	860.7375	No. LV PD***
158.055	McCarran Airport	121.1	Ground E of 01R/19L	852.6375	Mirage
155.94	McCarran Airport	121.9	Ground W of 01R/19L	853.6375	Mirage
155.95	McCarran Airport	127.15	Approach	854.6375	Mirage
153.935	LC Convention Center Security	125.9	Depart South	856.9125	Mirage
154.74	LC Convention Center	118.4	Clearance	858.9125	Mirage
153.845	LC Convention Center Security	119.4	Clearance	859.9125	Mirage
155.985	LC Convention Center	125.9	Clearance	859.8125	Mirage
158.835	LC Convention Center	120.45	Final Approach	860.9125	Mirage
151.175	Conservation Aircraft	319.95	Ground	119	Grand Canyon Tower
151.34	STSTE Parks	257.8	Tower	119.35	Nellis Control
151.46	Wildlife Car-Car	379.15	Approach	132.55	Nellis Tower
158.82	Parks 153.875 In	353.7	Depart North	255.7	Fighters
158.925	Downtown Trollys	380.05	Depart South	236.6	Desert Control
154.65	Metro County PD	379.95	Clearance	318.5	Fighters
154.71	Metro County PD	353.7	Clearance	324.3	Nellis Tower
154.74	Metro County PD	379.15	Clearance	173.5375	Nellis Mobile 165.1125 In
154.755	Metro County PD Training	380.05	Clearance	173.5875	FD
154.89	Metro County PD Special Events	853.4875	Excaliber	173.5625	Hospital
155.25	Metro County PD	855.2875	Excaliber		
155.37	Metro County PD	857.9125	Excaliber		
155.52	Metro County PD Training	858.2875	Excaliber		
155.55	Metro County PD	859.8375	Excaliber		
155.73	Metro County PD	860.8375	Excaliber		
155.91	Metro County PD Detective & Intelligence				
156.03	Metro County PD				
156.21	Metro County PD Detective/Car-Car				
150.775	Metro County PD Swat Port				

* Las Vegas and Metro Police Departments are in the process of changing to 800 MHz systems

** Old system, now replaced by Motorola Type II 800 MHz system (855.7125-860.9375). Visit Warren Whitby's website at **http://members.aol.com/wwhitby2/nv.html** for full details. Also see "Scanning Report," p. 26, this issue.

*** GE Ericsson EDACS system



The author at Hoover Dam

For those you who are auto racing fans, you can catch the boys from NASCAR when they visit the Las Vegas Motor Speedway across the road from Nellis AFB.

Scanning at Hoover Dam

I was fortunate enough to have gone out there to visit an old friend who was able to show me the ropes. So, after about 36 hours in the casino she dragged me off for a drive through the desert. Our destination, Hoover Dam.

For more years than you and I have been around, the Colorado River has flowed its 1,400 mile length from the Rocky Mountains to the Gulf of California, bringing water that has been the life-blood for the local inhabitants, livestock, and plants.

The problem was that as the snows melted

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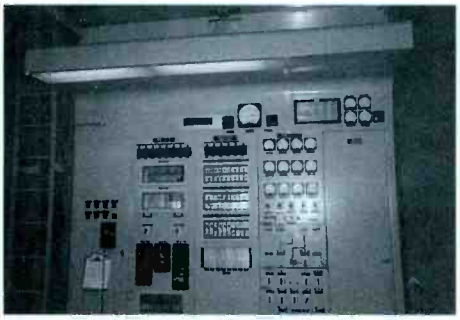

Hoover Dam control room

in the spring and early summer, the same river that brought this life blood frequently flooded low lying areas, destroying lives, crops, and property. Then, in late summer or early fall it often dried to just a trickle.

The river had to be harnessed to provide a stable, year-round water supply. In 1928, Congress passed the Boulder Canyon Project Act authorizing construction of Boulder Dam, later to be renamed Hoover Dam. Construction began in 1931 and was completed two years ahead of schedule, in 1935.

Although the primary goal of the dam was to provide flood control, quite a few by-products have also been developed, one of which is meeting the domestic water needs of more than 18 million people in the states of Arizona, Nevada, and California. Another benefit has been the production of enough hydro-electric power to serve the needs of 1.3 million people per year.

A facility of this nature requires many employees to operate it. You can monitor maintenance on 164.200 MHz. It also draws many visitors per year. In fact, the Bureau of Reclamation provides tours daily. You can contact them at (702) 294-3523.

A facility like this also calls for the protection of the facility, its employees, and its visitors. To meet these needs, the facility maintains its own police force. The Hoover Dam Police operate on 164.475MHz. See Table 2 for the radio codes.

TABLE 2: HOOVER DAM POLICE RADIO CODES

10-1	Officer Needs Assistance
10-4	Acknowledgment
10-7	Out of service
10-8	In Service
10-9	Repeat Transmission
10-10	Altercation in progress
10-19	Return to HQ
10-20	location is_____
10-21	Call HQ
10-23	Unit on scene
10-24	Departed scene
10-25	Meet me at_____
10-50	Motor Vehicle Accident
10-51	MVA with injuries
10-55	Aided Case
10-99	Hit on Warrant
Code 1	Bomb Scare
Code 4	Situation under control
Code 7	On Meal
Code 10	Haz Mat

Another major by-product is that the waters which are held back by the dam have created the world's largest man-made lake. Due to its 12 month season, the 1.5 million acre Lake Mead National Recreation Area, which also includes Lake Mohave downstream, attracts more than 9 million visitors each year. With these numbers the National Parks Service is kept busy maintaining law and order, fighting fires, and providing medical attention. See Table 3 for area frequencies for Lake Mead.

Whether you're headed to Las Vegas to see the scenery, to try your hand at the tables, or to attend one of the many conventions that gather here year-round, don't forget to bring your scanner. While you put your feet up in your room or by the pool, you can still get in on the action to be found in this Nevada city that never sleeps.

Photos by Harry Baughn

Lake Mead

TABLE 3: LAKE MEAD RADIO FREQUENCIES

Ch 1	166.300	Simplex
Ch 2	166.300	Wilson Mountain Repeater
Ch 3	166.300	Jumbo Mountain Repeater
Ch 4	166.300	Perkins Mountain Repeater
Ch 6	168.350	Tac
Ch 7	172.600	Tac-1
Ch 8	156.800	Marine Ch 16
Ch 9	157.100	Marine Ch 22A

UHF Links 411.700, 412.025, 417.375, 417.625

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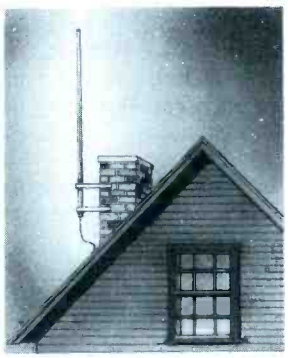

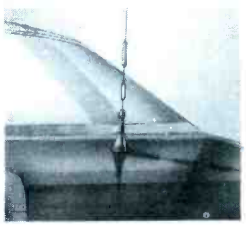

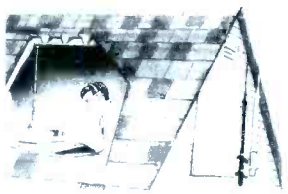

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Across the Pond

By Pat Martindale

Are you planning a holiday trip to the United Kingdom? Are you planning to bring along your scanner or shortwave receiver? This article is written as a preview of what to expect when monitoring outside North America."What's the difference?" I hear you cry. "A radio is a radio, no matter where in the world you live."

This is partially true, but VHF/UHF scanning and HF monitoring as a hobby across this side of the great Atlantic is a different world from that experienced by our American friends. "Why?" you ask "the equipment is similar, and radio waves do not recognize international boundaries." Again very true, but let's not ignore one fundamental difference — *the law.*

Here in Britain, very different laws apply, when it comes to an ordinary citizen wanting to intercept radio signals, to those in place "across the pond." In 1949, the British government passed an Act of Parliament called the "Wireless Telegraphy Act" (WT Act). In the intervening years, this law has stood guard against all those who should want to tune in to radio transmissions made by all but a few users of the radio spectrum. What is the reason for the law?

The reason given by the UK Radiocommunications Agency (RA), the body currently responsible for the application of the Act, is that it is necessary to protect the privacy of people using radio communications. No doubt the government of the day had reason to impose it upon its people. The Act has certainly never been repealed and is still applied, with some vigor, when the need arises.

In days past, when suitable radio equipment was difficult, if not impossible, to obtain, the Act was probably sufficient to deter people from attempting to obtain it. Nowadays, with the ready availability of scanners etc., the Act is looked upon by many as just another minor obstacle that is (more or less) ignored!

SO, WHAT DOES THIS ACT SAY?

The Act says many things, but I only intend to deal with those aspects of the law so far as it affects radio hobbyists such as scanner users and HF listeners. To go into the full details of the Act would require a far larger article than this, and an in depth analysis would probably require a legally trained brain, which, I hasten to add, your writer does not possess!

So far as the casual users of scanners and similar receiving equipment are concerned, there are two offenses to be considered under UK law. The first one we shall look at is covered by Section 5(b) of the WT Act 1949. This states that it is an offence if a person

> *"otherwise than under the authority of the Secretary of State or in his duty as a servant of the Crown, either:*
> *(i) uses any wireless telegraphy apparatus with intent to obtain information as to the contents, sender or addressee of any message whether sent by means of wireless telegraphy or not, which neither the person using the apparatus nor any person on whose behalf he is acting is authorised by the Secretary of State to receive; or:*
> *(ii) except in the course of legal proceedings or for the purpose of any report thereof, discloses any information as to the contents, sender or addressee of any such message, being information which would not have come to his knowledge but for the use of wireless telegraphy apparatus by him or by another person." (1)*

In plain English, what this means is that unless you have authority to listen to a transmission you should not be listening! Such authority is usually conveyed by the granting of a license to use a particular service, though direct authority can be granted by the Secretary of State. In the case of a license issued to, for example, an employer who requires his employees to use a company radio scheme, then those employees would become licensed to use the allocated frequencies when required to do so by the employer.

Part (ii) above makes it an offense to disclose any information that you should happen to "overhear." Not only is it an offense to listen, its also an offense to tell anyone what you have heard!

The law forbids the listener to tune in to all but three things in the UK. Firstly, the transmissions made by *licensed* broadcasters. The requirement of a license to listen to those was abolished some years ago. I stress the word licensed. It is illegal in the UK to listen to pirate radio transmissions, even those originating abroad. It is still illegal to receive television transmissions without a license, but radio is now free of such restriction. Restrictions are also placed on reporting of transmissions heard from pirate stations. This is deemed to be advertising of the station and is illegal. The way that the radio press gets round this restriction is to either report the name of the station or the frequency — not both.

Next, transmissions from radio amateurs and those using Citizens Band can be intercepted without restriction. A license is required to transmit on both the amateur and CB bands and, in the case of the amateur bands, the license can only be gained by the passing of examinations and payment of a fee, but anyone can listen in.

Finally, the Act allows the mariner to intercept weather reports and navigational information without which the safety of life at sea could be compromised. Again, to transmit on the marine bands requires a license, but no such license is needed for reception of safety-related information usually transmitted by the Coastguard.

The second offense under UK law that could be committed by the scanner user is under Section 1 of the Interception of Communications Act 1985. If a person - *"intentionally intercepts a communication in the course of its transmission by post or by means of a public telecommunications system." (2)* he or she is guilty of an offense.

This means that it is illegal to listen to mobile phone networks which are designated in the UK as forming part of the public telecommunications system.

SO WHERE DOES THIS LEAVE THE LISTENER?

The popularity of scanning as a hobby in the UK grew when it was revealed that some cellular telephone calls could easily be intercepted with a high-street bought scanner. Readers will no doubt remember the controversy that surrounded the alleged interception of calls made by the late Diana, Princess of Wales, amongst others. The press and television gave out a great deal of incorrect information about the capabilities of scanners, much of which was based on a total lack of understanding of radio.

This sort of "scandal" always interests the British public, and the newspapers and television stations did not like to let a little inaccuracy get in the way of a good story! Following publication of these stories, the UK radio retailers reported an increase in the number of scanners being sold. Until this time, the vast majority of the Great British public had never heard of a scanning radio!

From a purely technical point of view,

Photo by Tony Walker.

The Concorde at Manchester Airport.

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the interception of radio signals, whether they be broadcast by the local or national radio station, the county police or emergency services, or any one of the multitude of people now using radio as an effective means of communication, has never been easier. I can go into my local radio shop and buy a scanner quite openly and without a license, straight over the counter.

No restrictions are imposed on the makers of the scanners, either through importation restrictions or other means, as to the range of frequencies covered by the scanner. Just so long as it meets relevant UK and European safety and emission legislation it can be imported and sold. You can also choose from a vast range of aerials suitable for use with your new receiver, many of them dedicated to reception of bands that you are not supposed to be listening to. All that is required to get set up is to part with some hard-earned cash!

The WT Act tells us what we *can* listen to, but what about all the transmissions being made that we are not supposed to intercept? Having bought my scanner, where can I find the frequencies used by those I want to listen to?

Over the years, many books have evolved that list supposedly "secret" frequencies — some are quite good, whilst some leave a great deal to be desired! These books can be purchased from the local bookstore without restriction.

For a long time, before scanning as a hobby became really popular in the UK, there operated an almost underground network of enthusiasts who regularly exchanged information. Most of this information was good; it was after all compiled by enthusiasts, some of whom took their hobby very seriously indeed. Many were licensed amateurs, some even worked in a professional capacity with radio. People with scanners tended to be quite secretive about the hobby, with good reason: the penalties for illegal use of a scanner can be severe. Much of this information filtered down the hobby on a person to person basis, rather than through published frequency lists. Now, as well as books, frequency lists are available from several sources including many available quite openly on the Internet.

Strange as it may seem, frequency information is also available from official sources. For instance, the Royal Air Force will sell to nonservice personnel a book (called an En-Route Supplement) that lists amongst other things, frequencies used by the major military and civil airfields in the UK. Separate editions are available to cover other areas of Europe. There are many sources of readily available information in the UK.

You would think that restrictions would be placed on the availability of this information, or on the availability of suitable receivers. Not so. It is not illegal in the UK to know what frequency is used by (for example) the local police. It is not illegal to write it down and sell the information for a profit. It only becomes illegal when that frequency is entered into a scanner!

A Royal Air Force Sea-King search and rescue helicopter of "E" flight, 202 squadron RAF, based at Leconfield. The primary role of the squadron is for rescue of military personnel, but they also respond to calls for assistance from the civil sector and marine rescue. Equipment includes VHF and UHF airband sets and marine radio. During holidays, the flight is often busy as many amateur sailors put to sea off the coast.

In the main, a "blind eye" is turned to people listening to aircraft, both military and civil. This does not mean that scanner users can relax their guard: it is still an offense, though if you go to any UK airport at a busy time you will probably find several scanner users in the viewing area, in full view of the authorities. At military airshows, it is quite common for the "frequencies of the day" to be posted by the Air Force. Aircraft monitoring is looked on as been a fairly innocuous pastime and, in truth, the authorities have far better things to do than chase aircraft spotters.

Having read the above, please do not think that if all you listen to is aircraft that you will "get away with it." If the RA want to prosecute you they will. The fact that it is common practice is no excuse under the law!

One of three world-rally specification Subaru Impreza vehicles used by the specialist Vehicle Crime Unit of Humberside Police and used for high speed pursuit. The communications technology carried by the vehicle is impressive,and includes a secure car-to-car link with other vehicles of the unit, VHF and UHF radios, and a GSM telephone. Listening to Police transmissions in the UK is illegal of course!

Certainly, a dim view is taken of people who listen to the emergency services. In the past, there have been reports in the UK press of scanner users being "trapped" by the broadcasting of bogus messages by the police that are intended to lure them to a particular location. These messages have been many and varied, but a popular one going around is reports of a UFO landing. When the scanner users turn up at the remote location to see the "spaceship," all they find waiting are the local police!

Now, whether these events actually take place is a matter of conjecture. Some claim to know of someone, possibly a friend of a friend, who was caught. I will leave the reader to make his own mind up!

HOW TO PREVENT UNAUTHORIZED LISTENING?

Some users, such as a few (though not all) police forces as well as Customs and Excise and similar, do use encrypted systems. Other users are gradually going over to digital systems that are well protected from interception by the average scanning hobbyist. The Metropolitan Police, who are responsible for policing the streets of Greater London, for example, have just gone over to a new trunked system for their "Personal Radio" scheme. (These are the multichannel UHF sets carried by most British police officers.)

The system they have installed still uses plain speech, but as with all trunking systems, following an exchange over the radio is difficult without the right equipment. Such equipment as trunk-tracking scanners are available, of course, but the ones currently being marketed in the UK will not track UK trunking systems. The sets are only able to track Motorola type I and II trunking systems, neither of which are in use in the UK.

As the UK emergency services are updating their equipment, they are incorporating the latest technology into the communications systems, with encryption systems being installed for use as required. As usual with such things, though, budgets play a large part, and many

A view showing similar equipment to that carried in the police Impreza. This photo is inside one of the unit's previous vehicles, a Ford Cosworth, and shows the radio, video and evidence collection equipment.

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The passenger and vehicle ferry Norstar, operated by North Sea Ferries. This photo was taken on the quayside at Rotterdam. The Hull to Rotterdam route into Europe is popular with holidaymakers, particularly those from northern UK.

services are reluctant to spend money on updating equipment when other more pressing operational needs have to be met.

In the shorter term, those wishing to listen will not have too much trouble doing so, but in the not too distant future, the UK emergency services are expected to go over, more or less *en mass*, to a trunked system based on the TETRA (Trans European Trunked Radio) standard. Negotiations are continuing between various bodies, commercial enterprise and government departments, over the Public Safety Radio Communications Project (PSRCP) with which the UK government hopes to introduce the benefits of digital communications to the police and other emergency services as the new century dawns.

Meanwhile, whilst these talks are going on, several police forces and county fire authorities are installing their own secure systems with one fire authority at least going over to a system based around digital cellular telephones with the capability to send both data and speech between control room and fire appliances.

ELSEWHERE IN EUROPE?

Listening laws do vary between the member states of the European Union. For instance, in The Netherlands it is within the law to not only own a scanner but no restriction is placed on what you can listen to. Disclosure of what you have heard is not permissible, though. Much the same law applies in Spain.

In France, scanner ownership is legal but the hobby is still very much regarded as an "underground" pastime and advice from my French colleagues is not to advertise the fact that you use a scanner. The laws in Germany are very much the same as the UK — illegal to listen without proper authority and no disclosure of anything overheard. Scanner ownership is legal, though.

FURTHER INFORMATION.

Should any reader require further information on UK listening law, the UK Radiocommunications Agency produces several informative leaflets, the text of most being available on the Internet. The most useful from a scanner user's point of view has to be document RA 169. For other radio users, including those who may require to transmit, document RA 67 will provide a wealth of information. For those without web access, the information can be obtained from the Agency. The author can provide contact details if required.

CREDITS.

(1) and (2) United Kingdom Radio Communications Agency. Document RA 169 (REV 4).

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ABOUT THE AUTHOR:

Pat Martindale, who lives on the East Yorkshire coast of England, has a long-standing interest in radio across the spectrum. He is a licensed radio amateur and holds a certificate of competency in Marine VHF Radio Telephony. Following an industrial accident, he took early retirement in August 1994, leaving plenty of time free to pursue his main interests of radio and model engineering. Other interests include miltary aviation, computing and playing guitar. He is willing to answer questions or discuss related matters via e.mail at: *pat@crayke.demon.co.uk*

He also wishes to thank those who helped with this article: friends in the world of radio who responded to questions with regard to mainland Europe; those who helped with pictures; the staff at the UK Radiocommunications Agency; and to Steve Pickering for his help with proof reading and constructive criticism.

U.K. BANDPLAN

This table should serve as a guide only. It should not be taken as a definitive bandplan as many variations apply.

From	To	Usage
30.000	34.500	Fixed Mobile & Paging systems. Cordless phones.
34.500	37.500	Mobile (mostly Government & Military) Model control.
37.500	47.000	Military Mobile Cordless phones.
47.000	50.000	Cordless phones Land mobile Baby listeners.
50.000	52.000	Amateur Radio.
52.000	64.000	Land Mobile & Radio Mikes.
64.000	68.000	Land Mobile. (including Military)
68.000	70.025	Military Mobile repeaters.
70.025	70.500	Amateur Radio.
70.500	71.500	Emergency Services Bases. Fire Brigades.
71.500	72.800	Low Band PMR mobiles (bases +13.5)
72.800	74.800	Government Mobile
74.800	76.700	USAF British bases & outside broadcast.
76.700	78.000	PMR & Government mobiles.
78.000	80.000	Private users & Government mobile.
80.000	84.000	Emergency Services (Fire) (mobile)
84.000	85.000	Military Mobile & Repeaters
85.000	88.000	Low Band PMR bases & Local Authorities
88.000	108.000	Broadcast band
108.000	118.000	Aeronautical Radionavigation Mobile Band
118.000	137.000	VHF Air Band
137.000	138.000	Space to Earth Communications & Weather Satellites
138.000	141.000	Mobile PMR Gas and Electricity authorities
141.000	143.000	Mobile. Government inc. land air and spoce.
143.000	144.000	Emergency Service Mobile (Police) coupled with bases at + 9 MHz
144.000	146.000	Amateur Radio
146.000	148.000	Emergency Service Mobile. (Police)
148.000	150.000	Local authorities & Military Mobile
150.000	152.000	Radio Astronomy
152.000	153.000	Emergency Services. (Police bases)
153.000	156.000	Paging Systems & Government mobiles
156.000	174.000	Mobile (Land & Marine) & Mobile Phones
174.000	225.000	Mobile & TV Broadcasting Radio Mikes
225.000	328.000	Military Air Band
328.000	335.000	Aeronautical Radionavigation
335.000	399.000	Aeronautical Mobile (Military)
399.000	400.050	Radionavigation by Satellite
400.050	406.000	Meteorological Satellites
406.000	420.000	Government mobile
420.000	440.000	Military & Amateur Radio
440.000	450.000	PMR Bases
450.000	470.000	PMR & Emergency Services
470.000	854.000	UK Band 4 TV & USSR Satellites
854.000	864.000	Emergency Services mobile
864.000	870.000	Mobile Phones
870.000	889.000	Mostly Military
889.000	960.000	Mobile Phones

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A Weather Satellite Primer

By J.S. "Stu" Gurske

Photos courtesy of the Dallas Remote Imaging Group

Early morning APT photo of the Rocky Mountains

From the darkness of space, electronic sentinels constantly monitor the changing and dynamic patterns of the world's weather. Day and night these satellites continuously observe and measure the many forces of nature which converge on our planet. Photographs are constantly sent to Earth from these orbiting satellites for analysis by meteorologists and scientists. But national government weather agencies aren't the only ones that can receive weather images. You can also receive weather satellite pictures like the pros, live and direct from space in your own home.

GEOSTATIONARY ORBITS

Geostationary spacecraft orbit the Earth at a speed and altitude that allow them to hover continuously over one area of the Earth's surface, providing continuous coverage of that area. U.S. coverage is provided by Geostationary Operational Environmental Satellites (GOES). One of the GOES communications functions is to provide Weather Facsimile (WEFAX) services. WEFAX data, with a resolution of 8 kilometers (4.96 miles), consist of retransmissions of processed GOES images, polar-orbiter data, and other meteorological information.

With its seemingly stationary position relative to Earth (a result of its orbit 35,581 km / 22,238 miles) above Earth, GOES provides views of almost a third of the Earth's surface. Images from GOES, combined with images from Japanese, Russian and European Space Agency geostationary satellites, provide a global view of the Earth's environment.

These satellites transmit WEFAX services in the area of 1.7 gigahertz (GHz).

Polar Orbits

Polar-orbiting satellites travel approximately 960 kilometers (600 miles) above Earth, providing a more detailed look at a smaller area. Their orbital paths cross almost directly over the poles and their sun-synchronous orbits mean that they cross the equator at the same time each day.

U.S. polar orbiters, called TIROS satellites, provide low-resolution imagery called Automatic Picture Transmission (APT). APT is real-time data, with a resolution of 4 kilometers (2.48 miles), that can be obtained when the satellite is within the receiving area of a ground station antenna – approximately every 102 minutes. APT transmissions can be received in the 136-138 Megahertz (MHz) range.

High Resolution Picture Transmission (HRPT) from polar-orbiters has data resolution of 1.1 kilometers (.7 mile), but requires more costly equipment to obtain it. Like the GOES WEFAX, HRPT is transmitted in the 1.7 GHz range.

When APT signals are sent by the orbiting satellite, it is usually in a frequency modulation (FM) format with the picture information sent by amplitude modulation (AM) using a 2400 Hertz (Hz) audio carrier. In other words, the signal is sent by FM. When the signal is detected by an FM receiver, a 2400 Hz signal is heard. This 2400 Hz signal has been AM modulated with the picture information during the transmitting process.

The bandwidth of this FM signal is not the usual 7.5 kilohertz (kHz) that police and fire departments use for communication. Instead the signal is over 30 kHz wide in bandwidth. Since most communications receivers and scanners are not capable of demodulating a signal that wide, some provision or modification to the receiver must be done to properly detect the 30 kHz FM signal.

If we are going to receive images from polar orbiting weather satellites, we must also allow for Doppler shift. If Doppler shift is taken into consideration, our receiver needs to be able to detect a 40 kHz wide signal. This is not as big a problem as one might first expect, as we shall soon see.

Either WEFAX or APT services enable the user to obtain substantial environmental data. A dual system that accesses both types of data provides a comprehensive and continuous picture of the environment. Continuing technology improvements and cost reduction now make that possible in a low-cost system.

Receiving equipment

Obviously, you need a receiver which is able to demodulate an FM 30 or 40 kHz bandwidth signal. The receiver must be able

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to tune the 136-138 MHz orbiting satellite band and, ideally, extend up to 1.7 gigahertz or so.

While few "off the shelf" commercial receivers can demodulate these signals, many special weather satellite receivers are now available today. They range from stand-alone receivers, to "plug in cards" (containing a complete receiver), to a special device which plugs into the intermediate frequency (IF) port of Icom R7000 or R7100 VHF/UHF communications receivers.

Many feel this special plug-in device is the more cost-effective approach, because it allows a general coverage receiver to serve its usual functions as well as using it as an excellent weather satellite receiver with the addition of this device.

Antennas

When receiving orbiting satellites, you should consider that they revolve (tumble) in space. They also send a circularly polarized signal (right hand circular), and therefore you need an antenna which will optimize this kind of signal. While simple antennas can be used, the best results will be obtained if you use crossed yagis with a phasing harness and an azimuth and elevation rotator system to track the satellite.

Alternatively, one can use turnstile types of antennas, but they almost always suffer dropouts during part of the period the satellite is in view. Typically, several "drop outs" with their attendant banding of the picture occur during a satellite pass when marginal antennas are used. As is always the case with radios, the better the antenna, the better the result.

Some people use antennas known as Lindenblads. They are good and perhaps better than the turnstile types, but because they are somewhat labor intensive, they do cost a bit more to build (or purchase). Similarly, the Quadrifilar Helix is another type of antenna used to receive circularly polarized signals, but it, too, is very labor intensive to construct, and therefore more costly. For the do-it-yourselfer both the Lindenblad and Quadrifilar Helix should be considered.

Antennas used for GOES WEFAX reception on 1691 MHz often consist of ring-type Yagis or dishes. Dishes provide much better signals to the receiver, but they require a little more effort and space. Dishes are available from satellite TV dealers as well as from vendors specializing in WEFAX equipment.

A dish collects the signal and reflects it to the feed horn located at the focal point of the dish. Feed horns for 1691 MHz can be built from coffee cans or purchased. Coffee cans can rust, though, so, for a permanent installation, it is best to either purchase an aluminum can and install your own probe (as in the author's construction article on page 16 of the April 1999 *MT*) or purchase the entire feed horn assembly from a weather satellite dealer.

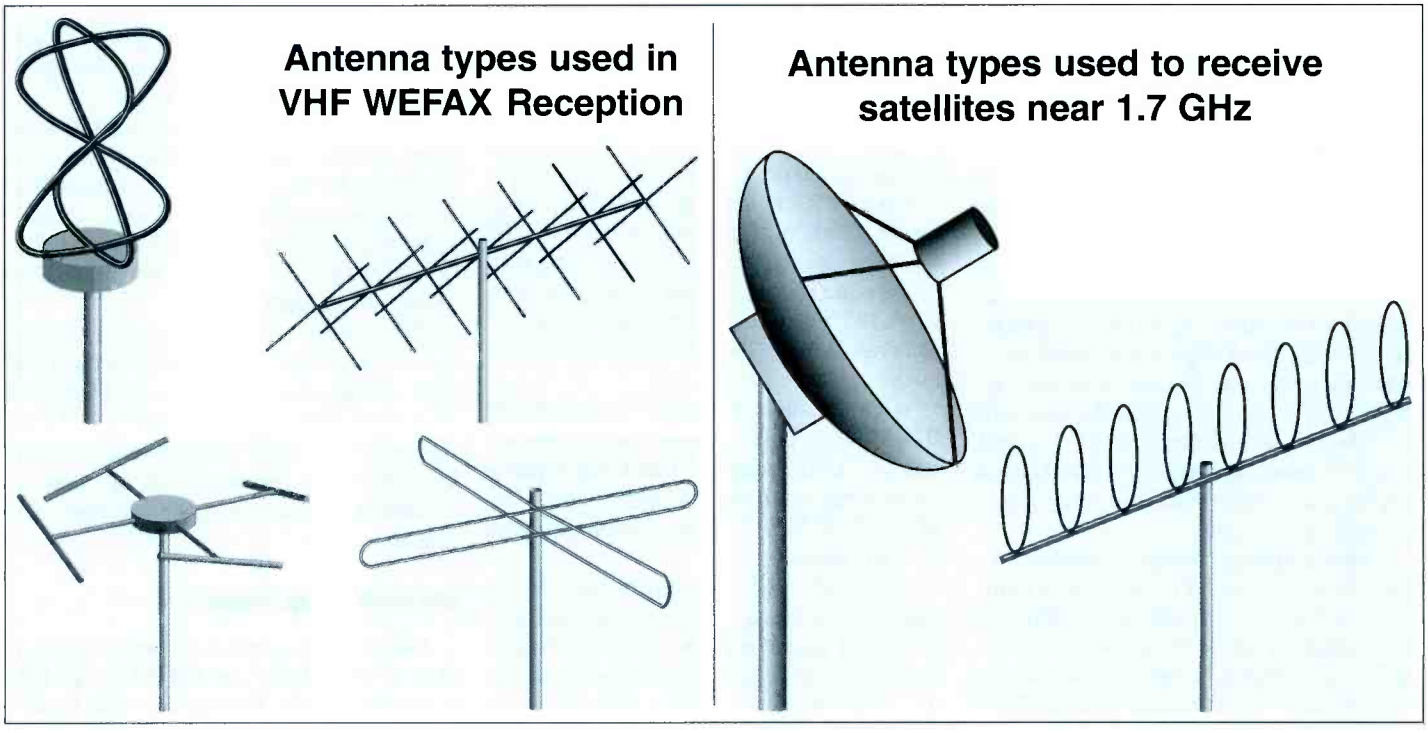
Down Converters

If your receiver will not tune to 1691 MHz, you might want to use a down converter. A down converter takes the higher frequency, 1691 MHz in this case, and converts it to a lower frequency. This lower frequency is usually in the 137 to 138 MHz range. You can then use your polar orbiter receiver to listen to the GOES satellites. Down converters can be built or they can be purchased from several weather satellite vendors.

Preamplifiers

For best results, one should mount some kind of a good preamplifier, tuned to 137.5 MHz, at the antenna. If you live in close proximity to an airport or on an aeronautical airway, you might want to consider installing a filter tuned to reject the aircraft band (108 to 136 MHz).

This filter might also be helpful if you have amateur radio operators or one of their repeaters located near you (144 to 148 MHz frequency range). Many enthusiasts do not use a preamplifier and manage to receive some images, but for excellent results you need the strongest signal possible. Use a preamplifier.



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Computers

Almost any kind of a computer (PC) will work. However, for excellent images, it is necessary to have at least a VGA monitor and video card in your computer. If you have SVGA, your images will reproduce even better. Your software might also allow for a video card with one megabyte (MB) of RAM (Random Access Memory) instead of the usual 512 kilobytes.

If your software provides for animation of your images, you may also need several megabytes of computer RAM installed in your machine to handle the larger job of animation. You do not need a large hard drive for image storage unless you want to store a lot of images on your computer.

Software

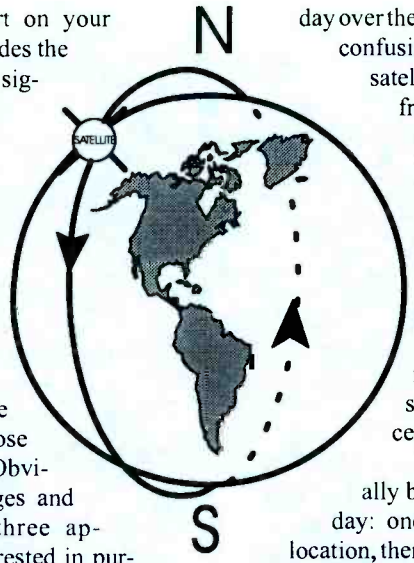
There are a lot of software vendors with excellent products being marketed today. I have used several different types and have been satisfied with all of them. In general, you will have a choice of three basic approaches to software.

1) A "plug-in card" for decoding the already demodulated signal.
2) A decoder which plugs into a serial or parallel (printer) port on your computer. It too, decodes the already demodulated signal.
3) A "plug-in card" which contains the entire radio receiver as well as the decoding hardware.

All three of these systems include the software as a part of the package. Some of these decoders are available in kit form for those who like to build things. Obviously there are advantages and disadvantages to all three approaches. If you are interested in purchasing a decoding system, make up a list of the advantages and disadvantages of each of these systems and then make your choice.

Orbital Prediction

If you want to listen to an orbiting satellite, you must, of course, know when it is going to appear over your location and where to look for it in the sky. The polar-orbiters get their name because they travel from north-to-south or south-to-north depending upon the time of day over the polar regions. This sounds confusing, but if you visualize a satellite rotating above the earth from pole to pole as the earth rotates under it, the satellite will come from the north at one time and 6 hours later it will come from the south. In practice, the orbiters come from the north and head south (descending) in the morning and from the south and head north (ascending) in the afternoon.



These satellites can usually be heard three times in one day: once quite far east of your location, then almost directly overhead, and once again when they are quite far west of your location. On the next day they will be heard twice: once to the east and quite high, then west of you and quite high; then the next day three times once again.

Obviously you will need some way of predicting where they will be at any given time. Fortunately, there are a lot of computer programs out there which are very user friendly, which will give you all the information you will need.

The German astronomer and mathemati-

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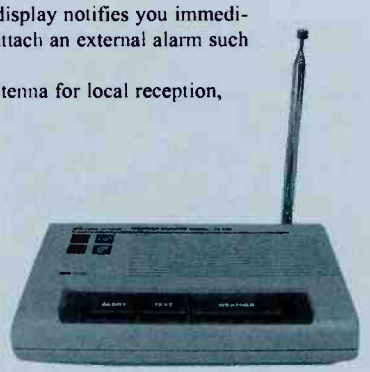

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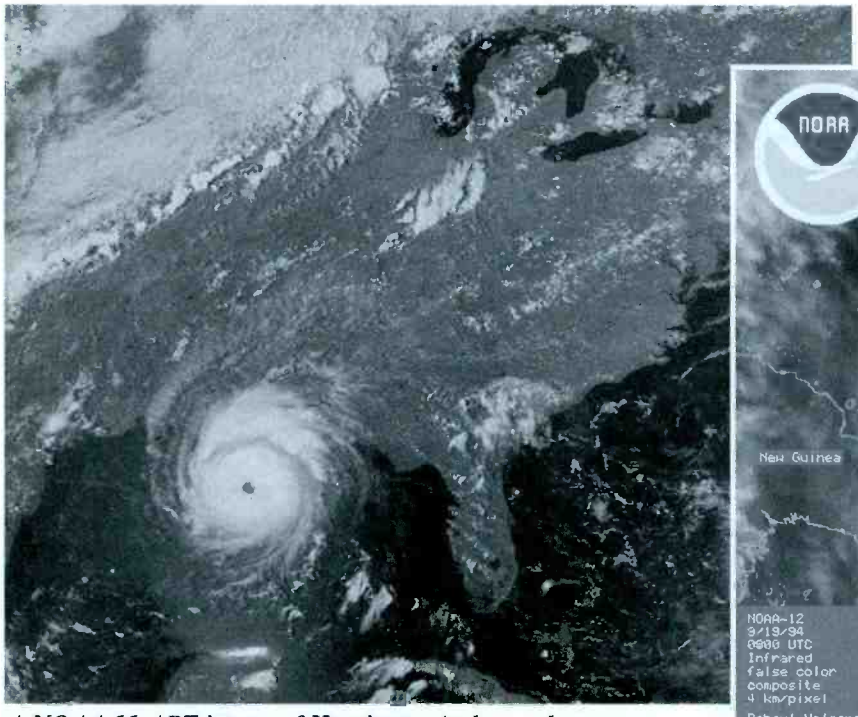
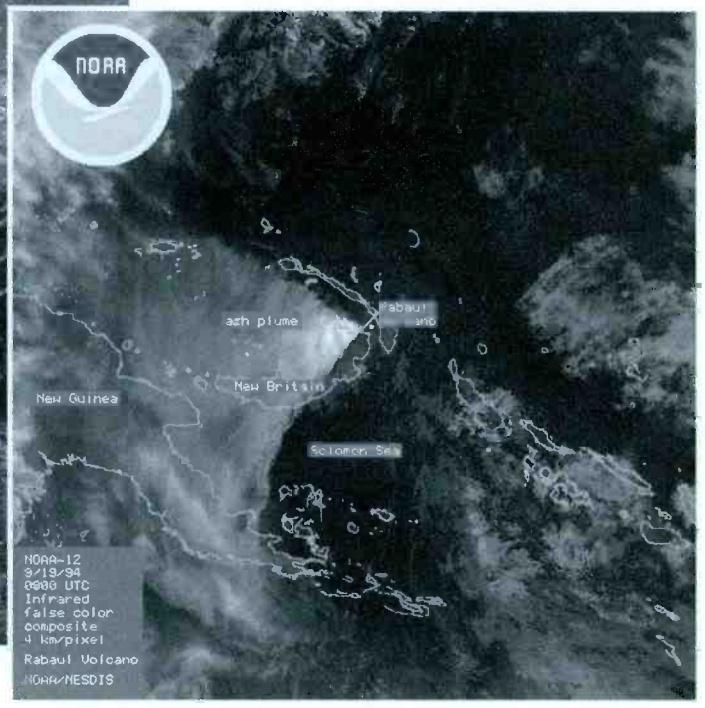


A NOAA 11 APT image of Hurricane Andrew taken on August 25, 1992, while the storm was located just south of Louisiana



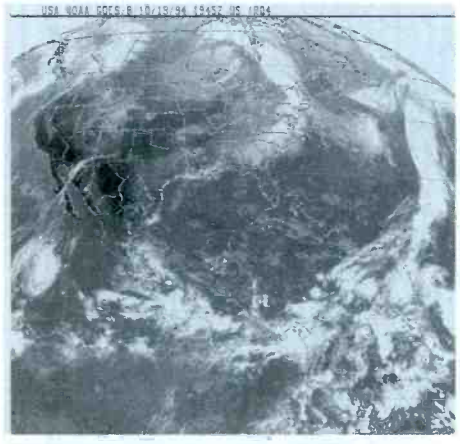
An APT photo of the Rabaul volcano taken by NOAA 12

cian Johannes Kepler (1571-1630), in 1627 published a treatise which predicted the way natural objects (and now, man-made satellites) rotate around a body, like the earth. This orbital information, called Keplerian data (or elements), must be updated in your computer program periodically. Fortunately, this data is readily available in many places including T.S. Kelso's site at **http://celestrak.com**

Satellite Tracking

When I began tracking satellites in 1969, I had to obtain a TBUS (TIROS satellite prediction) message from the weather bureau, then plot the data on a satellite tracking chart, and then go outside to my garage roof to listen to the satellite using headphones. I tracked the satellite by hand by pointing my antenna where I thought the satellite would appear. When I began receiving it, I followed it by listening for the strongest signal. A helper tended the equipment in the house. I received many excellent pictures using this method and became quite good at it!

Today, I use a tracking program in the computer which controls the azimuth and elevation rotators to point the antenna and follow the satellite as it passes over my location. There are several tracking programs available and they all seem to function well. Some have more bells and whistles, such as warning beeps when the satellite appears or messages which tell the status of your rotators.



WEFAX image from the GOES 8 weather satellite received on 1691 MHz

Saving Images

When you start receiving good images (or even the first one) you will want to preserve many of them in some way. There are photographic hoods available which will hold the camera steady, will cut out reflections and allow you to use your 35 mm camera or other film formats to take excellent pictures.

You can save the images to diskettes, but since the orbiter images may use well over a megabyte of space, if you copy a full pass with 2040 bytes per line, a diskette may not be able to save the entire pass. You can, with most programs, save just a screen full which will fit on a diskette.

But another approach – and the one I often use – is to save the image on a computer backup tape. I save entire passes on tape and when I want to look at it later I merely use the restore function, then select the part of the image I want to use. I then record that portion to a diskette for processing in my graphics manipulator (to adjust for brightness, contrast, gamma etc). By using backup tape, I always have the full image to work with. A zip drive would work equally well.

Weather satellite imagery reception can be fun and educational. With the price of weather satellite equipment plummeting, why not consider putting up your own APT or WEFAX direct readout station to monitor the Earth from space?

Stu Gurske, K9EYY, is the president and founder of Swagur Enterprises and an avid weather satellite enthusiast since 1969.

This article has been reprinted with permission from Satellite Times, July/Aug 1995.

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Looking for a great hand-held two-way transceiver? To celebrate our 30th anniversary, CEI has teamed up with RELM Communications to offer you our transceivers guaranteed to work in the year 2000 and beyond. With the CEI package deal, you will get your choice of VHF or UHF MP series portable transceiver, belt clip, wall charger, 700 ma rechargeable battery, antenna, and two year limited factory warranty. The CEI RELM package deal is only $299.95 plus $19.00 shipping. You'll save over $215 off the regular retail price when you order now! Firefighters and rescue workers depend on the RELM MPV32 transceiver for direct two-way communications with their fire or police department, civil defense agency or ham radio repeater. The MPV32 is our most popular programmable frequency agile five watt, 32 channel handheld transceiver that has built-in CTCSS, which may be programmed for any 50 standard EIA tones. Frequency range 136.000 to 174.000 MHz. UHF range 450-480 MHz. The full function, DTMF compatible keypad also allows for DTMF Encode/Decode and programmable ANI. Weighing only 15.5 oz., it features programmable synthesized frequencies either simplex or half duplex in 2.5 KHz. increments. Other features include PC programming and cloning capabilities, scan list, priority channel, selectable scan delay, selectable 5 watt/1 watt power levels, liquid crystal display, time-out timer and much more. When you order the MPV32 from CEI, you'll get an antenna, 700 ma rechargeable battery, add $20.00 to substitute a 1000 ma battery), battery charger, belt clip and user operating instructions. Other useful accessories are available. A heavy duty leather carrying case with swivel belt loop part **#LCMP** is $49.95; rapid charge battery charger, part **#BCMP** is $69.95; speaker/microphone, part **#SMMP** is $54.95; extra high capacity 1000 ma. ni-cad battery pack, part **#BPMP1** is $79.95; extra 700 ma. ni-cad battery pack, part **#BPMP7** is $59.95; cloning cable, part **#CCMP** is $34.95; PC programming kit, part **#PCKIT030** is $224.95. Your RELM radio transceiver is ideal for many different applications since it can be programmed with just a screwdriver and programming instructions in less than 10 minutes. Programming is even faster with the optional PC kit. The programming instructions part **#PIMPV** is $19.00. To order this special RELM deal, call CEI at 1-800-USA-SCAN or visit our web site at **http://www.usascan.com**.

TrunkTracking Radio

DISTRIBUTOR'S COUPON | EXPIRES 07/31/99 | #9906M8

SAVE $125 on one BC895XLT

Save $125 when you purchase your Bearcat 895XLT scanner directly from Communications Electronics Inc., PO Box 1045, Ann Arbor MI 48106 USA. Telephone orders accepted. Call 1-800-USA-SCAN. Mention offer CEI8. TERMS: Good only in USA & Canada. Only one coupon is redeemable per purchase and only on specified product.

Bearcat®895XLT-A Radio Scanner

Mfg. suggested list price $729.95/**Special $319.95**
300 Channels • 10 banks • Built-in CTCSS • S Meter
Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High
Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked communications transmissions (see BC235XLT description below) 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*** – This feature lets you record channel activity from the scanner onto a tape recorder. ***CTCSS Tone Board*** (Continuous Tone Control Squelch System) which 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. Order from CEI today. Call 1-800-USA-SCAN.

DISTRIBUTOR'S COUPON | EXPIRES 07/31/99 | #9906M2

SAVE $100 on one BC235XLT

Save $100 when you purchase your Bearcat 235XLT handheld scanner directly from Communications Electronics Inc., PO Box 1045, Ann Arbor MI 48106 USA. Telephone orders accepted. Call 1-800-USA-SCAN. Mention offer CEI2. TERMS: Good only in USA & Canada. Only one coupon is redeemable per purchase and only on specified product.

Bearcat®235XLT-A TrunkTracker

Mfg. suggested list price $429.95/**CEI price $269.95**
300 Channels • 10 banks • Trunk Scan and Scan Lists
Trunk Lockout • Trunk Delay• Extra battery & charger
10 Priority Channels • Programmed Service Search
Size: 2-1/2" Wide x 1-3/4" Deep x 6" High
Frequency Coverage:
29.000-54,000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat TrunkTracker BC235XLT, is the world's first scanner capable of tracking a selected radio transmission as it moves across a trunked radio system. Now it's easy to monitor fleets and subfleets in analog trunked radio systems. The BC235XLT can also work as a conventional scanner. This 300-channel, programmable handheld scanner provides scanner users with uninterrupted monitoring capabilities of Type I, II, IIi and hybrid trunking systems. Now it's easy to continuously monitor conversations even though the message is switching frequencies. The BC235XLT comes with AC adapter, CRX120 battery charger, two rechargeable long life ni-cad battery packs, belt clip, flexible rubber antenna, earphone, owner's manual and one year limited Uniden warranty. The BC235XLT when ordered from CEI now features built-in attenuator feature. Not compatible with AGEIS, ASTRO, EDACS, ESAS and LTR systems. Call CEI at 1-800-USA-SCAN to order your Bearcat Trunktracker now.

Radio Scanners

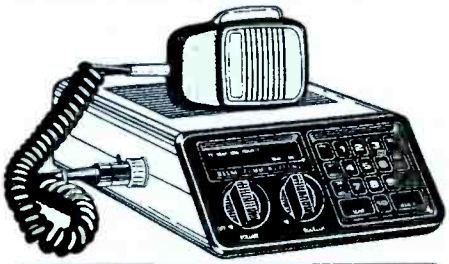
Monitor fire, police, weather, marine, medical, aircraft and other transmissions with your radio scanner from CEI.

AOR 5000+3G-A Desk Receiver/Government orders only	$1,949.95
AOR 8200B-A wideband handheld scanner	$519.95
Bearcat 9000XLT-A 500 channel base/mobile scanner	$344.95
Bearcat 3000XLT-A 300 channel handheld scanner	$329.95
Bearcat 895XLT-A 300 ch.TrunkTracker base scanner	$319.95
Bearcat 760XLT-A 100 channel base/mobile scanner	$179.95
Bearcat 235XLT-A 300 channel TrunkTracker scanner	$269.95
Sportcat 150-A 100 channel handheld with 800 MHz.	$144.95
Bearcat 148XLT-A 20 channel weather alert base scanner	$79.95
Bearcat 80XLT-A2 50 channel handheld scanner	$109.95
Bearcat 60XLT-A 30 channel handheld scanner	$79.95
Bearcat BCT12-A2 information mobile scanner	$144.95
Bearcat BCT7-A information mobile scanner	$149.95
ICOM PCR1000-A computer communications scanner	$474.95
ICOM R10 handheld wideband communications receiver	$399.95
RELM RMV60B 60 Watt 45 channel VHF transceiver	$549.95
RELM SMV4099 45 Watt 99 channel VHF transceiver	$349.95

RELM RH256N-A Wideband Transceiver

Mfg. suggested list price $460.00/**Special $284.95**
Size: 6-1/2" Wide x 10-3/4" Deep x 2-3/4" High
Frequency Coverage: **144.000-174.000 MHz.**

Now...all two-way radio users can have their own RELM two-way transceiver and stay in touch with their office. The RELM RH256N is a powerful 25 Watt wideband scanning transceiver used by thousands of police and fire departments. The RH256N is programmable for up to sixteen different frequencies with selectable CTCSS tones on each channel. Also includes simplex and repeater capability, scan delay and time-out timer. Built-in priority scanner is selectable from the slope-front panel. When you order the RH256N from CEI, you'll get a complete package deal including microphone, vehicle mounting bracket, DC power cords and RELM's two year limited warranty. You can also use the RH256N as a base station if you order our 22 amp 12 Volt DC power supply part **#PS26K** for $94.95 and $25.00 shipping. VHF transmitting antenna with PL259 connector part **#ANTK** is $29.95. Programming instructions part **#PI256** is $19.00.



Buy with confidence

It's easy to order from us. **Mail orders to:** Communications Electronics Inc., P.O. Box 1045, Ann Arbor, Michigan 48106 USA. Add $19.00 per weather station or radio product for UPS ground shipping, handling and insurance to the continental USA unless otherwise stated. Add $12.00 shipping for all accessories and publications. Add $12.00 shipping per antenna. For Canada, Puerto Rico, Hawaii, Alaska, Guam, P.O. Box or APO/FPO delivery, shipping charges are two times continental US rates. Michigan residents add state sales tax. No COD's. Satisfaction guaranteed or return item in unused condition in original packaging within 61 days for refund, less shipping charges. 10% surcharge for net 10 billing to qualified accounts. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. We welcome your Discover, Visa, American Express, MasterCard, IMPAC or Eurocard. Call anytime 1-800-USA-SCAN or 800-872-7226 to order toll-free. Call 734-996-8888 if outside Canada or the USA. FAX anytime, dial 734-663-8888. **Dealer and international inquiries invited.** Order from Communications Electronics Inc. today.

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www.americanradiohistory.com

Richard Barnett
ScanMaster@aol.com

That Digital Dilemma

Whenever you read the scanner newsgroups and magazines lately you're struck by all the talk about agencies converting to digital. Of course when one major city, such as Cleveland, made the switch, the hue and cry from all corners of Ohio (a scanning hotbed thanks in part to the stalwart All Ohio Scanner Club) rang with such force that it seemed like the entire state went the bits and bytes route.*

Cities and state agencies, on a scattershot basis around the country, are taking the plunge. We've discussed it in these pages many times before and we pin our hopes to the notion that one of the big industry players will deliver salvation in the form of a digital scanner. Only time will tell.

A recent contributor to this column discussed communications during the Swiss Air tragedy off the Canadian shoreline (see May issue). This month, David George, the Emergency Communications Coordinator for the Halifax Regional Municipality provides us with some insight into the plans for a new province-wide digital radio system in his province of Nova Scotia. The idea, or at least the impetus to move on the idea, was spawned out of the disaster.

David asked to speak with the radio community at large to air his concerns about another digital migration. Will it not make it difficult, if not impossible, for the wider community to stay in tune with public safety communications, and, more importantly, for many public safety agencies to keep their existing, well-oiled radio system? David writes to radio system managers and hobbyists both:

"Hello Folks,

"My name is David George and I am the Emergency Communications Coordinator for Halifax Regional Municipality in the province of Nova Scotia, Canada.

"This is a volunteer position and my job is to interface amateur radio, ground search and rescue and to provide emergency backup communications systems to the municipality should their system become inoperative or overloaded. Myself and many of my colleagues were directly involved in the Swiss Air incident.

"I have a question and I am directing it more to all the emergency communications dispatchers and those involved with the use of trunking systems.

"As an indirect result of the Swiss Air disaster, which happened just outside the City of Halifax in Peggy's Cove, the Province of Nova Scotia has decided to construct a province wide 800 MHz digital radio network. The province now uses the Nova Scotia Integrated Mobile Radio System which is a series of 23 VHF repeater sites hosting these agencies: Royal Canadian Mounted Police, Government Services, Dept. of Natural Resources, Dept. of Transportation, Municipal Fire Depts., and Health Services. Health Services has additional repeaters bringing the total up to 68 province wide.

"Each agency is on a different frequency but can cross connect through an operator at the radio control centre. Also, each repeater is linked via microwave to the next one so that repeaters can be linked together for province wide communications. The system is used by the various agencies for all day to day communications. It is also used by folks such as the 24 ground search and rescue teams, the Red Cross, volunteer fire departments, and there are 15 amateur radio repeaters attached to various sites as well.

"The City of Halifax already has a Motorola Smartzone IIi system, which is not digital. The province wants to put in a Motorola Digital Smartzone system to replace the VHF one, but the City of Halifax has no plans to buy into the new one as of yet.

"So here is the problem and my question.

"Halifax has an analog Smartzone system, the province wants a digital Smartzone system. The rest of us still use VHF systems. How have the rest of you been able to interface everyone so that it all works and you can talk to all during an emergency?

"The new digital system is scanner proof and the RCMP will have their communications encrypted as well. The plan is to give every volunteer fire department at least one 800 MHz radio and maybe two. We have 340 volunteer fire departments in Nova Scotia. The trouble is that most of the rural fire department members are dispatched via VHF pagers. The repeaters for these pagers are on the government sites slated to be dismantled.

"For ground search and rescue, we have the requirement to monitor several agencies at once, and of course we will only get one 800 MHz radio as well. How will we be able to communicate from multiple sites and from teams in the woods with only one radio? We are presently able to communicate with any agency as needed from any location. Also, 800 MHz is attenuated via tree cover. The Red Cross depends on getting their emergency response vehicles out to the areas where needed via the VHF radio system. None of these issues have been addressed.

"Also, Motorola has stated that no one shall interface any device to their radios, such as allowing VHF radios to access the 800 MHz system via crossband repeating. It has been found out that we could not control any of our existing repeaters or radios via touch tone, as the new 800 MHz system's bandwidth is so narrow that touch tones cannot be passed.

"My questions are:

- What has happened to all of the volunteer fire departments in this situation?
- What happened to smaller agencies?

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- Have you been able to interface existing VHF or UHF systems to the new 800 MHz ones?
- What happened to agencies or the media that monitored via scanners?
- How is the range of your 800 MHz systems?
- What happened to the crime rate in areas whereby concerned citizens could not help the police by listening to scanner reports?
- What happened to fatality rates or property damaged that was lessened by quick response of fire personnel listening via scanners?
- Are you happy with the final results?

"The Nova Scotia Amateur Radio Association, the Provincial Ground Search and Rescue Association, Coast Guard, Volunteer Fire Departments and EMO volunteers are trying to lobby now for changes so that the radio system will be flexible enough to allow for interfacing.

"Do any of you have similar problems or solutions that you might share with me? Thank you, David George"

You can respond with your thoughts directly to David at his e-mail address: *David.George@Dal.Ca*

*(Ohio state agencies may actually go digital if the nascent MARCS system gets off the ground.)

The Other Extreme: An Open Door and Airwave Policy in Public Safety

A contributor recently sent a news clipping from a small paper in Canada (not sure of the location). The headline reads "Police look for radio thieves." It seems that burglars broke into the Chase ambulance station and ran off with a number of two-way radios. The second paragraph reads, "Police are asking anyone who listens to a scanner to report incidents of strange voices on ambulance channels. Noting the voice's gender, race and location, if possible, would be helpful."

So, on the one hand, the RCMP apparently wants no one listening to their radio traffic as evidenced by their desire for encryption. On the other hand, they want scannists to help them track down thieves by monitoring their scanner. You draw your own conclusions.

A less contradictory and quite impressive approach can be found in Las Vegas, of all places. We understand from an Internet posting that the following Special Notice was posted by the Las Vegas Fire Department at newspapers and at radio and television stations by a LVFD public relations/media liaison officer. This is a real eye-opener. It's terrific to see this kind of cooperation between two such public service entities.

LAS VEGAS FIRE & RESCUE
DATE/TIME: 050499/0000PDT
RELEASE: 99-62

SPECIAL NOTICE FOR THE MEDIA
PLEASE READ - PLEASE POST IN NEWSROOM

MONITORING FIRE RADIO CHANNELS

"Since Valley fire departments started using 800 megahertz radios last Fall, a number of new fire channels have been made available for emergency, administrative, support, training and tactical use. But this has made monitoring our channels a little

(Photo by Harry Baughn)

Not only are the fire fighters in Las Vegas media-friendly (we had to take this shot twice, so they posed for this one), but the public information officer holds free classes for the media.

TrunkTrac®

New Version 5.2

TrunkTrac, the first, and one of the most sophisticated trunk tracking technologies available, is now even better. New pricing and additional features make TrunkTrac your best choice if you're serious about tracking Motorola Type I, II, IIi, and Hybrid systems. TrunkTrac now supports the BC895XLT, PCR1000, R7000, R7100, R8500, R9000, and the RS Pro 20xx series with an OS456/535 board installed.

Competing products cost more, don't decode the control channel, can't deal with Type I fleet maps, and won't properly decode many Type II talk groups. TrunkTrac's patented technology let's you do all that and much more. TrunkTrac consists of easy to use menu driven software, an FCC Class B approved signal processing board you plug into an ISA slot in your PC, a serial interface, and a discriminator buffer for your scanner. Everything you need, including cables, is supplied. With TrunkTrac you'll have access to Private Call and Interconnect activity and can follow up to four systems at once. Any combination of VHF/UHF/800/900 MHz systems, including FED-SMR trunking, is supported. TrunkTrac lets you assign a 35 character alpha tag (up to 1000/system) to all IDs. You can set Lockouts, Personality Files, Scan Lists, and much more. TrunkTrac lets you log system activity to an ASCII file for database import and traffic analysis. We think you'll like TrunkTrac so much it comes with a 30 day money back guarantee. And For a limited time, when you purchase TrunkTrac, we will install the discriminator mod in your scanner for free. **TrunkTrac** ver 5.2.....**$297.95**

Scanner Master PO Box 428, Newton Highlands, MA 02161 1-800-722-6701
www.scannermaster.com

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(Photo by Harry Baughn)

complicated, sometimes leading to confusion. I would like to give you some hints on how to listen to our radio.

"Because of the 800 MHz system, most of the media had to acquire new Trunk Tracking scanners to monitor all of the different channels being used. Trunk Trackers will seek out channels being used, and put them into its memory. It was easier in the past to monitor only four channels and you knew who was talking by knowing what channel they were on. With the numerous channels now available and with the possibility that channels are changed from time to time (like just this past month) it can be difficult to know exactly who is talking. Also a number of new channels have been added, something we did not have in past. Some of those channels are used for training purposes.

"The radios are now used in training exercises more frequently than they were in the past. They can be used in the classroom, on the training ground or at a building somewhere in the city. In most cases, that traffic can be heard on your (trunk tracking) scanners. A number of inquiries from the media recently were attributed to training classes. This will increase in the future. It would be almost impossible to notify the media each time we plan to use our radios for training purposes and this is something I do not plan to do.

"This is what I suggest you do: If you monitor such traffic, you can call me. If there is an emergency, MOST OF THE TIME, I will notify YOU of the event either by cellphone or by pager, so you can probably figure that it is a training exercise. I WOULD SUGGEST YOU CHECK FIRST BEFORE MAKING ANY RELEASES TO THE PUBLIC. A few times in my career, the media reported to the public a breaking story, when in fact it was a training exercise.

"Another way to learn about our communications system is by attending one of the media classes I have scheduled. The May and July classes are full. I still have four slots open for the June 24, 1999 class. Touring the Communication Center and an explanation of how the system works is part of the class. The class is free and all you have to do to register is call me. If you have any more questions about our communications system, please call me."

Frequencies, Talkgroups, and Other Good Stuff

N5KGN was kind enough to send along the following trunk system information. He omitted several of the more sensitive talkgroups:

City of Longview Texas

Frequencies

855.2125 856.7625 857.7625 857.9375 858.7625
858.9375 859.7625 859.9375 860.7625 860.9375

ID	Talkgroup
16	City TAC 1
48	City TAC 2
80	Police Administration
112	Police CID
144	Police Supervisor 1
176	Police Supervisor 2
208	Police Dispatch 1
240	Police Dispatch 2 (Inquiry)
272	Police Talkaround
304	Police TAC 1
336	Police TAC 2
400	Fire Dispatch 1
432	Fire Dispatch 2
464	Fire Administration
496	Fire Prevention
528	Fire Supervisor
560	Fire Talkaround
592	Fireground 1
624	Fireground 2
656	Fireground 3
688	Fire TAC 1
720	Fire TAC 2
752	City Service
784	Building Inspection
816	Collection/Distribution
848	Drainage Operations
880	Engineering
912	Environmental Health
944	Parks Department
976	Sanitation Department
1008	Street Department
1040	Traffic Engineering Department
1072	Wastewater Treatment
1104	Water Supply Operations
1136	Radio System Management
1168	Utilities

Yet Another Weather Disaster

Is there anyone who likes the new automated (computer-generated) voice of the National Weather Service broadcasts? Isn't the whole purpose of the NOAA enterprise to encourage people to listen to the broadcast? Who can stand listening to the monotone staccato of Robo-Meteorologist?

It used to bring a smile to your face listening to the suppressed excitement of a local weather service forecaster announcing an impending snowstorm. If you traveled, you might get a kick out of hearing the regional accents as the day's weather was described.

Here in Boston, there was always that weatherman from Taunton, Massachusetts, who would forcefully report on the local "weends" (read winds). It was his signature. You knew who you were listening to just like so many of us have a favorite dispatcher, whose style we appreciate and whose voice and radio mannerisms are pleasant to the ear.

One can take an educated guess at some of the reasons behind the move to another form of the dreaded digital voice. A manpower savings, perhaps? The ability to get notifications out to the public more quickly in some manner? Could it be legal protection against misinterpretation of one of those regional accents? Another bureaucratic effort to annoy the public at large?

Scannists have long used the Weather Service broadcasts to test their receiver sensitivity, the effectiveness of their new antenna, and, of course, to obtain watch and warning reports on forthcoming storms. Now we might as well start using pager tone bursts to conduct our testing; they're about as exciting to listen to as the mechanical weatherman (can anyone say "S-50" on the meter?).

Here's our broadcast for the day: "Weather Nuts and scannists to NOAA! We want our real, live, forecasters back on-the-air!"

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Larry Van Horn, N5FPW
email: larry@grove-ent.com

Gearing up for a Revolution

Whether you are aware of it or not, there is a quiet revolution going on in the VHF/UHF frequency spectrum. Instead of being assigned frequencies from those set aside for each separate license classification, license applicants now draw from a frequency pool. The entire radio spectrum coordinated by the private land mobile service is separated into only two pools: public safety/public service and industrial/business.

Service Search will be taking an in-depth look at all the new public safety allocations and the frequency spacing plans currently being licensed by the Federal Communications Commission (FCC). Scanner listeners should be listening for newly allocated splinter channels (VHF 7.5 kHz/UHF 6.25 kHz) to become active in their areas.

Over the summer, many families take to the road, so in this month's column we will cover the frequencies coordinated for highway patrol and other state law enforcement agencies (FCC service code "PP State"). Next to each frequency are listed the states which are licensed to operate there, based on current FCC database information. We have also included the National Law Enforcement channels (NLEC) 155.475 and 155.4875 – a new frequency created with the new channel spacing.

Next month we will examine the new emergency medical frequencies in the public safety frequency pool.

State Law Enforcement Agency Allocations

Frequency	Class of Station	States Licensed/Pending and notes
42.02	Base or mobile	AK CA GA MS MO WV
42.04	Base or mobile	CT FL NE NY WI WV
42.06	Base or mobile	MO SC TX WV
42.08	Base or mobile	CA MS OH SC
42.10	Base or mobile	SC WV
42.12	Base or mobile	CA IN ME MO MS SC WV
42.14	Base or mobile	ME NY SC WI
42.16	Base or mobile	CA IN MS PA
42.18	Mobile	CA CT GA MI MS NE
42.20	Mobile	CA CT IN MS NE
42.22	Mobile	MO NC WI
42.24	Mobile	CA CT ID MI MS
42.26	Mobile	IA ND SC TN WV
42.28	Mobile	CA MI NE TN
42.30	Mobile	CA CT MI MS NE NY
42.32	Base or mobile	GA MO OK
42.34	Base or mobile	CA IL MA NE SC
42.36	Base or mobile	CA CT IL NY TN
42.38	Base or mobile	MA MO NC ND WI
42.40	Base or mobile	CA IN MA
42.42	Base or mobile	CA IN MA TN
42.44	Base or mobile	CA IL MA NH OR
42.46	Base or mobile	CA IL MA NE
42.48	Base or mobile	CA CT MI NE NY
42.50	Base or mobile	CA IL MA NC NV
42.52	Base or mobile	CA CT IL NC NY PA
42.54	Base or mobile	CA ID IL MA
42.56	Base or mobile	CA IL MN NC ND NV OH OR PA TN
42.58	Base or mobile	CT MI MO NC NV
42.60	Base or mobile	CA IL NC OK PA
42.62	Base or mobile	CA IL NC PA RI
42.64	Base or mobile	CA CT MI NC
42.66	Mobile	CA IL NC OH WY
42.68	Mobile	CA CT IL MI NC
42.70	Mobile	CA IL NC NV
42.72	Mobile	CA IL NC OH
42.74	Mobile	CA MI NC NV OH TN
42.76	Mobile	CA IL NC
42.78	Mobile	CA MO MN NC NV OH OR PA
42.80	Base or mobile	One way paging to mobiles only IL MI MS NC NV TX
42.82	Base or mobile	CA MN NC OR WY
42.84	Base or mobile	CA IL MS NC
42.86	Base or mobile	FL MI MN NC OR VA VT
42.88	Base or mobile	CA IL ID NC NV OR UT WY
42.90	Base or mobile	FL IL NC NV OR TX
42.92	Base or mobile	CA FL NC OR VA
42.94	Base or mobile	MI NC NV OR UT
44.62	Base or mobile	AL AR KY NY
44.66	Base or mobile	AR AZ FL IL
44.70	Base or mobile	IL OK
44.74	Base or mobile	AR FL MA MD OH
44.78	Base or mobile	AL AR FL KY
44.82	Base or mobile	AZ KS NH OH
44.86	Base or mobile	CT DE NH OH
44.90	Mobile	MA MD OH OK
44.94	Base or mobile	FL KS NH OH
44.98	Base or mobile	KS NH OH
45.02	Base or mobile	CA CT DE NH OH OK
45.06	Base or mobile	FL IL OH TX
154.665	Base or mobile	AZ CA CO CT DE FL IA IL KY MA ME MI MN MS MT NC NH NJ NM NV NY OK OR PA PR RI SC TN TX UT VA WA WI WV
154.6725	Base or mobile	No licenses currently issued or pending (Bandwidth not to exceed 11.25 kHz)
154.680	Base or mobile	AK AZ CA CO DC DE FL GA IL KS ME MI MN MT NC ND NJ NY NV OH OK OR PA PR RI TN TX UT VA VI WA WI WV WY
154.6875	Base or mobile	CT (Bandwidth not to exceed 11.25 kHz)
154.695	Base or mobile	AK AZ CA CO CT DE FL IL IN ME MI MN MO MS MT NC ND NJ NY NV OK PA PR RI SC TN TX UT VA WA WI
154.7025	Base or mobile	CT ME (Bandwidth not to exceed 11.25 kHz)
154.905	Base or mobile	AK AZ CA CO GA IA IL KS ME MI MN MS MT NC ND NJ NM NY NV OK OR PA PR RI TN TX UT VA WA WI WV
154.9125	Base or mobile	ME (Bandwidth not to exceed 11.25 kHz)
154.920	Base or mobile	AK AL AZ CA CO DC FL IA IL IN KS KY ME MI MN MO MT NC NJ NM NV NY OK OR PA SC TX UT VI WA WI WV
154.9275	Base or mobile	No licenses currently issued or pending (Bandwidth not to exceed 11.25 kHz)
154.935	Base or mobile	AK AZ CA CO DE FL GA IL ME MI MN MS MT NC ND NH NJ NM NY OH OK OR PR RI TN UT VA WA WI
154.9425	Base or mobile	No licenses currently issued or pending (Bandwidth not to exceed 11.25 kHz)
155.445	Base or mobile	AL AZ CA CO FL GA IA IL IN KS ME MI MN MO MT NC NJ NY OH OK OR PA RI SC TX UT VA WA WI WY
155.4525	Base or mobile	No licenses currently issued or pending (Bandwidth not to exceed 11.25 kHz)
155.460	Base or mobile	AK AZ CA CO FL GA IA IL IN KS ME MI MN MS MT NC NJ NY OH OK OR PA PR SC TX UT VA WA WI WV
155.4675	Base or mobile	ME (Bandwidth not to exceed 11.25 kHz)
155.475	Base or mobile	Nationwide Police Emergency Communications Net
155.4825	Base or mobile	Nationwide Police Emergency Communications Net: No licenses currently issued or pending (Bandwidth not to exceed 11.25 kHz)
155.505	Base or mobile	AK AL AZ CA CO FL GA IA IL IN ME MI MN MO MT NC ND NJ NM NY NV OR PA PR RI TN TX UT VA VI WA WI WV WY
155.5125	Base or mobile	No licenses currently issued or pending (Bandwidth not to exceed 11.25 kHz)

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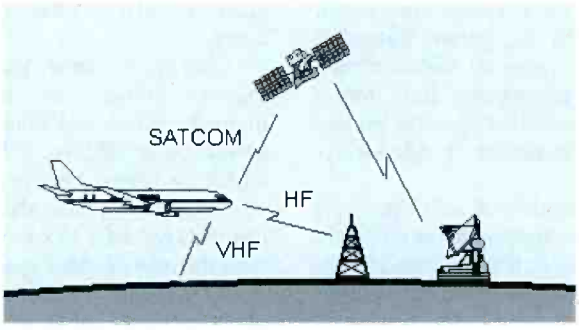
Are Planes Going Digital?

One of the more interesting services using high frequency (HF) utility bands has always been the routed aeronautical mobile. These radio nets provide air traffic and operational control for all civil and most military flights over the oceans. Line-of-sight VHF coverage fails this far out, and even satellites often have marginal coverage.



Right now, most of what we hear is upper sideband (USB) voice communication on the Major World Air Route Area (MWARA) frequencies spaced all over HF. These MWARA are used by oceanic control stations to update aircraft positions and put them, manually, into whatever system is being used to track flights. It's great fun for us, but the airlines aren't always as thrilled. For them, it's a constant source of delays on congested oceanic routes.

We're quite lucky that there's still so much to hear. The industry would love to move everything to some automated, all-encompassing scheme, as ships have done, but it's not that simple. For many years, various groups have churned out dense, acronym-laced proposals, and still all we have is at best a start, not a system. MWARA fans can be assured that there is no wholesale move to digital in our immediate future, though we will definitely hear a few changes.

Enter HF ACARS

ACARS stands for Aircraft Communication And Reporting System. It's a computerized message system developed in the seventies by Aeronautical Radio, Incorporated. ARINC, as it's known, is a giant company that began in 1929 as an airline radio support consortium. It still maintains most of the ground-to-air radios used worldwide for commercial air transportation.

On VHF, ACARS has grown steadily into something of an unofficial industry standard, used daily for millions of messages to and from an ever-increasing number of flights. It's not certified for air traffic control, and at 2400 bits per second the net's capacity is somewhat strained. But it's there, it's supported heavily by ARINC, and it works. ACARS monitoring is a fast-growing hobby in itself, and a real boon for plane spotters who can often follow flights around the world.

More recently, ARINC has begun promoting GLOBALink, which attempts to extend the line-of-sight range of VHF ACARS. The goal is to seamlessly integrate VHF with HF and satellites, switching modes as necessary. This has required adapting ACARS to the more demanding conditions of noisy HF links.

While the users won't notice the difference, we certainly will. HF ACARS uses a single-tone modem, phase-shift keyed, with a completely different sound from the two tones used on VHF. On radios in USB mode, HF ACARS makes short, buzzy noises, sometimes with sync or protocol beeps audible right at the start.

Users of "packet radio" will notice similarities. Both of these modes exchange short, standard datagrams between computers, though ACARS treats message types differently. Generally speaking, it has uplinks (ground-to-air), downlinks (air-to-ground), and squitters (test messages).

Squitters?!

In aviation jargon, a "squitter" is an automatic, digital burst from a radar transponder or a radio, triggered at a random time by another station. HF squitters are exchanged by ACARS stations as automatic link establishment (ALE), continually testing three or more frequencies for the best circuit.

ARINC has also contracted with TCI Wireless for real-time ionospheric sounding. Together, all this makes up HFDL, High-Frequency Data Link, the HF portion of the GLOBALink. Early in 1999, the first ten ARINC ground stations became operational.

Lately, we've been hearing an unconfirmed, out-of-band, ACARS-like signal on 8975.5 kHz digital. My receiver is set on this frequency as I write this and plenty of bits are flying through the sky. If so, it's probably the Pacific net, from either San Francisco, California; Molokai, Hawaii; or Anchorage, Alaska. The other ground stations are in Annapolis, Maryland; Islip, New York; Reykjavik, Iceland; Ballygirreen, Ireland; Auckland, New Zealand; Johannesburg, South Africa; and Hat Yai, Thailand.

We'll have to keep our ears open for the rest of the frequencies. There will be a lot of them, but HFDL is somewhat embryonic, and right now they change a lot. Larry Van Horn has heard squitters on 11312 kHz.

Can these be decoded by hobby equipment? Not yet, unfortunately, due to the different type of modem. If the mode catches on, though, it's only a matter of time.

HFDL is far from replacing voice traffic, however. This is not a repeat of the maritime revolution, and in fact there are no current plans to completely abandon MWARA. Once again, though, the early twenty-first century is looking rather digital.

More New Star

Last month, we were looking for the last unknown frequency of Taiwan's bizarre New Star Broadcasting. This is a group of high-powered AM (standard amplitude modulation) stations, running hours of coded "numbers" messages, presumably aimed at spies. All have tinkly musical introductions, then a disturbingly happy, machine-spliced, female voice in Chinese.

Well, we can look no more. Gary Cohen has found New Star on 15385 kHz AM, with an identification (phonetically) of "Di Er Tai," or "Second Service," at 1130 UTC. This fills out the five "services," as 15385, 13750, 11430, 9725, and 8300 kHz AM, all for several hours each day. As we noted last month, each broadcast lasts 30 minutes, but the carrier does not drop between these. None of these are parallel. Presumably, each aims at a different group of spooks.

The 8300 kHz frequency is continuing to hold up nicely into the Western US any morning around 1500 or 1600 UTC, despite the coming of summer. Signal strengths are down, but it's hard to miss the cat's-meow pitch of this mechanical voice. Of course, now that I've said this, it'll probably change. That's normal in the numbers racket.

Good luck!

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Utility Loggings

Hugh Stegman

Abbreviations used in this column

AFB	Air Force Base	LDOC	Long Distance Operational Control
ALE	Automatic Link Establishment	LSB	Lower Sideband
AM	Amplitude Modulation	MARS	Military Affiliate Radio System
ARQ	Automatic Repeat Request teleprinter system	MFA	Ministry of Foreign Affairs
ARQ6-90	6-character-block simplex ARQ teleprinter system	NATO	North Atlantic Treaty Organization
ARQ-E3	Single channel ARQ teleprinter system	No Joy	Station did not answer call
CAMSLANT	Coast Guard Area Master Station, Atlantic	RAF	Royal Air Force
COMM	Communications	RSA	Republic of South Africa
CW	Morse code telegraphy ("Continuous Wave")	RTTY	Radio Teletype
EAM	Emergency Action Message, coded military orders	SAM	Special Air Mission
FEC	Forward Error Correction teleprinter system	Sitor-B	Simplex Telex Over Radio, FEC mode
JSTARS	Joint Surveillance Target Attack Radar System	Swed-ARQ	ARQ scheme used by Swedish embassies
		UHF	Ultra High Frequency
		UK	United Kingdom
		Unid	Unidentified
		US	United States
		VHF	Very High Frequency
		VIP	Very Important Person

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time).

4003.0 US Army MARS, with LSB stateside net, at 0110. (Larry Van Horn-NC)

4009.0 Unid-Typical out-of-band fishing boat net, in Cajun accented English, at 0034. (Van Horn-NC)

4020.0 US Army MARS, with LSB stateside net, at 0036. (Van Horn-NC)

4029.0 US Army MARS, with stateside net at 0113. (Van Horn-NC)

4232.0 FUF-French Navy, Fort de France, Martinique, RTTY tests, at 0116. (Van Horn-NC)

4271.0 CFH-Canadian Forces, Halifax, NS, with FAX weather chart at 0107. (Van Horn-NC)

4278.5 AFN-American Forces Network, still being relayed from NAR, US Navy Comm Station, Key West, FL, at 0104. (Van Horn-NC)

4500.0 US Air Force MARS, with stateside net at 0121. (Van Horn-NC)

4645.0 Unid out-of-band aeronautical station, heard several times. ("Giulio"-Italy) *Klingenfuss has this one as Tallinn Air, Estonia, indeed just slightly out-of-band. -Hugh*

4739.0 Fiddle-US Navy P-3 ops, Jacksonville, FL, in life raft search with P-3's Red Claw 71A through E, at 0125. (Ron Perron-MD)

4757.0 SAM 00300-US Air Force VIP flight, patch via Andrews to 440th Tactical Air Wing on Mystic Star frequency F-734, at 0810. (Paul Bunyan-MO)

5687.0 Goose 72-Possible C-130 in radio check with Plantation Ops, at 0249. (Perron-MD)

6640.0 Hawaiian 6-Hawaiian Airlines commercial flight, on an East Pacific LDOC frequency, getting advice from "Medlink" for a sick passenger at 0604. Then worked Hawaiian Dispatch and San Francisco, at 0615. (Hugh Stegman-CA)

6715.0 Graphite-US Strategic Command, working WAR 46, net control at the US Joint Alternate Command Post, at 0627. (Jeff Haverlah-TX)

6721.0 Reach 6034-US Air Force Air Mobility Command, ALE and patch via Offutt to Tanker/Airlift Command Center, at 2052. (Bunyan-MO)

6741.0 ZKX-Auckland Radio, New Zealand, with "quick brown fox" RTTY test, at 0927. (Bunyan-MO)

6767.0 Unid-Cuban "cut" CW numbers, at 1202. (Cam Castillo-Panama)

6770.0 Unid-Cuban "cut" CW numbers, at 0215. Cuban "Atencion" AM numbers, at 0359. (Castillo-Panama)

6825.0 Unid-Cuban "cut" CW numbers, at 1202. (Castillo-Panama)

6867.0 Unid-Cuban "cut" CW numbers, twice at 1202. (Castillo-Panama)

6972.0 Unid-Cuban "cut" CW numbers, at 0233. (Castillo-Panama)

7651.6 Whitecastle-US joint drug interdiction in the Caribbean, telling Shark 12 that he was clear to pursue into Jamaican waters, and that he would be getting helo Scorpion 02 from the Jamaican Defense Force, at 0119. (Perron-MD)

7784.0 NAR-US Navy Comm Station, Key West, FL, with weather in RTTY, at 1605. (Van Horn-NC)

7831.0 WAR 46-US military Joint Alternate Command Post, MD and PA, working Force Out, temporary control of "Nightwatch" command net, at 0719. (Haverlah-TX)

7888.0 Unid-Cuban "cut" CW numbers, at 1202. (Castillo-Panama)

8187.0 Unid-Cuban "Atencion" AM numbers, at 1105. (Castillo-Panama)

8568.5 XFM-Manzanillo Radio, Mexico, sending a slow CW marker and long tone by hand, at 1227. (Van Horn-NC)

8776.0 Cue Stick with 30-character EAM, at 0411 and again at 0415. (Haverlah-TX)

8846.0 N306PA-Private Cessna 650, owned by ALG Incorporated, NC, at 1431. (Van Horn-NC)

8906.0 United 914-United Air Lines 777, tail number N792UA, with selcal check at 2149. N101GA-Private Gulfstream IV, position report at 2236. (Van Horn-NC)

8965.0 Trout 99-US Air Force, using ALE with Andrews AFB at 2112. (Bunyan-MO)

8971.0 Blue Star Tech Control-US Navy P-3 ops, Puerto Rico, in radio checks with "E2," at 0112. (Perron-MD)

8983.0 CAMSLANT Chesapeake-US Coast Guard, VA, working Rescue 1718 (HC-130, Clearwater, FL), in search for refugee rafts from Haiti, at 1835. (Perron-MD)

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Utility World Loggings (continued)

8992.0 SAM 995-Unknown US Air Force VIP, getting weather via patch to Andrews Metro via Thule, at 0118. (Bunyan-MO) JSTARS 03-US Air Force E-8C surveillance aircraft, with patch through Thule Global regarding arrival arrangements, at 0328. AAFA-US Army Vessel *James Loux*, LSV-6, with patch through Andrews AFB to AAC2, Ft. Eustis, VA, at 1753. (Perron-MD) Heavy Arm-US Strategic Command "Nightwatch" net, calling WAR 46, then relaying very long EAM, at 1705. (Haverlah-TX) Volition-US military, with EAM, simulcast on 11244 kHz, at 2057. (Van Horn-NC)

9016.0 Graphite working Cue Stick, then back to Z250 (15962 kHz), at 0115. WAR 46 Mobile-US joint command ground unit, no joy with WAR 46, control station at the US Joint Alternate Command Post, at 0143. (Haverlah-TX)

9018.0 Hoop 55-US Air Force, working Hoop 56, also using satellite and 227.8 MHz secure, at 0121. (Haverlah-TX)

9025.0 Offutt-US Air Force, NE, making patch from Petro 31 to Shocker Control (McConnell AFB) on a discrete frequency, then Petro 31 went to 6761 kHz (USAF air-to-air), at 1825. (Van Horn-NC) Fuzzy 44-US Air Force tanker, setting up refueling of Wolf 01, first in a flight of two F-16s escorting Royal Jordanian 001, the king of Jordan's aircraft, at 1916. Wolf 01 reporting end of escort, at 2112. (Bunyan-MO)

9110.0 NMF-US Coast Guard, Boston, MA, with FAX weather charts, at 1501. (Van Horn-NC)

9320.0 PACAF 01-VIP aircraft for Commander, US Pacific Air Forces, working Andrews on F-616, at 0647. (Bunyan-MO)

10051.0 WSY70-New York Volmet, NY, with aviation weather, at 0500. (Van Horn-NC)

10166.5 FDY-French Air Force, Orleans, with RTTY "voyez le brick..." marker, at 0006. (Van Horn-NC)

10204.0 WAR 46-US Joint Alternate Command Post, working Male Hawk in "Nightwatch" net, at 1323. Ligament-US Stratcom Nightwatch net working Fire Light, clear and secure, at 2032. (Haverlah-TX) Tell Tale-US Stratcom Nightwatch net, working Applicant in clear and secure voice, at 1813 and 1937. (Van Horn-NC)

10583.0 Andrews-US Air Force, Andrews AFB, MD, with patch from SPAR 63, a USAF VIP flight, at 0553. (Haverlah-TX)

10717.0 Air Force Two-US Air force SAM 56973 with Vice-President aboard, working Andrews on Mystic Star F-262, at 0155. (Bunyan-MO)

11153.5 SAM 60203-US Air Force VIP flight, with patch via Andrews to Blade Runner on Mystic Star F-576, at 2008. (Bunyan-MO)

11175.0 ADNG-US Army Vessel *Port Hudson*, LCU 2035, making patch through Andrews AFB. (Perron-MD) Tabor 11-US Air Force, returning with hung weapons, patch through Hickam to Raymond 33, at 0422. (Haverlah-TX) Scalp 11-US Air Force B-52, with an overheating problem preventing scheduled arrival at refueling point, telling Scalp 12 to advise the tanker so, at 1556. (Allan Stern-FL) Blue Angel 9-US military, requesting patch through Offutt Global at 1936. (Bunyan-MO)

11191.0 Hershey-US Joint Interagency Task Force, East, in anti-smuggling operation with station that sounded like "Fine Grey," at 1550. (Perron-MD)

11243.0 Unknown-US military, only copied a part of the tactical callsign which sounded like "Camp," then EAM at 2300. (Ben Loveless-USA)

11421.6 FJY5-French DTRE comm agency, with personal ARQ-E3 messages in French, for DTRE Paris, at 0830. (Hall-RSA) *DTRE is French for "Direction des Telecommunications des Reseaux Exterieurs." -Hugh*

11494.0 Cornstalk working Man Fish, at 1625. (Haverlah-TX)

11565.0 EZI-Mossad, Israel, AM callup and repeated message in phonetic letter groups, at 0102. (Gary Neal-TX)

12135.0 Unid-Cuban "Atencion," callup and AM numbers, at 0200. (Neal-TX)

12370.0 NMC-US Coast Guard Area Master Station, Pacific, CA, with FAX weather charts, at 1428. (Van Horn-NC)

12579.0 NRV-US Coast Guard, Apra Harbor, Guam, with weather in SITOR-B, at 1408. (Van Horn-NC)

12730.5 NMC-US Coast Guard Area Master Station, Pacific, CA, with good quality FAX weather charts, at 1428. (Hall-RSA)

12829.5 XFM-Manzanillo Radio, Mexico, sending a slow CW marker and long tone by hand, at 1425. (Van Horn-NC)

12857.0 6WW-French Navy, Dakar, Senegal, testing in RTTY, at 1419. (Van Horn-NC)

13031.2 FUF-French Navy, Fort de France, Martinique, testing in RTTY, at 1411. (Van Horn-NC)

13119.0 WOM-AT&T High Seas Radio, FL, with radiotelephone traffic on maritime duplex channel 1215, at 1926. (Van Horn-NC) *The three AT&T stations were supposed to close in February, but at least for now they remain on-air by FCC order. -Hugh*

13200.0 Teal 23-US Air Force Reserve 53rd Weather Recon, Keesler AFB, MS, in patch to Teal Ops via Andrews AFB, at 1749. (Perron-MD)

13215.0 Raymond 19-US Air Force, no joy calling what sounded like Morris 24, at 1855. Trout 99-US Air Force, using ALE with Offutt, at 2036. (Bunyan-MO)

13257.0 Canadian Rescue 333-Canadian Forces CC-130H, Trenton, working Trenton Military in a search, at 2146. (Perron-MD)

13306.0 N464QS-Private Gulfstream IV aircraft, Gillette Company, at 1453. (Van Horn-NC)

13530.0 KAWN-US Air Force Digital Weather Switch, with RTTY weather probably the US Navy relay from Saddlebunch Key, FL, at 0730. (Hall-RSA) *KAWN is a US weather service identifier, not a radio callsign, though they look similar. -Hugh*

14373.0 MNRV-Monrovia, Liberia, with G-TOR connection to Sant-Tako, some Spanish traffic passed, at 0830. (Hall-RSA)

14412.0 SAM 60204-US Air Force VIP flight, possibly on F-070, getting weather info from Andrews Metro, at 1959. (Bunyan-MO)

14817.5 JPA-Interpol, Tokyo, Japan, with encrypted RTTY police bulletins, at 0853. (Hall-RSA)

14885.0 Artillery Club-Unknown US military or government, working callsign that sounded like "Free Heat," on FEMA F-44 at 1726. (Bunyan-MO)

15027.0 Relief 01-US Air Force, no joy with Lobo (Howard AFB Air Ops Center), at 1928. (Bunyan-MO) *Ongoing Central American hurricane relief -Hugh*

16077.0 WUJ1-US Army Corps of Engineers, using ALE with WUG (also USACE) on "Channel 12," at 1609. (Bunyan-MO)

16302.5 DZFG-Yugoslavian MFA, Belgrade, presumably war-related RTTY code groups for unknown stations, at 0946. (Hall-RSA)

16366.9 Kinshasa Telecoms-Kinshasa, Zaire, on new frequency and mode (G-TOR), with link to Lumumbashi for business traffic, at 0930. (Hall-RSA)

16799.5 Sovship *Leningorsk*-Russian vessel with RTTY crew greetings to parents in Kaliningrad, at 0929. (Hall-RSA)

16978.5 2AS-Partial callsign of unid Philippine ship, with FEC news relay, in English, from Manila Central, at 0933. (Hall-RSA) *A lot of these maritime news and religious broadcasts come out of the Philippines. -Hugh*

18018.0 RAF-Royal Air Force, UK, with NATO "colors" weather for air bases, at 2100. (Van Horn-NC)

18300.2 RFTJF-French military/NATO joint forces, with coded ARQ-E3 traffic at 1740. Bob also started hearing high-power US military circuits after the war began. (Hall-RSA)

18626.0 Andrews VIP-US Air Force Mystic Star net, calling SAM 60204 at 1933. (Bunyan-MO)

19088.0 CLP1-MFA, Havana, Cuba, with RTTY diplomatic text traffic, at 1956. (Van Horn-NC)

19101.7 RFLI-French Forces, Fort de France, Martinique, with ARQ-E3 traffic at 2007. (Van Horn-NC)

19131.0 Atlas-US Drug Enforcement Agency, working Flint 413 and 931, at 1554. (Perron-MD)

19699.0 UFN-Novorossiysk Radio, Russia, giving football scores in SITOR-B, at 1625. (Hall-RSA)

20153.0 DKAR-French Embassy, Dakar, Senegal, with ARQ6-90 code groups on DKRX circuit, for MFA Paris, at 1710. (Hall-RSA)

20863.0 Unid-Idling ARQ-E3, then "okokok rf547 to 543 ras 73," first time anything at all has been heard on this frequency, at 1738. (Hall-RSA)

22487.0 WLO-Mobile Radio, AL, with Sitor-B traffic list, at 1547. (Van Horn-NC)

22537.0 FUF-French Navy, Fort de France, Mauritania, testing in RTTY, at 1545. (Van Horn-NC)

23595.7 MFA, Stockholm, Sweden, with test and 5-letter code groups in Swed-ARQ, first time they've used so high a frequency, at 1140. (Hall-RSA)

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Baudot and Beyond

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Computerized Monitoring Aids

Have you ... ever found yourself buried in books and other reference material while monitoring? ... wanted to control those expensive radios and decoders at the same time? ... ever felt there must be something that centralizes all that important information?

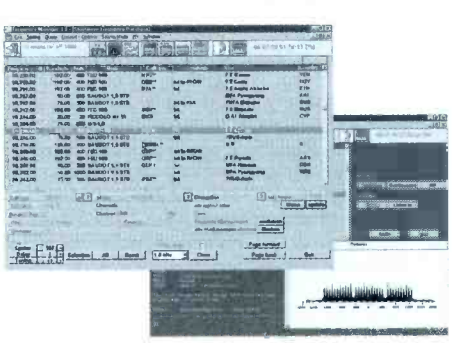
Well, this month we'd like to review just such a tool: NSK's "PC Frequency Manager (PCFM)," a CD-ROM-based Windows 95/98 program that integrates multiple frequency databases, a controller for your radios, and a pile of essential monitoring reference information. The program also includes audio samples of just about every digital system on the air, just in case you're not sure what you've just tuned into.

The Databases

PCFM contains four frequency databases covering 27,000 HF utilities, 16,000 HF and AM broadcast stations, numbers stations and 12,000 VHF channels – the latter of limited use outside Germany. Each database can be quickly and easily searched or sorted according to key fields. For example, the HF utilties database contains frequency, baud rate, shift, system name, callsign, user, country, channels (for a multi-channel system), selcal (if used), and the typical contents of the transmission (text, encrypted groups, etc).

Going to a particular frequency is as easy as hitting Control-G ("goto") and entering the frequency. Need to know distance and bearing to a selected station? Just hit the little globe icon, and the program calculates both for you. Amazing!

Unlike some other database offerings, PCFM doesn't leave out the interesting stuff. Besides the aforementioned numbers stations, the HF Utilities database also includes unidentified systems or users – the suspected Russian FAPSI (Federal Agency for Communications and Intelligence) stations, complex Phase Shift Keyed (PSK) systems, and those four-tone 195.3 baud stations we mentioned a few months ago.



The databases seem about as complete, accurate, and up-to-date as you can get. But, you can also add, delete or edit your own database entries, too, using any database's update functions. You can also order regular updates from NSK to stay bang up-to-date.

The Receiver Controllers

Want to control those expensive radios you're using, too? PCFM allows you to control up to three receivers at the same time. Most Kenwood, Yaesu and Icom radios are supported, along with the JRC NRD525, 535 and 545, WJ HF1000, AOR AR3000a, 3030 and 5000, Racal R71, 72, 6790, and 6775. Modules for the popular Icom PCR1000 and AOR 8200 receivers are also on the drawing board.

Clicking on the "RX" button brings up a window (configured according to the selected radio) by which each radio's chief functions can be accessed. With some radios, the database follows along as you tune. If you need to tune the receiver to a specific database entry, just double click a line in the database and the frequency is automatically transferred to the radio. Or, selected database entries can be used to set your radio to scan only those channels.

The Audio and Systems Database

Wonder what digital system you're listening to, or need to know what 240 baud 8-tone RS-ARQ sounds like? A click on the "ear" button selects, and then plays a sound sample from the CD's collection of over 120 digital signals. You can even record a signal off-air (in standard Windows .WAV format) if you've connected your radio's audio output to your soundcard.

For a closer look at a digital system, you can click the "systems" button which reveals a searchable database of digital systems, including a detailed description, an example signal frequency spectrogram and oscilloscope trace, together with the aforementioned sound sample.

Reference Material

Remember that desk covered with reference books? PCFM replaces all of this with nearly a dozen mini-databases accessed through the program's "Info" menu. Here you can find lists of thousands of callsigns, an Arabic ATU-80 to English phrasebook, country list, common radio abbreviations, weather stations, airport codes and frequency allocations. Again, all of these databases can be flexibly searched and sorted.

An on-line "technical handbook" is also included, providing definitions and extra information on topics like Morse code, various commonly heard teleprinter alphabets, NATO routing indicators (handy for all you French Forces listeners), and SELCAL tables.

Decoder Controller

You thought those folks at NSK forgot about that decoder connected to your PC? Well, they didn't. A click on the "Decoder" button loads your favorite decoder program, and you can get decoding while the database sits in the background.

Requirements

To run PCFM, you'll need at least a 133 MHz 486-based machine running Windows 95 or 98, with a CD-ROM drive. In addition, you'll need about 30 Mb free hard disk space within which to install the program and databases, and the sound files can be left on the CD-ROM to minimize disk usage. Although we reviewed the Windows version of PCFM, a DOS version is also available, which contains most, but not all of the features we described here.

If you'd like to know more, check out NSK's website at **http://ourworld.compuserve.com/homepages/Frequencymanager/**

The program installs effortlessly from the CD-ROM, costs $129 (the DOS version is priced at $89) plus $7 worldwide airmail and can be ordered on-line or via a telephone call to NSK's offices in Germany. Unfortunately, as yet, there's no US-based agent for Freqency Manager, so here's how to contact them:

Ingenieurbüro für Satellitentechnik
Mühlenweg 11
24217 Stakendorf
Germany
Telephone : +49 4344 6758 or
+49 171 7004782
Fax : +49 4344 5154

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Shortwave Broadcasting

Glenn Hauser, P.O. Box 1684-MT, Enid, OK 73702
E-mail: <ghauser@hotmail.com>; fax: (580) 233-2948, ATT: Hauser

China Sneaks in Cuban Relay

China Radio International, which for many months had no English broadcast to eastern North America in prime time before 0300 UT, suddenly appeared at the beginning of May at 2300 on 5990 kHz, and 0100 on 9570 kHz (as well as Spanish at 0000, Chinese at 0200 UT).

This was first reported by Joe Hanlon and Bob Thomas. Brian Alexander and Bob Thomas lamented 9570 blocking one of Romania's best frequencies in English at 0200. CRI in Chinese at 0200 on 9570 was running a good 2 seconds behind Spain relay on 9690, indicating a multiple satellite feed. We also found 9570 in use at 1200 for Chinese, at 1300 for English.

Then Ivan Grishin, Bob Thomas and I kept monitoring for clues as to location. The signals seemed too strong for Mali, and often they were missing, or just with open carrier. But they were much stronger on the East Coast than in Oklahoma. This indicated a relatively close but directional location. Ivan later found these listed on the CRI website as "test transmissions," asking for reports, but nothing about where they came from! 5990, however, was designated for the Caribbean.

Considering the previous reports of Chinese technicians assisting Cuba to improve its shortwave facilities (including jamming – see CUBA below), and these operational and propagational factors, we figured these had to be cooperation between the Cuban and Chinese communists. Did Arnie Coro, who should be in a position to know, ever say anthing about this on *DXers Unlimited*? Not for at least two weeks after this started. But the clincher was Ivan Grishin's observation, on two separate occasions, that 5990 had audio of R. Habana Cuba's Portuguese service mixing with CRI!

The Cuban deal may be just in time, considering China's apparent distaste for relying on nasty NATO/western countries (Spain, Canada, France, and even WUST in Washington, DC) for CRI relays while involved in bombing fellow communists in Serbia ...

ALBANIA R. Tirana in Albanian very strong at 0700-0955 on 14220 = 2 x 7110 (Klaus Elsebusch, Germany, *hard-core-dx*)

ARGENTINA [non] Radio Pasteur, the first free student radio station of Argentina, will transmit its programs via WRMI-Radio Miami International, 9955, every Friday at 0130-0200 UT (Thursdays nights in the Americas). Radio Pasteur is a radiophonic production of Pasteur Group, an educational-cultural enterprise managed by journalist and DX-er Claudio Morales. Program topics include human rights violations during the military government; ecology; geography; history; sports; arts. Radio Pasteur will confirm four reception reports with four special QSL cards and a nice present. Please send 2 IRCs to: Radio Pasteur / Claudio Morales; Casilla 1852 - Correo Central; 1000 Buenos Aires, Argentina. You can write by E-Mail: *radio-pasteur@iname.com* (Radio Pasteur) or *morales.arg@sicoar.com* (Claudio Morales)

AUSTRALIA "Australia May Reopen Transmitter To Asia." Radio Australia could reclaim millions of listeners in Asia after a government decision to allow international broadcasters to lease its now-closed shortwave transmitter in the north of the country. The government has agreed to process applications that are in the national interest – a move that could see the re-opening of the US$32 million Cox Peninsula transmitter once used by Radio Australia.

The transmitter, near Darwin, was closed two years ago after big cuts in funding for the ABC, which runs Radio Australia. Some of the world's biggest international broadcasters are believed to be interested in using the transmitter to broadcast to Asia. A government spokesman said Radio Australia would be allowed to use the transmitter again by entering into a commercial agreement with any international broadcaster granted a licence to lease it (Asian Broadcasting Union via *Electronic DX Press*)

Tentative registrations for Darwin for A99 are included in the ABU-HFC consolidated file: 13605 at 1100-1700, 21525 at 0000-1000, 25725 at 1000-1400 (*EDXP*)

AUSTRIA The ORF *Neighbour in Need* program started April 26, 1800-2300 on 5945 and 1476; for crisis regions in the Balkans, in Serbo-Croat, Albanian, English, German, in conjunction with the Red Cross, missing-persons announcements for Kosovars; in response to the humanitarian catastrophe in Kosovo and in Albania (Andy Sennitt, *swprograms*)

BOLIVIA 3310, R Mosoj Chaski, Cochabamba, 0950 talk by man and woman in local language, high Andean vocals, full ID 1000. Nice signal (Jay Novello, NC)

HCJB's *DX Partyline* interviewed Eldon ---, engineer of R. Mosoj Chaski. Name means "New runner" or "New messenger." Was inaugurated April 12; sked is 0900-1200, 2200-0100; 10 kW. All in Bolivian Quechua dialect; Casilla 4493, Cochabamba; chaski@bo.net for QSL, though unsure if they can QSL by E-mail. Using lazy-H vertical-incidence antenna (gh)

CANADA RCI frequencies clashing with Germany: 17800 Sundays at 1506 for *From Naked Ape to Superspecies* during April and May was blocked by RTBF Belgium in French to Africa; one of the 1200 UT frequencies, 17820, including Sunday for *Quirks and Quarks* mixed with Deutsche Welle at 1230. Some better frequency coordination is called for (gh)

RCI has added 15470 on their 2000-2130 broadcast; usually the best reception here in mid-USA compared with the other frequencies at that time. At other times, 15325 is still better (Will Martin, MO, *Review Of International Broadcasting*) At 2000-2130, new 15470 and 17570 replace 15265 and 17870 (*Panlview*, Bulgaria)

Is CBC's *The Great Eastern* comedy show going off the air? *TGE*'s webpage says that April 24's was the last new show and 'best of's' would continue through June 19. There were no new shows produced from Feb-April due to the CBC strike, so it was a short season! (Joel Rubin, NY) Check Sat 2100 on 15470

There are very strong feelings that none will be forthcoming. In May 1998, the CBC directed the BCN creative team to make the show more "broadly accessible." We did nothing of the sort. (Paul Moth) Let the CBC know what you think about *The Great Eastern cbcinput@toronto.cbc.ca* Have you checked our webpage? **http://www.greateastern.cbc.ca** (Paul Moth via Hal Doran, alt.radio.networks.cbc via Mike Cooper)

COLOMBIA Clandestines: Voz de la Resistencia, 6170 [or more precisely, 6168.3], from some unknown location in southern Colombia, heard daily 1130-1205 and 2130-2205. Radio Patria Libre, location unknown, 6210v at 2210-2238 two days in a row, but missing the next two days (Yimber H. Gaviria, Colombia, *Mundo Radial*)

COSTA RICA Once the new three-phase powerline is in place, RFPI has plans and is seeking funding for, a 100 kW transmitter! (RFPI *Mailbag*) Finally, RFPI has their new website up including audio archives! **http://www.rfpi.org/** (Chet Copeland, DC)

CUBA In the town of Bejucal in La Habana province there is an electronic encampment of directional antennas constructed with Chinese technology that supposedly improves shortwave radio transmissions from Cuba, but it is in fact interfering with transmissions of Radio Martí. Herminio San Román, Director of the Office of Cuba Broadcasting, says MW and SW interference increased at the end of last year.

The installation of the antenna encampment constructed at the end of last year by the state enterprise Radiocuba was classified as

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-99=summer season, Mar-Oct; [non] = Broadcast to or for the listed country, but not necessarily originating there.

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an "utter necessity to continue the process of modernization of the International Center of Shortwave Transmission Titán (Centro Internacional de Transmision de Onda Corta Titán)," stated the tabloid *Granma*, official media organ of the Cuban Communist Party. Chinese advisors worked in conjunction with Cubans to also improve the capacity of the transmitters. (Pablo Alfonso, *El Nuevo Herald*, Miami, via Armando F. Mastrapa, *Clandestine Radio Watch*)

R. Rebelde's morning show, *Haciendo Radio*, will now be available on SW Mon-Sat; excellent musical show *Memorias* on the air at the same time [when?] on Sundays; and daily one-hour program on SW during our local evenings. 6140 local morning, omni to Carib; 9600 to CAm, curtain array. Started Sat May 8, //AM and FM frequencies and 5025. R. Rebelde SW Service, P O Box 6277, Habana, Cuba 10600. Antennas and schedules may be adjusted. Sat heard from 1100 on both 6140, 9600. Could be on earlier; check from 1000. Evening for one hour on 6120 0300-0400 to CAm daily.

Pedro Pablo Figuredo, RR's Director General, is making a big effort to provide RR listeners with a nice SW signal, too (Arnie Coro, RHC *DXers Unlimited*) Increased transmitter capacity ties in with new China relays

CZECH REPUBLIC For the new season R. Prague will offer a new set of QSL cards on the subject of old radios (Edwin Southwell, World DX Club *Contact*)

[non] And I do mean *non*! Despite what Jeff White says about the NW antenna of WRMI being used for Prague relays from 0230 to sign-off, I hear absolutely no trace of WRMI amid the Cuban communist jamming, at 0300 on 9955 (gh, OK)

ECUADOR 4919, Radio Quito, 4919, on a UT Thu ending at 0500 *Carta a los Ecuatorianos* for Ecuadorians abroad, playing pasillo music (Elmer David Escoto R., Honduras)

ERITREA [and non]. Demise of Sudanese, Eritrean opposition radios. The presidents of Sudan and Eritrea signed a peace agreement on 2nd May in Qatar. It therefore seems likely that the three Eritrean opposition stations hosted by Sudan (Voice of Truth, Voice of Free Eritrea and Voice of Democratic Eritrea – all on 9230 kHz) and the two Sudanese opposition stations hosted by Eritrea (Voice of Sudan and Voice of Freedom and Renewal – on 8000 and 7000 kHz respectively) will cease operations (Chris Greenway, British DX Club)

ETHIOPIA It's not in English, but Radio Ethiopia has been fairly strong most nights for many weeks on 7110. Sometimes music, sometimes talking in Amharic, but the when they play music, they're definitely worth listening to. The music sounds like a cross between classical Arabic music and James Brown. I find it beguiling. Here in eastern North America, 7110 comes in pretty well from 0300 until 0400, an hour or so after sunrise in Ethiopia (Ralph Brandi, *swprograms*)

GERMANY The summer edition of DW's English program newsletter says *Mailbag North America* will be broadcast at 0105 and 0505 UT on the last Monday of each month (Jim Moats, OH)

GUYANA GBC, 5950, 0845-0930+ variety of Hindi style vocals, local pops. English talk with wedding anniversary, birthday, mothers'day greetings. Time checks; good. Two-hour window to hear Guyana at 0800-1000 when Okeechobee is off the air (Brian Alexander, PA)

ISRAEL The new Bezeq frequency director (takes care of all Kol Israel frequencies), Moshe Oren, is trying to help improve Kol Israel reception around the world. (e.g. There were extra Reshet Bet relay transmitters in the middle of the day Eastern Time, when nobody was home to listen. Having an English broadcast prime time has been suggested before... it's now getting done.) He would like to receive reception reports from people around the world (especially Western US) and especially by professional monitors. Email him directly: *moshe_oren@bezeq.co.il*

From the *Jerusalem Post* (Grapevine section) - Sarah Manobla of the Kol Israel English Service has retired after almost 40 years of service there (since 1960). She started her radio career at the BBC under the name, "Ursala Taub." During a visit to Israel, someone suggested that she should work for Kol Israel - which she eventually did!(Doni Rosenzweig)

Galei Zahal, Israel Defence Forces Radio, was back on SW a few days in mid-April, pounding in on 6442-USB in Hebrew at 0030-0145. Last SW appearance was four years ago (Hans Johnson, FL, *Cumbre DX*)

KAZAKHSTAN Kazakh Radio has again changed its shortwave schedule: 2300-0300 and 1300-1700 on new 12115 (strange, but very good choice) with 1st program relay in Kazakh and Russian (instead of 2nd program in Kazakh). Latest schedule (0400-0800 on 17825, 1700-2100 on 6255) is deleted (Mikhail Timofeyev, Russia)

LITHUANIA On April 1, 1999, Lithuanian radio and television transmitting center started to use a brand new 100 kW "Continental Electronics" 418F type shortwave transmitter, installed at Sitkunai site (18 km NW of Kaunas). A new vertical curtain HR 2/2/.5 type 12/9/7 MHz non-reversible antenna, with reflector, beamed at 260 degrees, was erected in order to improve West European coverage. Daily schedule on 9710:

0900-0930 Radio Vilnius/Foreign Service (in Lithuanian, repeat of yesterdays prgr); 0930-1000 Radio Vilnius/Foreign Service (in English, repeat of yesterdays prgr); 1000-1100 2nd domestic program of the Lithuanian Radio (press review); 1100-1200 1st domestic program of the Lithuanian Radio (news and talk prgr); Sundays only: 1200-1300 Universelle Leben (Religious, in German and English). Other planned new Sitkunai frequencies at various times: 9555 / 9790 / 11615 / 11625 / 12020.

Both the new (100 kW, 260 deg.) and an old 50 kW (9710 kHz, 260/80 deg.) HF transmitters could be leased to foreign broadcasters. Future plans: construction of HR 4/4/.5 type 310 deg. antenna for the Radio Vilnius North American Lithuanian and English language services. Work to be finished by November 1999. (Rimantas Pleikys, *MT* reader) Note no mention of 0030 broadcast on 9855, which is no doubt still via DTK Jülich, Germany, despite some speculation otherwise (gh)

LUXEMBOURG [non] From May 2, at 1400-1600, commercial "Europaradio" can be heard in German on 5975 via Jülich. Luxembourg-based RTE plans to transmit Sundays on a regular basis. **http://www.tageblatt.lu/rte** (Köhler, ADXB-OE) *The 208 Sound* reviving the old R. Luxembourg, is now on Merlin Network One: Mon-Sat 0200-0300 on 9795, 11875 to NAm; 0900-1000 on 13660, 17630, 21550 to elsewhere (via Ivan Grishin, *Review Of International Broadcasting*)

MALTA [non] Voice of the Mediterranean [via Russia] with heavy signal on 12060 at 2015, but also weaker on 11410, why? (Guidoi Schotmans, Belgium, *hardcore-dx*) Could be mixing product with transmitter on 11735 (gh) This looks like the only active site left for VOM – unofficial – and this is the schedule page: **http://www.woden.com/~falcon/schedule.html** (Tom Sundstrom, NJ, *ibid.*)

MEXICO 9704.93 - Radio Mexico International, XERMX heard with a DX program in English, *DXperience* on a UT Sun at 0303, "radio speaking about radio" (Volodya Salmaniw, BC) The new URL of Radio Mexico International is **http://hello.to/rmi** (Mizuno Mitsuaki, Japan, *Cumbre DX*)

RAI, Italy, is no longer using 6010 this summer, allowing R. Mil to be heard clearly in Mexico City; reports are wanted on how well it is heard elsewhere. Send to Apartado Postal 21-1000, 04021 - Mexico 21, D.F. for a reply from *Encuentro DX* (Héctor García Bojorge)

NIGERIA [non]. Nigerian opposition shortwave station Radio Kudirat returned in mid-April, *daily* 1900-2000 on 6205 and 11560 (not 11540 as announced) via South Africa. The station had closed down on 31st December 1998 for "maintenance." However, it was widely assumed that the station was closing for good; It now seems that we were premature in reading the last rites.

The Post Express reported that Prof. Wole Soyinka had applied for a licence for R. Kudirat in Nigeria but the new government was unlikely to grant it as a "security risk." So SW transmissions from outside were resumed (Chris Greenway, England, *Review Of International Broadcasting*)

NORWAY Olav Grimdalen, in charge of Frequency Planning at the Norwegian P&T, advises that since the abandonment of English programming from Radio Norway International, DX reports have virtually stopped. I believe that this is also a consequence of the "no-QSL" policy for NRK, since Jan 1. Olav retires on Apr-30 after serving since 1962, but will continue as a part-time external consultant for frequency planning. Olav mentioned that without the support from the worldwide network of monitors, his task would have been very difficult, and he plans to travel and visit as many listeners as possible. Best of luck in your retirement, Olav! (Bob Padula, *Electronic DX Press*)

PAKISTAN Radio Pakistan heard in English at 0200-0230 on 11930 and 15455, *Good Morning Pakistan* and news at 0215. (Jose Jacob, India, *Electronic DX Press*) English at 0200-0230 certainly new; had just been slow news at 0230-0245 – is that still on? (gh)

PERÚ The previously unidentified on 5304.8 is R. Paz y Vida, heard at 2334-0108, from Pampas in Tajacaya, Huancavelica. In the mornings only programs in

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Quechua, 1030-1200 and 2330-0100 Spanish 2330, Quechua from 0000.

R. Súper Nueva Sensación, 6675.6 heard at 2210-2300 after several weeks off the air, back on new frequency, ex 6618.9. These programs I hear weekdays: 2230-2300 *Ritmo Tropical;* 2300-2330 *Festival Tropical;* 2330-0000 *Nochecitas San Juaneras;* 0000-0100 *Anochecer Campesino.* Usual s/off at 0100 (Rafael Rodríguez R., Santafé de Bogotá, Colombia)

POLAND Polish Radio are now broadcasting under their old name of R. Polonia, it was announced (Sheila Hughes, British DX Club *Communication*)

RUSSIA While we may find it at other times, these are the only scheduled broadcasts of V. of Russia, English to North America, until Sept. 5: 0100-0300 on 15595, 15520, 12050, 9665; 0300-0500 on 17690, 17660, 17630, 17565, 15595, 12050, 9665, 7125 (VOR website)

On *Moscow Mailbag* Joe Adamov commented on an atmosphere of "psychosis" that is rising in Russia in connection with events in the Balkans (B. Cooley, BC. *Review Of International Broadcasting*) Another term we heard him use was "hysteria" (gh)

With Radio Yugoslavia now off the air, the Voice of Russia's special program on the Kosovo situation provided some interesting listening after the news, UT 0111, on 9665. Also heard in the afternoon at 1711 on 11675. They often include listeners' email as well (Ivan Grishin, Ont., *R.I.B.*)

9450, China Radio, transmitting via Petropavlovsk-Kamchatsky, operates here at *1200-1300*, power is 200 kW, which makes it well heard in Australia. Programmes are in Chinese and the frequency is valid from March 28 to Sept 4. The autumn/winter frequency for the last period was probably 5895.

China Radio is a media ministry of the Assemblies of God. The station responded to my report on "Real Light Radio" sent to P.O. Box 90337, Jianshaju, Hong Kong, with a sked all in Chinese (not much help), but then replied in English from their Taiwan "field" address at 21 Chang Chun Road, 7th Floor, Taipei 10413. Director Richard Adams can be contacted by E-mail at *readams@usa.net* but station staff can provide more specific details at *cradio@gcn.net.tw* (David Foster, Australia, *NU* via DSWCI *DX Window*)

SPAIN Justin Coe interviewed his predecessor, Terry Burgoyne, on REE *Radio Waves.* Misunderstanding about the circumstances of his departure came from his wry wit, he says. It was entirely voluntary, as he decided to take early retirement at age 62, as there were other things he wanted to do, instead of waiting until 65. Planned to visit Vatican Radio soon and tape interviews for a free-lance piece on *RW.* References to being replaced by a younger person were just being factual (gh)

SRI LANKA [non] IBC *0000-0050 in Tamil followed by English to 0100 on new 9355 ex-7460 (Jose Jacob, India, *Electronic DX Press*) IBC Tamil used to be via Germany, but it is now via the CIS. It is very strong right now and has some strong hum on it, long outages of the audio. Initially, IBC was a good balanced broadcaster, which soon went into being a front organisation for the Tamil Tigers, the LTTE. IBC has a lot of disinformation, but they deny it. There was some hue and cry about it in our local newspapers and the Germans were asked why they give transmitting facilities to such broadcast when Sri Lanka is playing host to the Deutsche Welle. Deutsche Telekom didn't know what was happening I must say in all fairness. So they ditched IBC (Victor Goonetilleke, Sri Lanka, *Cumbre DX*)

SWEDEN George Wood has created a new discussion forum a place for the discussion of everything related to Radio Sweden, especially its programming. Comments and questions about general Scandinavian items are also welcome. The forum is being hosted by Deja News. To check it out this new forum, go to: **http://www.sr.se/rs/english** and click on the link for the "Discussion Forum" on the left of the page. (Peter Bowen, *swprograms*)

UKRAINE Current state of Radio Ukraine shortwave broadcasts according their chief engineer: The service to North America [through the Nikolayev-Kopani site] and the English broadcast 1100-1200 are cancelled; the service for Europe mostly uses just three transmitters. They try to get more money from the responsible ministry for a restoration of the full service. A quick check after 1700 showed indeed just 5905, 6020 and 6090 [all Brovary] on the air, although the German service still announces all scheduled frequencies (Jörg Sajuk via Michael Bethge, WWDXC via Kai Ludwig) Kharkov site, with its characteristic "growl" was also off the air, probably for good (Ludwig)

UKoGBaNI If you hear a British station on 15070, it's not BBC returning to the longtime frequency it had been forced to vacate, but pirate R. Free London (gh) RFL, 15070, heard on a Sunday at 1013-1036 saying they would stay on utnil 1337. Lots of jingles and music (Ignacio Sotomayor, Spain, *hard-core-dx*)

USA To resolve the conflict with *Talk to America*, another call-in show at 1700, Judy Massa's *Border Crossings* has been retimed to 1900-2000 after the news, M-F; on 9565 and 13725 from Lampertheim; 11970 and 15235 Philippines; 9840 and 12015 Udorn (VOA *Communications World*)

WBCQ Operations Manager Randi Steele, who took turns with Al Weiner actually runnning the station, announced she had quit her job. She said that Allan had asked her to draft a hate-speech policy and if he liked it, he would endorse it. She said she did draft the policy and that Allan announced it on the air. Sometime after the announcement she said that Allan talked to one R. G. Stair and that after that conversation Allan called her and told her that the hate-speech policy was nothing but a "Manifesto of Censorship" and that they would not be implementing it. He also said that Stair's broadcasts would continue on WBCQ. Randi quit on the spot (John H. Carver Jr., Mid-North Indiana)

Big Steve Cole's *Different Kind of Oldies Show* on WBCQ 7415 moved an hour later for a bit more summer coverage, Sat 2330 (gh)

WBCQ is back on E-mail with a new address: *wbcq@gwi.net* says Al Weiner. New from June 8: *A British-Canadian Viewpoint*, Tue 2000-2030, refreshingly produced by John, in Minden, Ont. (gh)

A new comedy radio show, Saturdays 2000-2300 on WBCQ 7415, *Saturday Morning Confusion* playing longform comedy including Firesign Theater, The Goons. Send your requests to *requests@tomanddarryl.org* or to Tom and Darryl, P.O. Box 665, Macomb IL 61455 (Duane Whittingham, rec.radio.shortwave via Chet Copeland)

Spectrum, which couldn't get its old time back, 10 pm ET Sat, due to Grove's "DX Block" on WWCR 5070, settled at first for 9 pm Sun, but then moved to 11 pm Sat (0300 UT Sun immediately after *World Of Radio*). By then it was almost summer, when they usually go on hiatus for re-runs; how about this year? (Bob Thomas, CT)

VIETNAM V. of Vietnam, A99: official registrations submitted to the ABU for the External Service are:

7285 MET 1100-1600 and 0000-0100 50 kW (to CIRAF 49, 216 degrees)
7285 VNI 1600-2200 100 kW (to CIRAF 46 and 47, 290 degrees)
7285 VNI 2200-2300 100 kW (to CIRAF 27, 320 degrees)
7285 VNI 2300-0000 100 kW (to CIRAF 46, 47, 290 degrees)
9730 VNI 0830-1600 and 2130-0000 100 kW
9840 VNI 1200-0030 100 kW
12020 VNI 1200-0030 100 kW
13740 VNI 0830-0000 100 kW
15115 VNI 0830-1600 and 2130-0000 100 kW

Note that the station operates two sites in Vietnam, So'n Tay (two 100 kW txers), and another site, believed to be at Me Tri (50 kW). Me Tri is about five km south-west of Hanoi. This is on the air only on 7285 at 0000-0100 and 1100-1600. The So'n Tay site is about 30 km north-west of Hanoi. The transmitters there are used for both domestic and external broadcasting. Of at least 11 transmitters at this site, nine are used for domestic services, believed to be 100 kW. Additional transmitters, previously used for the external service, are used to [jam] Vietnamese broadcasts of Radio Free Asia.

Voice of Vietnam relays over Russian transmitters for A99 are as follows:
7250 Krasnodar: 0100-0130 English, 0130-0230 Vietnamese, 0230-0300 English
9830 Armavir: 0300-0330 Spanish, 0330-0400 English
2030 Moscow: 1900-1930 Russian, 1930-2030 Vietnamese
12070 Moscow: 1700-1730 English, 1730-1830 Vietnamese, 1830-1900 French
17595 Petropavlovsk-Kamchatka: 0400-0500 Vietnamese
(*SW Guide to South East Asia* via *Electronic DX Press*)

YUGOSLAVIA I was monitoring the nightly propaganda from Belgrade on 9580 from 0000 UT April 23. At 0006 the audio feed to the transmitter site was suddenly replaced by loud white noise, so loud the overmodulation covered 9575 to 9585. About five minutes later the transmitter went off the air and was not heard again. (John Cobb, GA, *World Of Radio*) This was the exact moment the Belgrade TV center was first bombed. Neither studios nor transmitters of R. Yugoslavia were there, but a vital relay between them. RY's North American service remained missing through mid-May, by which time it had been eliminated from RY's posted schedule; in case it still comes back, check last summer's frequency 11870 as well at 0000, 0430 (gh)

The domestic service on 7200 from a site within Serbia continued audible in Europe (Wolfgang Büschel, Kai Ludwig) English external came back at 1930 on 7230 (Chris Hambly, Australia)

Yugoslavia's website has moved to **http://62.229.99.175** (Daniel Sampson, WI)

By mid-May, the RY website omitted the NAm service:

1800-1830 6100 Russian to Russia/Moscow
1830-1900 7230 Serbian to Australia
1900-1930 7220 Spanish to Spain
1930-2000 6100 Serbian to Europe
2000-2030 6100 German to W.Europe
2030-2100 6185 French to W.Europe
2100-2130 6185 English to W.Europe
2130-2200 6185 Serbian to W.Europe
(via Ivan Grishin, *Review Of International Broadcasting*)

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

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Broadcast Loggings

GLOBAL FORUM

Gayle Van Horn

0030 UTC on 9855
LITHUANIA: Radio Vilnius. ID, political and economic news. (William McGuire, Cheverly, MD)

0014 UTC on 4915
BRAZIL: Radio Anhanguera. Brazilian station band scan in Portuguese, stations audible as: **Radio Difusora** 4815, 0040; **Radio Educacao Rural** 4755, 0057; **Radio Missoes da Amazonia** 4865, 0540; **RadioCapixaba** 4935, 0547; **Radio Aparecida** 9630, 0758; **Radio Brazil Central** 4985, 2143, // 11814.95; **Radio Bandeirantes** 9645, // 11925, 2355; **Radio Nova Visao** 11705, 2345. (Karl van rooy, Netherlands/*Hard Core DX*) **Radio Universo** 9565, 2205. (Zacharias Liangas, Thessoliniki, Greece/HCDX)

0049 UTC on 13695
THAILAND: Radio Thailand. Sports focus on soccer and NBA, computer program commercial. (John Jenkins, Charleston, WV)

0058 UTC on 4702.23
BOLIVIA: Radio Eco. Evening messages opening with "atencion ... atencion," to ID/frequency quote at 0105. (Ruud Vos, Urecht, Netherlands, *HCDX)* Bolivia's **Radio Illimani** 4945, 0907 with "La Voz de Bolivia," // 6025; **Radio Santa Cruz** 6135, 0903. (Paul Ormandy, Oamaru, New Zealand/HCDX) **Radio Movima** 4472, 2259 with regional music, time check, audible only in LSB, very poor signal. (Liangas, GRC)

0100 UTC on 9665
RUSSIA: Voice of. Editorial on NATO strikes. *Moscow Mailbag* on 7125, 0310; (Jim Boynton, Newton, MA) Program on poet Pushkin 11675, 1845. (Bob Fraser, Cohasset, MA)

0130 UTC on 3339.96
PERU: Radio Altura, Cerro de Pasco. Spanish with station ID, fair-poor quality. Peru's **Radio Comas** 3250.79, 0235. (Vos, NLD/*HCDX*)

0140 UTC on 5020
COLOMBIA: Ecos del Atrato. Soccer coverage to Caracol ID and "esta es Ecos del Atrato," to frequency quote and commercial. (Daniele Canorica, Switzerland) Colombia's **Nacional de Colombia** tentatively logged on 4955, 0313-0321+. (Harold Frodge, Midland, MI)

0200 UTC on 9570
ROMANIA: Radio Romania Intl. Fair to 0300, // 6155, 9510 inaudible. 0400-0500, 5990 good quality, // 6155. (Lee Silvi, Mentor, OH; Dexter Anderson, Westerly, RI)

0200 UTC on 3280
ECUADOR: La Voz del Napo. Spanish ID into sports program. (Vos, NLD/*HCDX*)

0205 UTC on 15250
SRI LANKA. VOA relay. ID, report on Kosovo.**VOA-U.K.** relay 7170, 0500. (McGuire, MD)VOA Creole service to Haiti 15120, 2100. (Anderson, RI) Tentative **VOA-Tinian** 15250, 1300-1340+ in Chinese. (Silvi, OH) 1800 Tinian in Chinese 12010, // 15160. (van rooy, NLD/*HCDX)*

0238 UTC on 6987
PERU: Radio San Miguel el Faique. Spanish text to Andean instrumentals. Time checks, "echo" spot ads to ID. (Frodge, MI) Peru's **Radio del Pacifico** 4975, 0800-0900. (Ormandy, NZ/*HCDX*)

0312 UTC on 4976
UGANDA: Radio Uganda. Best monitored in USB to avoid interference. Lite English pops to station ID and newscast. (Frodge, MI)

0348 UTC on 4939.4
VENEZUELA: Radio Amazonas. Spanish ballads and regional "cumbias." Lengthy ID promo at 0400*. (Frodge, MI)

0402 UTC on 6180
UNITED KINGDOM: BBC WS. World news, focus on Lebanon and Albania. (McGuire, MD) Russian service 15225, 1420. (Anderson, RI)

0443 UTC on 6265
ZAMBIA: ZBS/Radio 1. Local language, pop music into "power steering and air bag" commercials (guess those words don't translate). Good interval signal to station ID and news at 0500. (Chris Mackerell, Wellington, New Zealand/*HCDX*). Zambia's **Christian Voice** on 4965, 1900 with poor signal ID and religious sermon. (Ormandy, New Zealand/*HCDX*)

0515 UTC on 17845
NORTHERN MARIANAS: FEBC/KFBS-Saipan. Good copy for station IDs at 10 minute intervals. (Brian Bagwell, St Louis, MO)

0604 UTC on 7165.11
TANZANIA: Radio Tanzania. English news/sports to closing mention, "from Dar Es Salaam." Commercial 0613 into religious sermon. Swahili to 0705 tune-out. Fair quality, with adjacent frequency interference. (Al Quaglieri, Albany, NY)

0659 UTC on 7109.95
ALBANIA: Radio Tirana. Multiple versions of interval signal, ID at 0700, into Albanian service. (Quaglieri, NY) 2300 on 7270, report on Kosovo. (McGuire, MD) 1900, 6245 in Italian. (Ormandy, NZ/*HCDX*) 6115.0-6115.7, *0328-0335+ in English with ID and news. (Frodge, MI)

0715 UTC on 15490
RUSSIA: Radio Tikhiy Okean. Russian. Mentions of "Govorith Vladivostok" to organ interval signal. ID, "Radio Stansya Tikhiy Okean" to brief music piece, // 12055 (**Komsomolsk-Amur**-much weaker, // 12077 (**Khabarovsk**) fair, // 15490 (**Irkutsk**) fair. (van rooy, NLD/HCDX)

0710 UTC on 11950
ECUADOR: HCJB. *Musical Mailbag.* (Boynton, MA) *Ham Radio Today* 17660, 2250, // 21455. (Fraser, MA)

0900 UTC on 15330
GUAM: KTWR/TWR. Chuck Swindell preaches on speaking in tongues. (Jenkins, WV)

1138 UTC on 3315
PAPUA NEW GUINEA: Radio Manus. Pidgin text for names/dates to ID. **NBC**-Pt. Moresby 4890, 1138-1151. (Frodge, MI)

1223 UTC on 11940.36
CAMBODIA: Natl Voice of. French text and clear mention of Cambodia at 1227. Western pop style music to regional Asian music. Brief announcement to frequency quote at 1223, Thai at 1234. (van rooy, NLD/*HCDX*)

1245 UTC on 13730
AUSTRIA: Radio Austria Intl. Show on walking tour of Vienna's Strauss sites. (Fraser, MA)

1300 UTC on 9615
USA: KNLS. English religious programming to Asia. Good consistent signal. (Dale Fisher, Cleveland, OH; van rooy, NLD/*HCDX*; Frodge, MI)

1700 UTC on 9165
AZERBAIJAN: Radio Dada Gorgud. *Arabic to 1800. English ID "this is Radio Dada Gorgud, the Voice of Azerbaijan" at 1803 into national and world news.(Frodge, MI)

1748 UTC on 5993.30
MALAWI: MBC. Chichewa language with mentions of Malawi at 1750, ad to native drums and clear ID at 1754. Afro pops, 1800 "MBC" ID and English headlines into newscast. Fair signal SIO=333. (van rooy, NLD/*HCDX*)

1758 UTC on 4885
KENYA: KBC. Announcer's vernacular text to time tips and clear ID 1800, into newscast. (van rooy, NLD/*HCDX*)

1807 UTC on 6315
CLANDESTINE: Voice of the Tigray. African horns style of music to vernacular text, // 5500, fair signal for both. (van rooy, NLD/*HCDX*)

2004 UTC on 5100
LIBERIA: Radio Liberia Intl. Highlife tunes to unknown language. Choral song with excessive utility interferences, tentative ID. (Kevin McFedries, Birmingham, UK)

2245 on 11600
CZECH REP.: Radio Prague. *History Czech*-on the history of the Balkans, // 15545. (Fraser, MA)

2245 UTC on 6010
BRAZIL: Radio Inconfidencia. Portuguese. Government news of Santa Catarina and Rio. Clear ID and program promo. Brazil's **Radio Clube Paranaense** in Portuguese to sports and world news. ID/frequency quote. (Canonica, SWI)

2305 UTC on 4766
INDONESIA: RRI Medan. Indonesian. National news in progress, good signal with minimal signal interferences. (Liangas, GRC) Indo **RRI-Biak** 6153, 0910 poor quality, chat to Indo pops.

2310 UTC on 5995
MALI: RTVM. French service with music and dedications, ""la soire dansante de l'emittent nacional du Mali." (Canonica, SWI; Frodge, MI)

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

www.americanradiohistory.com

The QSL Report

Gayle Van Horn, gayle@grove.net

GLOBAL FORUM

Summer Grab Bag

• Last month's report of Cambodia's verification needs an address update. Send your report with enclosures to: General Department of the National Radio of Cambodia, Street No. 106, (Preah Mokahsal Triamei Kossamak), Phnom Penh, Kingdom of Cambodia. Thanks to Alan Davies, Bangkok, Thailand/*EDXP*.

• The Cumbre DX website has some helpful links of interest to QSLers. Go to: <**www.ralabs.com/cumbre/index.html#qsl**> for a printable listing of current 1999 QSL information from the pages of Cumbre DX. *The QSL Info* section also includes additional summaries of 1995-1998. The informative summaries are compiled by Cumbre's George Maroti, and represent an outstanding compilation of verifications. Link on to Rich Hankison's QSL Gallery – *To QSL or Not to QSL* – for more how to's on the QSL aspect of the hobby!

• Monitoring MARS traffic remains prominent among utility devotees. The U.S. Army MARS, Germany, website, includes information for QSLing MARS stations. Your report should include: the call sign, date, time, frequency, transmission mode, readability-strength-tone (RST) report, and comments. Send your report in care of the following addresses.

For call signs beginning with prefixes "AEM1" through "AEM9"
To: MARS Station (Call Sign Heard)
In-care-of: HQ, 5th Signal Command
Atten: AFSE-OP-PFM (MARS)
APO, AE 09056-3104
USA

For all other MARS call signs:
To: MARS Station (Call Sign Heard)
In-care-of-HQ USASC
Ft. Huachuca, AZ 85613-5000

CENTRAL AFRICAN REPUBLIC

Radio Minurca, 9900 kHz. Full data map card plus schedule. Received in 64 days for mint stamps. Station address: P.O. Box 2732, Bungui, Central African Rep., (Stephen Leite, Fall River, MA) Station is interested in receiving reception reports. According to David Smith, Director, "email is rather fragile in Central African Republic, so I use two different systems. One of them is usually down." Email reports can be sent to the Director at: <**radmin@intnet.cf**> <**smith2.unep@un.org**> FAX via New York City; # 1-212-963-9715. *(NASWA/Shortwave Center)*

CHILE

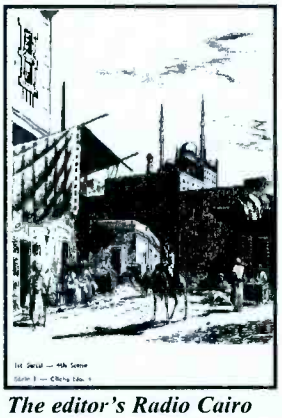
Radio Voz Cristiana, 21550 kHz. Full data green/cross emblem card unsigned. Received in one year for an English report and two IRCs. Verification address via; Casilla 490-3 Santiago Chile. (Bill Wilkins, Springfield, MO; Chris Mackerell, Wellington, New Zealand/*HCDX*) U.K. address: Ryder Street, West Bromwich, B70 OEJ. Station's website: <**www1f.btwebworld.com/christian- vision/**> Reports also may be sent to: P.O. Box 2889, Miami, FL 33144.

COASTAL RADIO

CW Station-WOM, 4363 kHz USB. Full data Florida map card signed by Frank Beecher Jr., plus station booklet. Received in 51 days for a utility report, three mint stamps and an address label. Station address: 1340 NW 40th Ave., Ft. Lauderdale, FL 33313. (Wilkins, MO)

EGYPT

Radio Cairo, 9475 kHz. Full data mosque scenery card signed by Doaa-English Staff, plus souvenir postcards and two English schedules. Received in 102 days for an English report following four years of letters, taped reports and enclosures. Station address: P.O. Box 566, Cairo, Egypt. (Randy Stewart, Springfield, MO)



The editor's Radio Cairo QSL card

MEDIUM WAVE

KCNZ, 1650 kHz AM. Form email QSL letter from Greg Alan-Program Director, after follow up in 30 minutes! Email: <**kcnz@cedarnet.org**> <**galan@cedarnet.org**>. (Patrick Martin, Seaside, OR)

KMIX, 1580 kHz AM. Full data letter signed by John R. Shadle-Chief Engineer. Received in seven days for an AM report. Station address: 2231 E. Camelback Rd., #326, Phoenix, AZ 85016. (Martin, OR)

KOAQ Terrytown, NE 690 kHz AM. Partial data letterhead verification signed by Ray Richards-Program Director. Received in 10 days for an AM report and an SASE (used for reply). Station address: 2002 Char Avenue, Scotts Bluff, NE 69361. Letterhead has P.O. Box 1263, Scotts Bluff 69363. (Harold Frodge, Midland, MI-DXing in Ontario)

WGN, 720 kHz AM. Partial data card signed by James J. Carollo-Director of Engineering, plus sticker. Received in 11 days for an AM report. Station address: 435 N. Michigan Ave., Chicago, IL 60611. (Wilkins, MO)

WHKT, 1650 kHz AM. Partial data letterhead verification signed by Susan Ervin-Asst. Manager. Received in 29 days for an AM report. Station address: 2202 Jolliff Rd., Chesapeake, VA 23321. (Frodge, MI)

WHMA, 1390 kHz AM. Full data card signed by Jay Freeland-Chief Engineer. Received in 10 days for a taped DX Test. Station was on 1 kW Night Pattern at the time I heard them, which nulls this area, so I am especially pleased with this. Station address: P.O. Box 278, Anniston, AL 36202. (Martin, OR)

WRNC, 1670 kHz AM. Partial data verification on Taylor Broadcasting letterhead signed by James K. Gay II-Studio Engineer. Received in 11 days for an AM report, one U.S. dollar and Denver postcard. Station address: 7080 Industrial Hwy, Macon, GA 31216. (Patrick Griffith-N0NNK, Federal Heights, CO)

WRZN, 720 kHz AM. Partial data letterhead verification signed by Linda Tilley-General Sales Manager. Received in 10 days for an AM report and an SASE (used for reply). Station address: 3988 N. Roscoe Rd., Hernando, FL 34442. (Frodge, MI)

WTBI, 1540 kHz AM. No data letterhead form signed by Bethany McNeely-Operations Manager, plus program schedule. Received in 42 days for an SASE (used for reply). Station address: P.O. Box 837, Pickens, SC 29671. (Frodge, MI)

WTDY, 1670 kHz AM. Partial data letterhead verification signed by Roy Simmons III-Engineer. Received in eight days for an AM report, one U.S. dollar and Denver postcard. Station address: P.O. Box 2058, Madison, WI 53701-2058. (Griffith, CO; Martin, OR)

WVMT Burlington, VT 620 kHz AM. Partial data letterhead verification signed by Charlie Papillo. Received in 90 for an AM report and an SASE (used for reply). Station address: P.O. Box 620, Colchester, VT 05446. (Frodge, Midland, MI)

NEW ZEALAND

Radio New Zealand Int'l., 11905 kHz. Full data color 50th Anniversary card, signed by James Shelley-Director, plus schedules. Received in 203 days for an English report and three IRCs. Station address: P.O. Box 123, Wellington, New Zealand. (Wilkins, MO; Leite, MA; Harald Kuhl, Germany/*HCDX*

PIRATES

Radio Blue Star, Holland 6910 kHz. Very detailed QSL letter from Henri for reception of Boxing Day program. Enclosed a diskette with Real Audio reception recording and one U.S. dollar. Station address: Postbus 1104, 8001 BC Zwolle, Netherlands. (Mackerell, NZ/*HCDX*)

WTBU, 6955 kHz. Partial data verification for station's slogan, *The Howard Stern Experience*. Received in a mere 476 days (!) for mint stamps. Station maildrop: P.O Box 28413, Providence, RI 02908 (Frodge, MI)

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How to Use the Shortwave Guide

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 Time) 4,5,6, or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each 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 ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes

s	Sunday
m	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a	Saturday

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
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Consult the propagation charts.

To further help you find a strong signal, we've included a chart on page 60 which takes into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the section of the chart for the region in which you live and find the line for the region in which the station you want to hear is located. The chart indicates the optimum frequencies (in megahertz-MHz) for a given time in UTC. (Users outside North America can use the same procedure in reverse to find best reception from North America.)

Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours – space does not permit 24-hour listings. Our program manager changes the stations and programming featured each month to reflect the variety available on shortwave, though BBC programs are almost always included.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The capital letter stands for a day of the week, using the same day codes as in the frequency listing (see above), and the four digits represent a time in UTC.

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Program Highlights

Jim Frimmel, Programming manager

Kosovo

In three special programs aired on *BBC World Service* in May and June, Alan Little examined the complex history of the current crisis in the Balkans in the program **Kosovo: The Seeds of Conflict**, in which some historians traced the conflict back to June 28th, 1389, when the Serbian Prince Lazar died in the Battle of Kosovo, the Serbs' last great stand against the Turkish invasion. That battle is still celebrated every year.

The Albanians arrived in Kosovo around the 17th century and are regarded by the Serbs as relative newcomers. The Albanians dispute this and trace their ancestry to the ancient Illyrians of the region. They have mostly been the majority population, they claim, and the Serbs have been the colonizers.

BBC producer Zina Rohan stated: "Both peoples see themselves as victims, as the objects of genocide. What is the truth? How much has history been invoked for purely strategic geopolitical purposes, and is what is happening at the moment peculiar to the Balkans, or is it a testament to human inhumanity?"

BBC Monitoring reports that *Radio Yugoslavia* is now down to one transmission in English a day (2100-2130 UTC on 6185). Radio Yugoslavia's main transmitting site is believed to be at Bijeljina in the Bosnian Serb part of Bosnia-Hercegovina.

Want to know more? Go to **<http://www.kosovo.org/links.html>** for all the best Internet links on the history of this region and the current conflict. From there you will get access to special web pages of *BBC, ABC, Newsweek, Time, New York Times, MSNBC, CNN* and many more sources.

Note a New Feature

Following a reader's suggestion, selected programs which remain the same Monday through Friday will be listed once instead of five times following the Sunday listing. This should allow us more room for more programming! Let us know how you like it.

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Frequencies

0000-0100	Anguilla,Caribbean Beacon	6090am			
0000-0100 vl	Australia, ABC/Katherine	5025do			
0000-0100 vl	Australia, ABC/Tent Creek	4910do			
0000-0100	Australia, Radio	9660pa	12080va	15240pa	17580va
		17750as	17795va	21740va	
0000-0015	Cambodia, Natl Radio Of	11940as			
0000-0100	Canada, CBC N Quebec Svc	9625do			
0000-0100	Canada, CFRX Toronto	6070do			
0000-0100	Canada, CFVP Calgary	6030do			
0000-0100	Canada, CHNX Halifax	6130do			
0000-0100	Canada, CKZN St John's	6160do			
0000-0100	Canada, CKZU Vancouver	6160do			
0000-0100	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0000-0027	Czech Rep, R Prague Intl	11615na	13580na		
0000-0100	Ecuador, HCJB	9745na	12015na	21455va	
0000-0030	Egypt, Radio Cairo	9900am			
0000-0100 vl	Guatemala, Radio Cultural	3300do			
0000-0100	Guyana, GBC/Voice of	5950do			
0000-0045	India, All India Radio	7410as	9705as	9950as	11620as
		13625as			
0000-0015	Japan, Radio/NHK	6155eu	6180eu	9665af	11705na
		11815as	13650as		
0000-0100	Liberia,LCN/R Liberia Int	5100do			
0000-0100	Malaysia, Radio	7295do			
0000-0100	Malaysia, RTM Sarawak	7160do			
0000-0100 vl	Malaysia,RTM KotaKinabalu	5980do			
0000-0100	Namibia, NBC	3270af	3289af		
0000-0100	Netherlands, Radio	6165na	9845na		
0000-0100	New Zealand, R NZ Intl	17675va			
0000-0100	North Korea, R Pyongyang	11845am	13650am	15230am	
0000-0100 vl	Papua New Guinea, NBC	9675do			
0000-0100	Russia, IBC Tamil	9355as			
0000-0100	Singapore,RCorp Singapore	6150do			
0000-0100	Spain, R Exterior Espana	15385na			
0000-0030	Thailand, Radio	9655af	9690af	11905af	
0000-0030	UK, BBC World Service	3915as	7110as	11945as	17615as
0000-0100	UK, BBC World Service	5965as	5970sa	5975am	6175am
		6195as	9410as	9590am	9915sa
		11955as	12095sa	15310as	15360as
		17790as			
0000-0100	UK, Merlin Network One	3985eu	9600na	11985na	
0000-0100	Ukraine, R Ukraine Intl	5905eu	6020eu	6090eu	7410eu
		9550na	9560eu	12040na	
0000-0100	USA, KAIJ Dallas TX	5810na			
0000-0100	USA, KTBN Salt Lk City UT	15590am			
0000-0100	USA, KWHR Naalehu HI	17510as			
0000-0030	USA, Voice of America	7115as	9770as	11760as	15185as
		15290as	17735as	17820as	
0000-0100 twhfa	USA, Voice of America	5995am	6130ca	7405am	9455af
		9775am	11695ca	13740am	
0000-0100	USA, WBCQ Monticello ME	7415na			
0000-0100	USA, WEWN Birmingham AL	5825na	13615na		
0000-0100	USA, WGTG McCaysville GA	5085am	9400am		
0000-0100	USA, WHRA Greenbush ME	7385na			
0000-0100	USA, WHRI Noblesville IN	5745na	7315sa		
0000-0100	USA, WINB Red Lion PA	11950am			
0000-0100	USA, WJCR Upton KY	7490na	13595as		
0000-0100 m	USA, WRMI/R Miami Intl	9955am			
0000-0100	USA, WRNO New Orleans LA	7355na			
0000-0100	USA, WSHB Cypress Crk SC	9430na	15285am		
0000-0100	USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
0000-0100	USA, WYFR Okeechobee FL	6085na	9505na		
0000-0030 vl	Vanuatu, Radio	4960do			
0015-0100	Japan, Radio/NHK	6155eu	6180eu	9665af	11705na
0030-0100	Austria, R Austria Intl	9655na			
0030-0100	Iran, VOIRI	9022am	9795ca	11970na	
0030-0000	Lithuania, Radio Vilnius	9855na			
0030-0100 vl	Solomon Islands, SIBC	5020do			
0030-0100	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0030-0100	Thailand, Radio	9655as	11905as	15395na	
0050-0100	Italy, RAI Intl	9675na	11800na	15240na	

Selected Programs

Sundays

0000 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. Repeat broadcast of a TV simulcast.

0000 Australia, Radio: RA News. Five or ten minutes of world, Australian, and regional news.

0000 India, All India Radio: Press Review.

0000 USA, WWCR #1 Nashville TN: What Does the Bible Say?. Pastor Dennis Costella of the Fundamental Bible Church of Los Osos, California, exposes false teachings and other religions.

0000 USA, WWCR #3 Nashville TN: Power of Prophecy. Texe Marrs and a guest discuss the evils and pitfalls of today and the outlook for tomorrow.

0010 Australia, Radio: Correspondents' Report. The ABC's foreign correspondents report home with Hamish Robertson.

0030 Australia, Radio: The Good Citizen. No information available.

0030 India, All India Radio: News and Commentary.

0030 USA, WWCR #1 Nashville TN: Life's Railway to Heaven. WT English evangelizes from South Carolina.

Monday-Friday

0000 Australia, Radio: RA News. See S 0000.

0000 India, All India Radio: Press Review.

0030 India, All India Radio: News and Commentary.

Mondays

0000 USA, WEWN Birmingham AL: Mother Angelica Live (encore). Down to earth (and sometimes humorous) inspiration.

0000 USA, WWCR #1 Nashville TN: The Jesus Time Network. Walter Bails evangelizes from Gatlinburg, Tennessee.

0000 USA, WWCR #3 Nashville TN: Discoveries in Health (hour 2) (live). The second hour of the health and herbs show from the American Freedom Network.

0010 Australia, Radio: Correspondents' Report. See S 0010.

0030 Australia, Radio: The Health Report. A program that examines health issues and makes complex scientific data understandable.

0030 USA, WWCR #1 Nashville TN: HarvestTime. Gospel music and inspiration from the United Pentecostal Church International.

0045 USA, WWCR #1 Nashville TN: First Hand. Rick Livingood with a world evangelism update.

Tuesdays

0000 USA, WEWN Birmingham AL: Pillars of Faith (live). Bishop D. Foley takes telephone questions about Catholic doctrine.

0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1100.

0000 USA, WWCR #3 Nashville TN: The Intelligence Report (live). A patriot radio program with Ted Gunderson.

0005 India, All India Radio: Radio Newsreel.

0010 Australia, Radio: Asia Pacific. See M 1110.

0030 Australia, Radio: The Law Report. Susanna Lobez brings an insider's perspective to the complexities of the law.

Wednesdays

0000 USA, WEWN Birmingham AL: Mother Angelica Live Family Night. A simulcast of the TV program.

0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1100.

0000 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See T 0000.

0010 Australia, Radio: Asia Pacific. See M 1110.

0030 Australia, Radio: The Religion Report. Hosted by John Cleary.

Thursdays

0000 USA, WEWN Birmingham AL: Mother Angelica Live. See M 0000.

0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1100.

0000 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See T 0000.

0005 India, All India Radio: Radio Newsreel.

0010 Australia, Radio: Asia Pacific. See M 1110.

0030 Australia, Radio: Media Report. Agnes Warren presents the inside story on how the communications industry operates and puts the spotlight on media people and their activities.

Fridays

0000 USA, WEWN Birmingham AL: Life on the Rock (live). Join Jeff Cavins and his weekly guest as they meet at a coffee house to discuss the joys and challenges of being a young Christian in the 90's.

0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1100.

0000 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See T 0000.

0010 Australia, Radio: Asia Pacific. See M 1110.

0030 Australia, Radio: The Sports Factor. Amanda Smith hosts the program that debates Australia's sporting culture.

Saturdays

0000 USA, WEWN Birmingham AL: The Journey Home (live). See W 1400.

0000 Australia, Radio: RA News. See S 0000.

0000 India, All India Radio: Press Review.

0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See T 1100.

0000 USA, WWCR #3 Nashville TN: American Sovereign (live). Brett Johnson.

0005 Australia, Radio: Asia Pacific. See M 1110.

0005 India, All India Radio: Radio Newsreel.

0030 Australia, Radio: Feedback. See S 0330.

0030 India, All India Radio: News and Commentary.

www.americanradiohistory.com

Frequencies

0100-0200	Anguilla,Caribbean Beacon	6090am			
0100-0200 vl	Australia, ABC/Katherine	5025do			
0100-0200 vl	Australia, ABC/Tent Creek	4910do			
0100-0200	Australia, Radio	9660pa	12080va	15240pa	15415as
		17580va	17750as	17795va	21740va
0100-0200	Canada, CBC N Quebec Svc	9625do			
0100-0200	Canada, CFRX Toronto	6070do			
0100-0200	Canada, CFVP Calgary	6030do			
0100-0200	Canada, CHNX Halifax	6130do			
0100-0200	Canada, CKZN St John's	6160do			
0100-0200	Canada, CKZU Vancouver	6160do			
0100-0129	Canada, R Canada Intl	5960na	9535am	9755am	11715am
		13670am			
0100-0156	China, China Radio Intl	9570na			
0100-0200	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0100-0200	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0100-0127	Czech Rep, R Prague Intl	7345na	11615na		
0100-0200	Ecuador, HCJB	9745na	12015na	21455va	
0100-0145	Germany, Deutsche Welle	6040na	6145na	9640am	11810na
		13720am			
0100-0200 s	Germany, Good News World	6155eu			
0100-0130 s	Germany, Universal Life	9495as			
0100-0130 m	Germany, V O Deliverance	9855na			
0100-0200 vl	Guatemala, Radio Cultural	3300do			
0100-0200	Guyana, GBC/Voice of	5950do			
0100-0130	Hungary, Radio Budapest	9560na			
0100-0200	Indonesia, Voice of	9525va			
0100-0130	Iran, VOIRI	9022am	9795ca	11970na	
0100-0110	Italy, RAI Intl	9675na	11800na	15240na	
0100-0200	Japan, Radio/NHK	9660me	11860as	11870me	15570as
		15590as	17685pa	17835sa	21670pa
0100-0200	Kenya, Kenya BC Corp	4885do			
0100-0200	Liberia,LCN/R Liberia Int	5100do			
0100-0200	Malaysia, Radio	7295do			
0100-0200 vl	Malaysia,RTM KotaKinabalu	5980do			
0100-0200	Namibia, NBC	3270af	3289af		
0100-0125	Netherlands, Radio	6165na	9845na		
0100-0200	New Zealand, R NZ Intl	17675va			
0100-0200 vl	Papua New Guinea, NBC	9675do			
0100-0200	Philippines, FEBC R Intl	15450as			
0100-0200	Russia,Voice of Russia WS	9665na	12050na	15520na	15595na
0100-0200	Singapore,RCorp Singapore	6150do			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300ca	9440sa	
0100-0200 vl	Solomon Islands, SIBC	5020do			
0100-0200	Spain, R Exterior Espana	15385na			
0100-0200	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0100-0130	Switzerland, Swiss R Intl	9885am	9905am		
0100-0200	UK, BBC World Service	5970sa	5975am	6175am	6195as
		9410as	9590am	9915sa	11955as
		12095sa	15280as	15310as	15360as
		17790as			
0100-0200	UK, Merlin Network One	3985eu	9600na	11875na	
0100-0200	USA, KAIJ Dallas TX	5810na			
0100-0200	USA, KTBN Salt Lk City UT	7510na			
0100-0200	USA, KWHR Naalehu HI	17510as			
0100-0200	USA, Voice of America	7115as	7200as	9635as	11705as
		11725as	11820as	15250as	17740as
		17820as			
0100-0200 twhfa	USA, Voice of America	5995am	6130am	7405am	9455af
		9775am	13740am		
0100-0200	USA, WBCQ Monticello ME	7415na			
0100-0200	USA, WEWN Birmingham AL	5825na	13615na		
0100-0200	USA, WGTG McCaysville GA	5085am	6890am		
0100-0200	USA, WHRA Greenbush ME	7385na			
0100-0200	USA, WHRI Noblesville IN	5745na			
0100-0200	USA, WINB Red Lion PA	11950am			
0100-0200	USA, WJCR Upton KY	7490na	13595as		
0100-0130 mtwhf	USA, WRMI/R Miami Intl	9955am			
0100-0200	USA, WRNO New Orleans LA	7355na			
0100-0200	USA, WSHB Cypress Crk SC	9430na	15285am		
0100-0200	USA, WWCR Nashville TN	3215na	5070na	7435na	13845na
0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	15165as	
0100-0130	Uzbekistan, R Tashkent	7105as	7285as	9375as	9540as
0100-0127	Vietnam, Voice of	7250va			
0105-0120	Croatia, Croatian Radio	9925na			
0115-0145 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0129-0200	Canada, R Canada Intl	5960na	9755am		
0129-0200 sm	Canada, R Canada Intl	9535am	11715am	13670am	
0130-0200	Slovakia, AWR Europe	11660as			
0130-0200	Sweden, Radio	13625as			
0130-0200 twhfa	USA, Voice of America	5995am	6130am	9455af	
0130-0200 a	USA, WRMI/R Miami Intl	9955am			
0140-0150	Greece, Voice of	7450na	9420na	11645na	15630na
0140-0200	Vatican City, Vatican R	7335au	9650au		
0145-0200	Albania, R Tirana Intl	6115na	7160na		

Selected Programs

Sundays

0100 USA, WEWN Birmingham AL: St. Joseph Radio Presents (encore). A discussion of Catholic beliefs and practices for all denominations.

0100 Australia, Radio: RA News. See S 0000.

0100 USA, WWCR #1 Nashville TN: Faith Holiness Church. Larry Cain evangelizes from South Carolina.

0100 USA, WWCR #3 Nashville TN: Tomorrow's News Today. George Hyatt is not the presenter, he's the evangelist.

0105 Australia, Radio: The Europeans. Maria Zijlstra presents reports and features on aspects of European politics, culture and society.

0130 USA, WWCR #1 Nashville TN: The Lights of Spiritual Guidance. Gospel and song with J. Harold Lowman.

0130 USA, WWCR #3 Nashville TN: Dixie Rising. Dan Meredith wants the South to rise again.

Monday-Friday

0100 Australia, Radio: RA News. See S 0000.

Mondays

0100 USA, WEWN Birmingham AL: Introduction to Mariology. See S 1500.

0100 USA, WWCR #1 Nashville TN: Tomorrow's News Today. See S 0100.

0110 Australia, Radio: Awaye. Lorena Allam hosts a program of indigenous arts and issues.

0115 USA, WWCR #1 Nashville TN: New Horizons. London Radio Service.

0145 USA, WWCR #1 Nashville TN: The Last Day Message. Rick Long's message is garnished with fire and brimstone.

Tuesdays

0100 USA, WEWN Birmingham AL: Truth Talks. Deal Hudson of Crisis Magazine and his guests discuss relevant issues, including ethics, charity and democracy.

0100 USA, WWCR #1 Nashville TN: Live Fire (live). Larry Pratt of The Gun Owners of America represents the gun lobby.

0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). A conservative, no-holds-barred commentary on American life that challenges people to become involved in the country's direction.

0110 Australia, Radio: Science Show. Robyn Williams presents the world of science, both at home and abroad.

Wednesdays

0100 USA, WEWN Birmingham AL: Our Father's Plan. Dr. Scott Hahn and Jeff Cavins lead an in-depth study of God's relationship to man throughout Biblical history.

0100 USA, WWCR #1 Nashville TN: Perspectives on America (hour 1) (live). See M 2300.

0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See M 0100.

0110 Australia, Radio: The National Interest. See S 1605.

Thursdays

0100 USA, WEWN Birmingham AL: LiveWire (live). Live call-in program.

0100 USA, WWCR #1 Nashville TN: Perspectives on America (hour 1) (live). See M 2300.

0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0100.

0110 Australia, Radio: Background Briefing. Australia's top award-winning current affairs program.

Fridays

0100 USA, WEWN Birmingham AL: Faith and Family (encore). See H 1500.

0100 USA, WWCR #1 Nashville TN: Perspectives on America (hour 1) (live). See M 2300.

0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See M 0100.

0110 Australia, Radio: Hindsight. See H 1605.

Saturdays

0100 USA, WEWN Birmingham AL: The World Over. See S 1500.

0100 Australia, Radio: RA News. See S 0000.

0100 USA, WWCR #1 Nashville TN: American Sovereign (live). See A 0000.

0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0100.

0105 Australia, Radio: Oz Sounds. See S 0430.

0130 Australia, Radio: Arts Talk. See W 2330.

0150 USA, WEWN Birmingham AL: Pro-Life Update. See H 0630.

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Frequencies

0200-0300	Anguilla,Caribbean Beacon	6090am			
0200-0300 twhfa	Argentina, RAE	11710am			
0200-0300 vl	Australia, ABC/Katherine	5025do			
0200-0300 vl	Australia, ABC/Tent Creek	4910do			
0200-0300	Australia, Radio	9660pa	12080va	15240pa	15415as
		15515va	17580va	17750as	21725pa
0200-0210	Bangladesh, Bangla Betar	4880as			
0200-0230 smwfa	Belarus, R Minsk	7210va	11670va		
0200-0300	Bulgaria, Radio	9400na	11700na		
0200-0300	Canada, CBC N Quebec Svc	9625do			
0200-0300	Canada, CFRX Toronto	6070do			
0200-0300	Canada, CFVP Calgary	6030do			
0200-0300	Canada, CHNX Halifax	6130do			
0200-0300	Canada, CKZN St John's	6160do			
0200-0300	Canada, CKZU Vancouver	6160do			
0200-0229	Canada, R Canada Intl	9535am	9755am	11715am	13670am
0200-0300	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0200-0205	Croatia, Croatian Radio	9925na			
0200-0300	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0200-0300	Ecuador, HCJB	9745na	12015na	21455va	
0200-0300	Egypt, Radio Cairo	9475na			
0200-0245	Germany, Deutsche Welle	9615as	9690as	11945as	11965as
		13690as	15560as		
0200-0300	Germany,Overcomer Ministr	9860na			
0200-0300	Guyana, GBC/Voice of	5950do			
0200-0300 irreg	Iraq, Radio Iraq Intl	11785am			
0200-0300	Kenya, Kenya BC Corp	4935do			
0200-0300	Malaysia, Radio	7295do			
0200-0230	Myanmar, Radio	7185do			
0200-0300	Namibia, NBC	3270af	3289af		
0200-0300	New Zealand, R NZ Intl	17675va			
0200-0245	Pakistan, Radio	11930as	15455as	17895as	
0200-0300 vl	Papua New Guinea, NBC	9675do			
0200-0300	Philippines, FEBC R Intl	15450as			
0200-0256	Romania, R Romania Intl	9510na	9570na	11725au	11740na
		11810as	17735as		
0200-0300	Russia,Voice of Russia WS	9665na	12020na	15520na	15595na
0200-0300	Singapore,RCorp Singapore	6150do			
0200-0300 vl	Solomon Islands, SIBC	5020do			
0200-0300	South Korea, R Korea Intl	7275as	11725sa	11810sa	15575na
0200-0300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0200-0300	Taiwan, Radio Taipei Intl	5950na	9680na	11740	11745va
		11825pa	15345as		
0200-0300	UK, BBC World Service	5970sa	5975am	6175am	6185am
		6195eu	9410me	9770af	9915sa
		11955as	15280as	15310as	15360as
		17790as			
0200-0300	UK, Merlin Network One	3985eu	9795na	11875na	
0200-0300	USA, KAIJ Dallas TX	5810na			
0200-0300	USA, KTBN Salt Lk City UT	7510na			
0200-0300 vl	USA, KVOH Los Angeles CA	9975am			
0200-0300	USA, KWHR Naalehu HI	17510as			
0200-0300	USA, Voice of America	7115as	7200as	9635as	11705as
		11725as	11820as	15250as	17740as
		17820as			
0200-0300	USA, WBCQ Monticello ME	7415na			
0200-0300	USA, WEWN Birmingham AL	5825va			
0200-0300	USA, WGTG McCaysville GA	5085am	6890am		
0200-0300	USA, WHRA Greenbush ME	7385na			
0200-0300	USA, WHRI Noblesville IN	5745na	7315sa		
0200-0300	USA, WINB Red Lion PA	11950am			
0200-0300	USA, WJCR Upton KY	7490na	13595as		
0200-0300	USA, WRNO New Orleans LA	7355na			
0200-0300	USA, WSHB Cypress Crk SC	7535na	9430na		
0200-0300	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0210-0215 thfa/vl	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0215-0220	Nepal, Radio	5005as	7165as		
0229-0300 sm	Canada, R Canada Intl	9535am	9755am	11715am	13670am
0230-0300	Albania, R Tirana Intl	6115na	7160na		
0230-0300	Austria, R Austria Intl	9655na	9870ca		
0230-0300	Hungary, Radio Budapest	9840na			
0230-0300 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0230-0300	Sweden, Radio	9495na			
0230-0257	Vietnam, Voice of	7250va			
0250-0300	Vatican City, Vatican R	7305am	9605am		

Selected Programs

Sundays

0200 USA, WEWN Birmingham AL: St. Joseph Radio Presents (encore) (Part 2). The second hour of a discussion of Catholic beliefs and practices for all denominations.

0200 Australia, Radio: RA News. See S 0000.

0200 USA, WWCR #1 Nashville TN: Open Bible Dialogue. Joseph Chambers preaches Bible prophecy from North Carolina.

0200 USA, WWCR #3 Nashville TN: Communications World ABC. A look at the people, technologies, economics, and politics involved in modern telecommunications.

0210 Australia, Radio: Fine Music Australia. The best Australian fine music performances and compositions are presented by Ivan Lloyd.

0230 Australia, Radio: Innovations. Desley Blanch reports on Australian inventions and innovative practices.

0230 USA, WWCR #3 Nashville TN: World of Radio. Glenn Hauser's communications program for shortwave radio listeners.

Monday-Friday

0200 Australia, Radio: RA News. See S 0000.

0210 Australia, Radio: The World Today. Tony Eastley with current affairs updates.

Mondays

0200 USA, WEWN Birmingham AL: Top of the Week. This Sunday program includes programs from EWTN's library of apologetics, music, teaching, drama and special offerings.

0200 USA, WWCR #1 Nashville TN: Power of Prophecy. See S 0000.

0200 USA, WWCR #3 Nashville TN: Mike Jarmus Program (hour 1) (live). Mike, his guests, and callers discuss UFOs and other far out topics.

Tuesdays

0200 USA, WEWN Birmingham AL: Catholic World Today. See M 0600.

0200 USA, WWCR #1 Nashville TN: The Sweet Liberty (live). Jackie Patru.

0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See M 0100.

Wednesdays

0200 USA, WEWN Birmingham AL: Catholic World Today. See M 0600.

0200 USA, WWCR #1 Nashville TN: The Sweet Liberty (live). See T 0200.

0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See M 0100.

0230 USA, WEWN Birmingham AL: The Little Flower. A program commemorating the centenary of the death of Saint Therese of Lisieux.

Thursdays

0200 USA, WEWN Birmingham AL: Catholic World Today. See M 0600.

0200 USA, WWCR #1 Nashville TN: The Sweet Liberty (live). See T 0200.

0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See M 0100.

0230 USA, WEWN Birmingham AL: Life is Worth Living. See W 0630.

Fridays

0200 USA, WEWN Birmingham AL: Catholic World Today. See M 0600.

0200 USA, WWCR #1 Nashville TN: The Sweet Liberty (live). See T 0200.

0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See M 0100.

0228 USA, WEWN Birmingham AL: Crisis Magazine. See H 1100.

Saturdays

0200 USA, WEWN Birmingham AL: Catholic World Today. See M 0600.

0200 Australia, Radio: RA News. See S 0000.

0200 USA, WWCR #1 Nashville TN: The Survival Report (live). Robert Henry offers mail order products from his Florida operation.

0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See M 0100.

0205 Australia, Radio: Ockham's Razor. See S 0405.

0228 USA, WEWN Birmingham AL: 2000 - The Great Jubilee. See S 1500.

0230 Australia, Radio: Earthbeat. See M 2330.

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0300 UTC SHORTWAVE GUIDE

11:00 PM EDT
10:00 PM CDT
8:00 PM PDT

Frequencies

0300-0400	Anguilla,Caribbean Beacon	6090am			
0300-0400 vl	Australia, ABC/Katherine	5025do			
0300-0400 vl	Australia, ABC/Tent Creek	4910do			
0300-0400	Australia, Radio	9660pa	12080as	15240pa	15415as
		15515va	17580va	17750as	21725pa
0300-0400	Australia,DefenseForces R	14790as			
0300-0400 vl	Botswana, Radio	4820do	7255do		
0300-0400	Canada, CBC N Quebec Svc	9625do			
0300-0400	Canada, CFRX Toronto	6070do			
0300-0400	Canada, CFVP Calgary	6030do			
0300-0400	Canada, CHNX Halifax	6130do			
0300-0400	Canada, CKZN St John's	6160do			
0300-0400	Canada, CKZU Vancouver	6160do			
0300-0356	China, China Radio Intl	9690na			
0300-0400	Costa Rica,RF Peace Intl	6975am			
0300-0400	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0300-0327	Czech Rep, R Prague Intl	7345na	9955na	11615na	
0300-0400	Ecuador, HCJB	9745na	12015na	21455va	
0300-0330	Egypt, Radio Cairo	9475am			
0300-0345	Germany, Deutsche Welle	6145na	9535na	9640na	11810na
		13780am	15105na		
0300-0400	Germany,Overcomer Ministr	9860na			
0300-0400 vl	Guatemala, Radio Cultural	3300do			
0300-0400	Guyana, GBC/Voice of	5950do			
0300-0400	Japan, Radio/NHK	17825ca	21610pa		
0300-0400	Kenya, Kenya BC Corp	4885do	4935do		
0300-0400 vl	Lesotho, Radio	4800do			
0300-0400	Malaysia, Radio	7295do			
0300-0330 stwhfa	Mexico, Radio Mexico Intl	9705am			
0300-0325	Moldova, R Moldova Intl	7520na			
0300-0400	Namibia, NBC	3270af	3289af		
0300-0400	New Zealand, R NZ Intl	17675va			
0300-0400 vl	Papua New Guinea, NBC	9675do			
0300-0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0300-0400	Russia,Voice of Russia WS	7125na	9665na	12050na	15595na
		17565na	17630na	17660na	17690na
0300-0330	S Africa, AWR Africa	6015af			
0300-0330	S Africa, Channel Africa	5955af			
0300-0400	Singapore,RCorp Singapore	6150do			
0300-0400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0300-0400	Taiwan, Radio Taipei Intl	5950na	9680na	11745as	11825as
		15345as			
0300-0330	Thailand, Radio	9655am	11905am	15395na	
0300-0400	Turkey, Voice of	7270va	11655va	21715va	
0300-0400	Uganda, Radio	4976do			
0300-0400	UK, BBC World Service	3255af	5975am	6005af	6175am
	6180eu 6185am	6190af	7160af	9410eu	11730af
	11760me 11765af	11955as	12095af	15280as	15310as
	15420af 17760as	17790as	21660as		
0300-0320	UK, BBC World Service	15360as			
0300-0400	UK, Merlin Network One	3985eu	9795na		
0300-0400	Ukraine, R Ukraine Intl	6020eu	7410eu	9550na	12040na
0300-0400	USA, KAIJ Dallas TX	5810na			
0300-0400	USA, KTBN Salt Lk City UT	7510na			
0300-0400 vl	USA, KVOH Los Angeles CA	9975am			
0300-0400	USA, KWHR Naalehu HI	17510as			
0300-0330 smtwh	USA, Voice of America	4960af			
0300-0400	USA, Voice of America	6080af	7105af	7275af	7290af
		7340af	9575af	9885af	
0300-0400	USA, WBCQ Monticello ME	7415na			
0300-0400	USA, WEWN Birmingham AL	5825va			
0300-0400	USA, WGTG McCaysville GA	5085am	6890am		
0300-0400	USA, WHRA Greenbush ME	7385na			
0300-0400	USA, WHRI Noblesville IN	5745na	7315sa		
0300-0400	USA, WINB Red Lion PA	11950am			
0300-0400	USA, WJCR Upton KY	7490na	13595as		
0300-0400	USA, WRMI/R Miami Intl	9955am			
0300-0400	USA, WRNO New Orleans LA	7395na			
0300-0400	USA, WSHB Cypress Crk SC	11930eu			
0300-0400	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0300-0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0310	Vatican City, Vatican R	7305am	9605am		
0300-0400	Zambia, Natl BC Corp	6165do	6265do		
0300-0400 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0305-0320	Croatia, Croatian Radio	9925na			
0310-0340	Vatican City, Vatican R	9660af			
0330-0357	Czech Rep, R Prague Intl	11600as	15530as		
0330-0350 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0330-0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0330-0400	Sweden, Radio	9495na	12060na		
0330-0400	Tanzania, Radio	5050af			
0330-0400	UAE, Radio Dubai	12005na	13675na	15400na	21485na
0330-0357	Vietnam, Voice of	9830va			
0340-0350	Greece, Voice of	7450na	11645na	15630na	
0345-0400	Tajikistan, Radio	7245as	9905as	11620as	
0356-0400	Zambia, Christian Voice	3330af	6065af		

Selected Programs

Sundays

0300 USA, WEWN Birmingham AL: The Holy Rosary (Living). Divine worship.
0300 Australia, Radio: RA News. See S 0000.
0300 Radio Mexico Intl: DXperience. Radio Mexico's new program for the shortwave listener/ham with background music in the foreground, talk in the background, and DX in the underground.
0300 USA, WWCR #1 Nashville TN: Watch America. John Pinkston of The Congregation of God Seventh Day with up-to-the-minute Biblical insights on world news and prophetic events.
0300 USA, WWCR #3 Nashville TN: Spectrum (live). SWLs and Hams call Mark Emanuele.
0305 Australia, Radio: Correspondents' Report. See S 0010.
0330 Australia: Feedback. Roger Broadbent answers letters and discusses new programs, reception problems, and questions about Australia.
0330 USA, WWCR #1 Nashville TN: Banner of Truth. Cornelius (Neil) Pronk is the radio pastor.
0345 USA, WWCR #1 Nashville TN: A Study in God's Word. From North Carolina, Hezakiah Smith reads Scripture.

Monday-Friday

0300 Australia, Radio: RA News. See S 0000.
0310 Australia, Radio: Australia Talks Back. Issues of the day with Sandy McCutcheon.

Mondays

0300 USA, WEWN: Rosary with Father Scallon.
0300 USA, WWCR #1 Nashville TN: Christ Kingdom Ministries. William Smith.
0300 WWCR #3: Mike Jarmus (live). See M 0200.
0330 USA, WEWN Birmingham AL: Salvation and Grace.
0330 USA, WWCR #1 Nashville TN: Leaves from the Tree of Life. Robert McClintock.

Tuesdays

0300 USA, WEWN: The Holy Rosary (Joyful). See S 0300.
0300 Radio Mexico: Antenna Radio Summary. See M 1400.
0300 USA, WWCR #1 Nashville TN: Lyon Gold and Silver Magnet Program (live). See M 0430.
0300 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.
0330 USA, WEWN Birmingham AL: Stations of the Cross. Praying the fourteen stations.
0330 USA, WWCR #1 Nashville TN: The Prophecy Club. Stan Johnson discusses bible prophecy from Topeka, Kansas.

Wednesdays

0300 USA, WEWN: The Holy Rosary (Sorrowful).
0300 Radio Mexico: Antenna Radio Summary. See M 1400.
0300 USA, WWCR #1 Nashville TN: Total Wellness Show (live). Grant Gerondale.
0300 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.
0330 USA, WEWN: Stations of the Cross. See T 0330.
0330 USA, WWCR #1: The Prophecy Club. See M 0330.

Thursdays

0300 USA, WEWN: The Holy Rosary (Glorious). See S 0300.
0300 Radio Mexico Intl: Antenna Radio Summary. See M 1400.
0300 USA, WWCR #1 Nashville TN: Total Wellness Show (live). See W 0300.
0300 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.
0330 USA, WEWN Birmingham AL: Stations of the Cross. See T 0330.
0330 USA, WWCR #1 Nashville TN: The Prophecy Club. See M 0330.

Fridays

0300 USA, WEWN: The Holy Rosary (Joyful).
0300 Radio Mexico Intl: Antenna Radio Summary. See M 1400.
0300 USA, WWCR #1 Nashville TN: Total Wellness Show (live). See W 0300.
0300 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.
0330 USA, WEWN Birmingham AL: Stations of the Cross. See T 0330.
0330 USA, WWCR #1 Nashville TN: The Prophecy Club. See M 0330.

Saturdays

0300 USA, WEWN Birmingham AL: The Holy Rosary (Sorrowful). See S 0300.
0300 Australia, Radio: RA News. See S 0000.
0300 Radio Mexico Intl: Antenna Radio Summary. See M 1400.
0300 USA, WWCR #1 Nashville TN: Total Wellness Show (live). See W 0300.
0300 USA, WWCR #3 Nashville TN: Health Programming (live). See A 1603.
0305 Australia, Radio: Rural Reporter. See S 0030.
0330 USA, WEWN Birmingham AL: Stations of the Cross. See T 0330.
0330 Australia, Radio: Lingua Franca. See F 2320.
0330 USA, WWCR #1 Nashville TN: The Prophecy Club. See M 0330.
0345 Australia, Radio: Book Reading. See F 2305.

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Frequencies

0400-0500	Anguilla,Caribbean Beacon	6090am			
0400-0430	Armenia, Voice of	4810va			
0400-0500 vl	Australia, ABC/Katherine	5025do			
0400-0500 vl	Australia, ABC/Tent Creek	4910do			
0400-0500	Australia, Radio	9660pa	12080va	15240pa	15415as
		15515va	17580va	17750as	21725pa
0400-0500	Australia,DefenseForces R	14790as			
0400-0426	Belgium,R Vlaanderen Intl	11840na	15565na		
0400-0500 vl	Botswana, Radio	4820do	7255do		
0400-0500	Canada, CBC N Quebec Svc	9625do			
0400-0500	Canada, CFRX Toronto	6070do			
0400-0500	Canada, CFVP Calgary	6030do			
0400-0500	Canada, CHNX Halifax	6130do			
0400-0500	Canada, CKZN St John's	6160do			
0400-0500	Canada, CKZU Vancouver	6160do			
0400-0430	Canada, R Canada Intl	11835me	11975me	15215me	
0400-0456	China, China Radio Intl	9730na			
0400-0500	Costa Rica,RF Peace Intl	6975am			
0400-0500	Cuba, Radio Havana	6000na	9820na	11705na	
0400-0500	Ecuador, HCJB	9745na	12015na	21455va	
0400-0445	Germany, Deutsche Welle	7225af	9565af	9765af	11785af
		13690af			
0400-0500	Guyana, GBC/Voice of	5950do			
0400-0415	Israel, Kol Israel	9435va	11605va	17535au	
0400-0500	Kenya, Kenya BC Corp	4885do	4935do		
0400-0500 vl	Lesotho, Radio	4800do			
0400-0410 vl/m-f	Malawi, MBC	5993do			
0400-0500	Malaysia, Radio	7295do			
0400-0430 twhfa	Mexico, Radio Mexico Intl	9705am			
0400-0425	Moldova, R Moldova Intl	7520na			
0400-0500	Namibia, NBC	3270af	3289af		
0400-0458	New Zealand, R NZ Intl	17675va			
0400-0500 vl	Papua New Guinea, NBC	9675do			
0400-0456	Romania, R Romania Intl	9570na	11740na	11810as	17735as
0400-0500	Russia,Voice of Russia WS	7125na	9665na	12050na	15595na
		17565na	17630na	17660na	17690na
0400-0430	S Africa, Channel Africa	5955af			
0400-0500	Singapore,RCorp Singapore	6150do			
0400-0430	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0400-0430	Switzerland, Swiss R Intl	9885am	9905am	13635eu	
0400-0430	Tanzania, Radio	5050af			
0400-0500	Uganda, Radio	4976do			
0400-0500	UK, BBC World Service	3255af	3955eu	5975am	6005af
	6175am	6180eu	6185am	6190af	6195eu
	7160af	9410eu	11760me	11765af	11955as
	12095af	15280as	15310as	15420af	15575as
	17640as	17760as	17790as	21660as	
0400-0500	UK, Merlin Network One	3985eu	9795na		
0400-0500	USA, KAIJ Dallas TX	5810na			
0400-0500	USA, KTBN Salt Lk City UT	7510na			
0400-0500 vl	USA, KVOH Los Angeles CA	9975am			
0400-0500	USA, KWHR Naalehu HI	17780as			
0400-0500	USA, Voice of America	6080af	7170va	7275af	7290af
		9575af	9885af	11965me	15205va
0400-0500	USA, WBCQ Monticello ME	7415na			
0400-0500	USA, WEWN Birmingham AL	5825va			
0400-0500	USA, WGTG McCaysville GA	5085am	6890am		
0400-0500	USA, WHRA Greenbush ME	7385na			
0400-0500	USA, WHRI Noblesville IN	5745na	7315sa		
0400-0500	USA, WINB Red Lion PA	11950am			
0400-0500	USA, WJCR Upton KY	7490na	13595as		
0400-0500 twhfa	USA, WRMI/R Miami Intl	9955am			
0400-0500	USA, WRNO New Orleans LA	7395na			
0400-0500	USA, WSHB Cypress Crk SC	11930eu	15195af		
0400-0405	USA, WWCR Nashville TN	5070na	5935na	7435na	
0400-0405 mtwhf	USA, WWCR Nashville TN	3215na			
0400-0405 as	USA, WWCR Nashville TN	3210na			
0400-0445	USA, WYFR Okeechobee FL	6065na	9505na		
0400-0500	Zambia, Christian Voice	3330af	6065af		
0400-0500	Zambia, Natl BC Corp	6165do	6265do		
0400-0500 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0405-0420	Croatia, Croatian Radio	9925na			
0405-0500	USA, WWCR Nashville TN	3210na	5070na	5935na	7435na
0415-0440	Italy, RAI Intl	5975af	7150af		
0430-0500	Austria, R Austria Intl	6015am	6155na	13730na	
0430-0500 a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0430-0500	Netherlands, Radio	6165na	9590na		
0430-0500 vl	Nigeria, Radio/Ibadan	6050do			
0430-0500 vl	Nigeria, Radio/Kaduna	4770do			
0430-0500	Nigeria, Radio/Lagos	3326do			
0430-0500	Swaziland, Trans World R	3200af	4775af		
0430-0500	Switzerland, Swiss R Intl	9885am	9905am		
0445-0500	USA, WYFR Okeechobee FL	9985eu			
0455-0500	Malaysia, Voice of	6175as	9750as	15295as	
0455-0500	Nigeria, Voice of	7255af	15120va		
0459-0500	New Zealand, R NZ Intl	11905va			

Selected Programs

Sundays

0400 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0000.
0400 Australia, Radio: RA News. See S 0000.
0400 USA, WWCR #1&3 Nashville TN: The Extraordinary Science Radio Hour. J.W. McGinnis of the Tesla Society.
0405 Australia, Radio: Ockham's Razor. Robyn Williams with straight, sharp talk about science.
0430 Australia, Radio: Oz Sounds. Thirty minutes of music selections by Radio Australia announcers.

Monday-Friday

0400 Australia, Radio: RA News. See S 0000.
0410 Australia, Radio: The World Today (repeat). See M 0210.

Mondays

0400 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0000.
0400 USA, WWCR #1 Nashville TN: Truth Shall Make You Free. Otis Bonds.
0400 USA, WWCR #3 Nashville TN: Watch America. See S 0300.
0430 USA, WWCR #1 Nashville TN: Lyon Gold and Silver Magnet Program (repeat). Lew Lyon hawks a variety of products for healing.
0430 USA, WWCR #3 Nashville TN: Jeff Davis Show (live). Jeff Davis.

Tuesdays

0400 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0000.
0400 Radio Mexico Intl: Regional Roots and Rhythms. See S 1400.
0400 USA, WWCR #1 Nashville TN: USA Radio News. See S 1100.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.

Wednesdays

0400 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0000.
0400 Radio Mexico Intl: Mail Box. See S 1500.
0400 USA, WWCR #1 Nashville TN: USA Radio News. See S 1100.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.

Thursdays

0400 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0000.
0400 Radio Mexico Intl: The Sounds of Mexico. See M 2300.
0400 USA, WWCR #1 Nashville TN: USA Radio News. See S 1100.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.

Fridays

0400 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0000.
0400 Radio Mexico Intl: Eternally Mexico. See M 2300.
0400 USA, WWCR #1 Nashville TN: USA Radio News. See S 1100.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.

Saturdays

0400 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0000.
0400 Radio Mexico Intl: Mail Box. See S 1500.
0400 USA, WWCR #1 Nashville TN: USA Radio News. See S 1100.
0400 USA, WWCR #3 Nashville TN: Health Programming (live). See A 1603.
0405 Australia, Radio: Pacific Focus. See S 0605.
0405 USA, WWCR #1 Nashville TN: The Bible's Greatest Heroes. Sound tracks from animated Bible stories.
0430 Australia, Radio: Jazz Notes. See S 1105.

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Frequencies

0500-0600	Anguilla,Caribbean Beacon	6090am				
0500-0600 vl	Australia, ABC/Katherine	5025do				
0500-0600 vl	Australia, ABC/Tent Creek	4910do				
0500-0600	Australia, Radio	9660pa	12080va	15240pa	15515va	
		17580va	21725pa			
0500-0600 as	Australia, Radio	17750as				
0500-0600 vl	Botswana, Radio	4820do	7255do			
0500-0600	Canada, CBC N Quebec Svc	9625do				
0500-0600	Canada, CFRX Toronto	6070do				
0500-0600	Canada, CFVP Calgary	6030do				
0500-0600	Canada, CHNX Halifax	6130do				
0500-0600	Canada, CKZU Vancouver	6160do				
0500-0529	Canada, R Canada Intl	5995na	6145eu	7295eu	9595eu	
	9755na 11710eu	11830na	13755eu	15330eu	15400eu	
0500-0556	China, China Radio Intl	9560na				
0500-0600	Costa Rica,RF Peace Intl	6975am				
0500-0600	Cuba, Radio Havana	9550na	9820na	9830na		
0500-0600	Ecuador, HCJB	9745na	12015na	21455va		
0500-0545	Germany, Deutsche Welle	9615am	9670na	11795na	11810na	
0500-0600	Guyana, GBC/Voice of	5950do				
0500-0600 as/vl	Italy, IRRS	3985va				
0500-0600	Japan, Radio/NHK	6110na	7230eu	11715as	11760as	
	11840as	11850pa	15230pa	15590as	17825na	
0500-0600	Kenya, Kenya BC Corp	4885do	4935do			
0500-0600 vl	Lesotho, Radio	4800do				
0500-0600	Liberia,LCN/R Liberia Int	5100do				
0500-0510 vl/m-f	Malawi, MBC	5993do				
0500-0600	Malaysia, Radio	7295do				
0500-0600	Malaysia, RTM Sarawak	7160do				
0500-0600	Malaysia, Voice of	6175as	9750as	15295as		
0500-0525	Netherlands, Radio	6165na	9590na			
0500-0600	New Zealand, R NZ Intl	11905va				
0500-0600 vl	Nigeria, Radio/Ibadan	6050do				
0500-0600 vl	Nigeria, Radio/Kaduna	4770do				
0500-0600	Nigeria, Radio/Lagos	3326do				
0500-0600	Nigeria, Voice of	7255af	15120va			
0500-0600	North Korea, R Pyongyang	3560as	11710eu	13790as		
0500-0600 vl	Papua New Guinea, NBC	9675do				
0500-0600	Russia,Voice of Russia WS	17625au	21790au			
0500-0530	S Africa, AWR Africa	5960af				
0500-0530	S Africa, Channel Africa	11720af				
0500-0600	Singapore,RCorp Singapore	6150do				
0500-0600 vl	Solomon Islands, SIBC	5020do				
0500-0556	Spain, R Exterior Espana	6055na				
0500-0505	Swaziland, Trans World R	3200af	4775af			
0500-0600	Uganda, Radio	4976do				
0500-0600	UK, BBC World Service	3255af	3955eu	5975am	6005af	
	6175am 6180eu	6190af	6195eu	7160af	9410eu	
	9740as 11760me	11765af	11955pa	12095pa	15280as	
	15310as 15360as	15420af	15475af	15575as	17640af	
	17760as 17885af	21660as				
0500-0600	UK, Merlin Network One	6010eu				
0500-0600	USA, KAIJ Dallas TX	5810na				
0500-0600	USA, KTBN Salt Lk City UT	7510na				
0500-0600	USA, KWHR Naalehu HI	17780as				
0500-0600	USA, Voice of America	5970af	6035af	6080af	7170af	
	7195af	9630af	11965me	12080af	15205va	
0500-0600	USA, WBCQ Monticello ME	7415na				
0500-0600	USA, WEWN Birmingham AL	5825va				
0500-0600	USA, WGTG McCaysville GA	5085am	6890am			
0500-0600	USA, WHRA Greenbush ME	11565af				
0500-0600	USA, WHRI Noblesville IN	5745na	7315sa			
0500-0600	USA, WINB Red Lion PA	11950am				
0500-0600	USA, WJCR Upton KY	7490na	13595as			
0500-0600	USA, WRNO New Orleans LA	7395na				
0500-0600	USA, WSHB Cypress Crk SC	9840af	11930eu			
0500-0600	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na	
0500-0600	USA, WYFR Okeechobee FL	5985na	9985eu	11580eu		
0500-0520	Vatican City, Vatican R	4005eu	5883eu	7250eu	9660af	
		11625af	15570af			
0500-0600	Zambia, Christian Voice	3330af	6065af			
0500-0600	Zambia, Natl BC Corp	6165do	6265do			
0500-0530 vl	Zimbabwe, Zimbabwe BC	3306do	4828do			
0505-0518	Croatia, Croatian Radio	13820au				
0505-0600 mtwhf	Swaziland, Trans World R	4775af	6100af	9500af		
0520-0530	Vatican City, Vatican R	9660af	11625af	15570af		
0530-0600	Austria, R Austria Intl	6015na				
0530-0600	Georgia, Georgian Radio	11805eu				
0530-0600 vl	Ghana, Ghana BC Corp	3366do	4915do			
0530-0600 mtwhfa	Malta, VO Mediterranean	7155eu				
0530-0600	Switzerland, Swiss R Intl	13635eu				
0530-0600	Thailand, Radio	9655eu	11905eu	15445eu		
0530-0600	UAE, Radio Dubai	15435au	17830au	21605au	21700au	
0530-0600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do			

Selected Programs

Sundays

0500 Australia, Radio: RA News. See S 0000.
0500 USA, WWCR #1 Nashville TN: The Great American Polka Show. An hour of polka favorites both old and new.
0500 USA, WWCR #3 Nashville TN: World Wide Country Radio. News, weather and the best of country music.
0505 Australia, Radio: Pacific Review. New program - no information available.
0530 Australia, Radio: In Conversation. A guest interview program.
0530 USA, WWCR #1 Nashville TN: The Lutheran Reformation Hour. Richard Shekner preaches from Chicago Heights, Illinois.

Monday-Friday

0500 Australia, Radio: RA News. See S 0000.
0500 USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1400.
0510 Australia, Radio: Pacific Beat. The magazine that provides a focus on the people and issues of the region.
0520 USA, WWCR #3 Nashville TN: Bible Pathway. Rick Hash with a five minute devotional commentary.
0525 USA, WWCR #3 Nashville TN: It Happened Today. Ed Reese provides a summary of Christian happenings on this date in years gone by.
0530 Australia, Radio: Sport. Five or ten minutes of sports news.
0530 USA, WWCR #3 Nashville TN: The Hour of Courage. Ron Wilson talks politics and the precious metals market.
0540 Australia, Radio: Pacific Beat. See M 0510.

Mondays

0500 USA, WWCR #1 Nashville TN: World of Radio. See S 0230.
0500 USA, WWCR #3 Nashville TN: The Spoken Word of God. Alexander Scourby narrates the King James version of The New Testament.
0530 USA, WWCR #1 Nashville TN: Communications World ABC. See S 0200.

Tuesdays

0500 USA, WWCR #1 Nashville TN: Financial Survival in the 90's. Jim Ceaderstrom.
0500 USA, WWCR #3 Nashville TN: Exodus III. Ben McKnight.

Wednesdays

0500 USA, WWCR #1 Nashville TN: Financial Survival in the 90's. See T 0500.
0500 USA, WWCR #3 Nashville TN: Exodus III. See T 0500.

Thursdays

0500 USA, WWCR #1 Nashville TN: Financial Survival in the 90's. See T 0500.
0500 USA, WWCR #3 Nashville TN: Exodus III. See T 0500.

Fridays

0500 USA, WWCR #1 Nashville TN: Financial Survival in the 90's. See T 0500.
0500 USA, WWCR #3 Nashville TN: Exodus III. See T 0500.

Saturdays

0500 USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1400.
0500 Australia, Radio: RA News. See S 0000.
0500 USA, WWCR #1 Nashville TN: Financial Survival in the 90's. See T 0500.
0500 USA, WWCR #3 Nashville TN: Missing Links. Joseph Krill.
0505 Australia, Radio: Pacific Focus. See S 0605.
0530 Australia, Radio: The Good Citizen. See S 0030.
0530 USA, WWCR #3 Nashville TN: Battle Cry Sounding. See F 1230.

Hauser's Highlights

France: Radio France Intl

English, A99 schedule:

1200-1300 9805, 15155, 15195 to Eu
15540 Gabon to Af
11600 Xian, China, to SEAs
1400-1500 17560 to ME/EAf
11910 China to India
17680 to S/SEAs
1600-1700 11615, 11995 and 12015 via Gabon
17850 Gabon to Af
1600-1730 15210 and 17605 Af

(RFI printed schedule, via *BC-DX*)

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Frequencies

0600-0700	Anguilla,Caribbean Beacon	6090am				
0600-0700 vl	Australia, ABC/Katherine	5025do				
0600-0700 vl	Australia, ABC/Tent Creek	4910do				
0600-0700	Australia, Radio	9660pa	12080va	15240pa	15415as	
		15515va	17580va	17750as	21725pa	
0600-0700 vl	Botswana, Radio	4820do	4830do	7255do		
0600-0700 vl	Canada, CBC N Quebec Svc	9625do				
0600-0700	Canada, CFRX Toronto	6070do				
0600-0700	Canada, CFVP Calgary	6030do				
0600-0700	Canada, CHNX Halifax	6130do				
0600-0700	Canada, CKZU Vancouver	6160do				
0600-0700	Costa Rica,RF Peace Intl	6975am				
0600-0605	Croatia, Croatian Radio	13820au				
0600-0700	Cuba, Radio Havana	9550na	9820na	9830na		
0600-0700	Ecuador, HCJB	9745na	12015na	21455va		
0600-0645	Germany, Deutsche Welle	6140eu	11915af	13790af	15185af	
		17820as	17860af	21680me		
0600-0700	Germany, Sunrise Radio	5850eu				
0600-0700	Germany,Overcomer Ministr	13810au				
0600-0700 vl	Ghana, Ghana BC Corp	3366do	4915do			
0600-0700	Guyana, GBC/Voice of	5950do				
0600-0630 vl	Italy, IRRS	3985va				
0600-0700	Japan, Radio/NHK	5975eu	7230eu	11740as	11840as	
		11850pa	17825na			
0600-0700	Kenya, Kenya BC Corp	4885do	4935do			
0600-0700 vl	Lesotho, Radio	4800do				
0600-0700	Liberia,LCN/R Liberia Int	5100do				
0600-0700	Malaysia, Radio	7295do				
0600-0700	Malaysia, RTM Sarawak	7160do				
0600-0700	Malaysia, Voice of	6175as	9750as	15295as		
0600-0700	New Zealand, R NZ Intl	11905va				
0600-0700 vl	Nigeria, Radio/Ibadan	6050do				
0600-0700 vl	Nigeria, Radio/Kaduna	4770do				
0600-0700	Nigeria, Radio/Lagos	3326do				
0600-0700	Nigeria, Voice of	7255af	15120va			
0600-0700 vl	Papua New Guinea, NBC	9675do				
0600-0641	Romania, R Romania Intl	11725na	11940na			
0600-0700	Russia,Voice of Russia WS	15490au	17615au	17655as	21790au	
0600-0630	S Africa, Channel Africa	15215af				
0600-0700	Sierra Leone, SLBS	3316do				
0600-0700	Singapore,RCorp Singapore	6150do				
0600-0700 vl	Solomon Islands, SIBC	5020do				
0600-0700 mtwhf	Swaziland, Trans World R	4775af	6100af	9500af		
0600-0700	UK, BBC World Service	5975am	6005af	6175am	6180eu	
	6190af 6195eu	7145pa	7160af	7325eu	9410eu	
	9740as 11760me	11765af	11940af	11955pa	12095eu	
	15310as 15360as	15400af	15420af	15565eu	15575as	
	17640af 17760as	17790as	17885af	21660as		
0600-0700	UK, Merlin Network One	6110eu	13720as			
0600-0700	USA, KAIJ Dallas TX	5810na				
0600-0700	USA, KTBN Salt Lk City UT	7510na				
0600-0700	USA, KWHR Naalehu HI	11565pa	17780as			
0600-0630	USA, Voice of America	5970af	6035af	6080af	7170va	
		9630af	9680af	11805af	11965me	
		11995af	12080af	15205va		
0600-0700	USA, WBCQ Monticello ME	7415na				
0600-0700	USA, WEWN Birmingham AL	5825va				
0600-0700	USA, WHRA Greenbush ME	11565af				
0600-0700	USA, WHRI Noblesville IN	5745na	7315sa			
0600-0700	USA, WINB Red Lion PA	11950am				
0600-0700	USA, WJCR Upton KY	7490na	13595as			
0600-0700	USA, WRNO New Orleans LA	7395na				
0600-0700	USA, WSHB Cypress Crk SC	13650af				
0600-0700	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na	
0600-0700	USA, WYFR Okeechobee FL	5985na	7355eu			
0600-0700 vl	Vanuatu, Radio	4960do				
0600-0700	Yemen, Rep of Yemen Radio	9780do				
0600-0700	Zambia, Christian Voice	3330af	6065af			
0600-0700	Zambia, Natl BC Corp	6165do	6265do			
0600-0700 vl	Zimbabwe, Zimbabwe BC	4828do	5012do			
0605-0610 mtwhfa	Croatia, Croatian Radio	5945eu	7365eu	9830eu		
0610-0615 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			
0630-0700	Austria, R Austria Intl	6015na				
0630-0700	Finland, YLE/R Finland	15250va	21670as			
0630-0700 t h	Georgia, Georgian Radio	6080me				
0630-0700 as	Italy, IRRS	7120va				
0630-0700 as	UK, BBC World Service	17885af				
0630-0700	USA, Voice of America	7170af	9680af	11805af	11965me	
		15205va				
0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7195af	
		9630af	11995af	12080af		
0630-0645	Vatican City, Vatican R	11625va	13765af	15570af		
0630-0645 mtwhfa	Vatican City, Vatican R	4005eu	5883eu	7250eu	9645eu	
		11740eu	15595eu			
0641-0700	Romania, R Romania Intl	9625eu	11725na	11775eu	11840eu	
		11940na	15270eu			
0645-0700	Germany, Deutsche Welle	6140eu				
0645-0655 as	Monaco, Trans World Radio	6045eu	9870eu			
0645-0700	Vatican City, Vatican R	11625va	13795af	15570af		
0655-0700 mtwhf	Monaco, Trans World Radio	6045eu	9870eu			

Selected Programs

Sundays

0600 USA, WEWN Birmingham AL: The Beatitudes. Father Andrew Apostoli presents this series as an eight step guide to holiness.
0600 Australia, Radio: RA News. See S 0000.
0600 USA, WWCR #1 Nashville TN: Music and Dancing. Miguel Dabul's program of music and inspiration originates from Norfolk, Virginia.
0600 USA, WWCR #3: Prophecy Flash. William Dankenbring preaches about the second coming.
0605 Australia, Radio: Pacific Focus. Coverage of issues of relevance to people of the Pacific region.
0630 Australia: Correspondents' Report. See S 0010.
0630 Finland, YLE Radio: News/Weather. World and Finnish news, regional weather, a business report, and currency exchange rates.
0630 USA, WWCR #1 Nashville TN: The Old Record Shop. Ken Berryhill with thirty minutes of selections of music from the days of the 78 rpm record. Recommended.
0630 USA, WWCR #3: World of Radio. See S 0230.

Monday-Friday

0600 Australia, Radio: RA News. See S 0000.
0600 USA, WWCR #1: USA Radio News. See S 1100.
0600 USA, WWCR #3: USA Radio News. See S 1100.
0605 USA, WWCR #1 Nashville TN: The Hour of Courage. See M-F 0530.
0605 USA, WWCR #3 Nashville TN: Freedom Calls. Bo Gritz hosts this talk radio program.
0630 Australia, Radio: Sports. A half-hour of sports.
0630 Finland, YLE Radio: News/Weather. See S 0630.
0640 Finland, YLE Radio: Compass North. A magazine program with features on life in Finland.
0644 Finland, YLE Radio: Finnish Press Review. Editorial opinion and reports on Finnish and world events.

Mondays

0600 USA, WEWN Birmingham AL: Catholic World Today. Glen Tapley covers the headline stories of the day from a distinctly Catholic perspective.
0610 Australia, Radio: The Australian Music Show. Kim Taylor presents the music, people, and issues of the Australian contemporary music industry.
0630 USA, WEWN: Moments of Truth. See S 1500.
0635 USA, WWCR #1: Ken's Country Classics. Key Berryhill with country music from a bygone era.

Tuesdays

0600 USA, WEWN: Catholic World Today. See M 0600.
0610 Australia, Radio: Presenter's Pleasure. See S 0030.
0630 USA, WEWN: Off the Shelf. See S 2330.
0635 USA, WWCR #1 Nashville TN: Natural Health Clinic. Terrance Sullivan of Oklahoma offers natural supplement products for the body.

Wednesdays

0600 USA, WEWN: Catholic World Today. See M 0600.
0610 Australia, Radio: Blacktracker. Mal Honess with an insight into the music of Australia's aborigines.
0630 USA, WEWN Birmingham AL: Life is Worth Living. This 50-part series was recorded in the 1960's and features Archbishop Fulton J. Sheen's timeless talks.
0635 USA, WWCR #1: Natural Health Clinic. See T 0635.

Thursdays

0600 USA, WEWN: Catholic World Today. See M 0600.
0610 Australia, Radio: Australian Country Style. Graham Bell goes up country.
0630 USA, WEWN Birmingham AL: Pro-Life Update. Father Frank Pavone speaks out against abortion.
0635 USA, WWCR #1 Nashville TN: Natural Health Clinic. See T 0635.

Fridays

0600 USA, WEWN: Catholic World Today. See M 0600.
0610 Australia, Radio: Music Deli. See M 1605.
0630 USA, WEWN: EWTN Bookmark. See S 1500.
0635 USA, WWCR #1 Nashville TN: Natural Health Clinic. See T 0635.

Saturdays

0600 USA, WEWN Birmingham AL: Get a Life in Christ. Father Benedict Groeschel hosts this series.
0600 Australia, Radio: RA News. See S 0000.
0600 USA, WWCR #1: USA Radio News. See S 1100.
0600 USA, WWCR #3 Nashville TN: Musical Memories. Martha Ganin.
0605 Australia, Radio: Feedback. See S 0330.
0605 USA, WWCR #1 Nashville TN: Rock the Universe. Rich Adcock's selections of rock recordings includes some rare treats.
0630 USA, WEWN Birmingham AL: The Gospel of Life. Father Richard Hogan expounds upon the principles in the Pope's encyclical on life.
0630 Australia, Radio: Arts Australia. Lisa Harris presents reviews and comment on current events within the Australian arts scene.
0630 Finland, YLE Radio: News/Weather. See S 0630.
0630 USA, WWCR #3: Words of Hope. See S 1100.
0635 Finland, YLE Radio: Feature Stories from Last Week. A review of last week's main stories.
0645 USA, WWCR #3: Wonderful Words of Life. The international ministry of the Salvation Army.

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FREQUENCIES

0700-0800	Anguilla,Caribbean Beacon	6090am			
0700-0800 vl	Australia, ABC/Katherine	5025do			
0700-0800 vl	Australia, ABC/Tent Creek	4910do			
0700-0800	Australia, Radio	9660pa	12080va	15240pa	15415as
		15515va	17580va	17750as	21725pa
0700-0726	Belgium,R Vlaanderen Intl	9925eu	15195eu		
0700-0800 vl	Botswana, Radio	4820do	4830do	7255do	
0700-0800	Canada, CFRX Toronto	6070do			
0700-0800	Canada, CFVP Calgary	6030do			
0700-0800	Canada, CHNX Halifax	6130do			
0700-0800	Canada, CKZU Vancouver	6160do			
0700-0800	Costa Rica,RF Peace Intl	6975am			
0700-0705	Croatia, Croatian Radio	13820af			
0700-0727	Czech Rep, R Prague Intl	9880eu	11600eu		
0700-0800	Ecuador, HCJB	11855eu	15115pa	21455va	
0700-0800 as/vl	Eqt Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eqt Guinea, Radio Africa	15186af			
0700-0800	Germany, Deutsche Welle	6140eu			
0700-0800 s	Germany, Good News World	13740as			
0700-0800	Germany, Sunrise Radio	5850eu			
0700-0800	Germany, Voice of Hope	5975eu			
0700-0800	Germany,Overcomer Ministr	13810au			
0700-0800 vl	Ghana, Ghana BC Corp	3366do	4915do		
0700-0800	Guyana, GBC/Voice of	5950do			
0700-0800 as	Italy, IRRS	7120va			
0700-0800	Kenya, Kenya BC Corp	4885do	4935do		
0700-0800 vl	Lesotho, Radio	4800do			
0700-0715	Liberia,LCN/R Liberia Int	5100do			
0700-0800	Malaysia, Radio	7295do			
0700-0800	Malaysia, RTM Sarawak	7160do			
0700-0800	Malaysia, Voice of	6275as	9750as	15295as	
0700-0800 mtwhf	Monaco, Trans World Radio	6045eu	9870eu		
0700-0705	New Zealand, R NZ Intl	11905va			
0700-0800 vl	Nigeria, Radio/Ibadan	6050do			
0700-0800 vl	Nigeria, Radio/Kaduna	4770do			
0700-0800 vl	Nigeria, Voice of	7255af	15120va		
0700-0800	Palau, KHBN/Voice of Hope	9965as	9985as	13840as	15725as
0700-0730 vl	Papua New Guinea, NBC	9675do			
0700-0756	Romania, R Romania Intl	15340af	17745af		
0700-0800	Russia,Voice of Russia WS	17495au	17625au	17665au	21790au
0700-0800	Sierra Leone, SLBS	3316do			
0700-0800	Singapore,RCorp Singapore	6150do			
0700-0730	Slovakia, R Slovakia Intl	9440au	15460au	17550au	
0700-0800 vl	Solomon Islands, SIBC	5020do			
0700-0730 mtwhf	Swaziland, Trans World R	4775af	6100af	9500af	
0700-0720 a	Swaziland, Trans World R	4775af	6100af	9500af	
0700-0705 s	Swaziland, Trans World R	4775af	6100af	9500af	
0700-0800	Taiwan, Radio Taipei Intl	5950na			
0700-0800	UK, BBC World Service	5975am	6005af	6175am	6190af
		7145af	7325eu	9410eu	9740as
		11760me	11765af	11835af	11940af
		11955pa	12095eu	15310as	15360as
		15400af	15485eu	15565eu	15575as
		17640eu	17760as	17790as	17830af
		21660as			
0700-0715 as	UK, BBC World Service	17885af			
0700-0800	UK, Merlin Network One	6110eu	9915eu	13720as	17630eu
		21550af			
0700-0800	USA, KAIJ Dallas TX	5810na			
0700-0800	USA, KTBN Salt Lk City UT	7510na			
0700-0800	USA, KWHR Naalehu HI	11565pa	17780as		
0700-0800	USA, WEWN Birmingham AL	5825va			
0700-0800	USA, WHRA Greenbush ME	11565af			
0700-0800	USA, WHRI Noblesville IN	5745na	7315sa		
0700-0800	USA, WJCR Upton KY	7490na	13595as		
0700-0800	USA, WRNO New Orleans LA	7395na			
0700-0800	USA, WSHB Cypress Crk SC	13650af			
0700-0800	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0700-0745	USA, WYFR Okeechobee FL	7355eu	9985eu	13695va	
0700-0800 vl	Vanuatu, Radio	4960do			
0700-0800	Zambia, Christian Voice	6065af			
0700-0800	Zambia, Natl BC Corp	6165do	6265do		
0700-0800 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0705-0710 s	Croatia, Croatian Radio	5945eu	7365eu	9830eu	
0706-0800	New Zealand, R NZ Intl	9700va			
0725-0800	Myanmar, Radio	9730do			
0730-0800	Austria, R Austria Intl	6155eu	13730eu	15410eu	17870eu
0730-0800	Georgia, Georgian Radio	11910eu			
0730-0800 vl	Papua New Guinea, NBC	4890do			
0730-0735 mtwhf	Swaziland, Trans World R	4775af			
0730-0800	Switzerland, Swiss R Intl	15545af	17685af	21750af	
0740-0750	Greece, Voice of	7475eu	9420eu	11645eu	15630eu
		17700au			
0740-0800	Guam, TWR/KTWR	15200as			
0800-0900	Anguilla,Caribbean Beacon	6090am			
0800-0830 vl	Australia, ABC/Katherine	5025do			
0800-0830 vl	Australia, ABC/Tent Creek	4910do			
0800-0900	Australia, Radio	5995pa	9710pa	11650va	12080va
		13605va	15515va	21725pa	
0800-0900 vl	Botswana, Radio	4820do	4830do	7255do	
0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFVP Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0900	Costa Rica,RF Peace Intl	6975am			
0800-0805	Croatia, Croatian Radio	13820au			
0800-0900	Ecuador, HCJB	11855eu	15115pa	21455va	
0800-0900 as/vl	Eqt Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eqt Guinea, Radio Africa	15186af			
0800-0900	Germany, Deutsche Welle	6140eu			
0800-0900	Germany, Sunrise Radio	5850eu			
0800-0900	Germany, Voice of Hope	5975eu			
0800-0900	Germany,Overcomer Ministr	13810au			
0800-0900	Guam, TWR/KTWR	15200as	15330as		
0800-0900	Guyana, GBC/Voice of	5950do			
0800-0900	Indonesia, Voice of	9525va			
0800-0900 as/vl	Italy, IRRS	7120va			
0800-0900	Kenya, Kenya BC Corp	4885do	4935do		
0800-0900 vl	Lesotho, Radio	4800do			
0800-0900	Liberia,LCN/R Liberia Int	5100do			
0800-0900	Malaysia, Radio	7295do			
0800-0825	Malaysia, Voice of	6275as	9750as	15295as	
0800-0900 vl	Malaysia,RTM KotaKinabalu	5980do			
0800-0900 s	Malta, VO Mediterranean	11770eu			
0800-0820 mtwhf	Monaco, Trans World Radio	6045eu	9870eu		
0800-0830	Myanmar, Radio	9730do			
0800-0900	N Marianas, KFBS Saipan	11650as	15380as		
0800-0900	New Zealand, R NZ Intl	9700va			
0800-0900 vl	Nigeria, Radio/Ibadan	6050do			
0800-0900 vl	Nigeria, Radio/Kaduna	4770do			
0800-0900	Nigeria, Radio/Lagos	3326do			
0800-0900	Palau, KHBN/Voice of Hope	9955as	9985as	13840va	15725as
0800-0900 vl	Papua New Guinea, NBC	4890do			
0800-0900	Russia,Voice of Russia WS	15490au	17495au	17625au	21790au
0800-0900	Sierra, Leone,SLBS	5980do			
0800-0900	Singapore,RCorp Singapore	6150do			
0800-0900	South Korea, R Korea Intl	9570au	13670eu		
0800-0900	UK, BBC World Service	6190af	9410eu	9740as	11940af
		11955pa	12095eu	15310as	15360as
		15400af	15485eu	15565eu	17640eu
		17760as	17790as	17830af	21660as
0800-0900 as	UK, BBC World Service	15575as	17885af		
0800-0900	UK, Merlin Network One	9915eu	13660eu	13720as	17630eu
		21550af			
0800-0900	USA, KAIJ Dallas TX	5810na			
0800-0900	USA, KNLS Anchor Point AK	9615as			
0800-0900	USA, KTBN Salt Lk City UT	7510na			
0800-0900	USA, KWHR Naalehu HI	11565pa	17780as		
0800-0900	USA, Voice of America	11775as	13610as	15150as	
0800-0900	USA, WEWN Birmingham AL	5825va			
0800-0900	USA, WHRA Greenbush ME	11565af			
0800-0900	USA, WHRI Noblesville IN	5745na	7315sa		
0800-0900	USA, WJCR Upton KY	7490na	13595as		
0800-0900	USA, WRNO New Orleans LA	7395na			
0800-0900	USA, WSHB Cypress Crk SC	9845pa	9860eu		
0800-0900	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0800-0900 vl	Vanuatu, Radio	4960do			
0800-0900	Zambia, Christian Voice	6065af			
0800-0900	Zambia, Natl BC Corp	6165do	6265do		
0800-0900 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0804-0820	Pakistan, Radio	15530eu	17835eu		
0805-0810 mtwhfa	Croatia, Croatian Radio	5945eu	7365eu	9830eu	
0815-0900 f	Seychelles, FEBA Radio	15460as			
0820-0830 t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0820-0850 s	Monaco, Trans World Radio	6045eu	9870eu		
0830-0900 vl	Australia, ABC/Alice Spgs	2310do			
0830-0900 vl	Australia, ABC/Katherine	2485do			
0830-0900 vl	Australia, ABC/Tent Creek	2325do			
0830-0900	Australia, Radio	17750as			
0830-0900	Austria, R Austria Intl	21650as	21765as		
0830-0900	Georgia, Georgian Radio	11910me			
0830-0900 vl	Solomon Islands, SIBC	5020do			
0830-0900	Switzerland, Swiss R Intl	9885as	13685as		
0845-0900 mtwhf	USA, WRMI/R Miami Intl	9955am			

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FREQUENCIES

0900-1000	Anguilla,Caribbean Beacon	6090am			
0900-1000 vl	Australia, ABC/Alice Spgs	2310do			
0900-1000 vl	Australia, ABC/Katherine	2485do			
0900-1000 vl	Australia, ABC/Tent Creek	2325do			
0900-1000	Australia, Radio	11650va	13605as	17750as	21820as
0900-0910 s	Bhutan, Bhutan BC Service	6030do			
0900-1000 vl	Botswana, Radio	4820do	4830do	7255do	
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-0956	China, China Radio Intl	15210pa	17755pa		
0900-1000	Costa Rica,RF Peace Intl	6975am			
0900-0929	Czech Rep, R Prague Intl	21745va			
0900-1000	Ecuador, HCJB	15115pa	21455va		
0900-1000 as/vl	Eqt Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af			
0900-0945	Germany, Deutsche Welle	6140eu	6160pa	9565af	15210af
		15410af	17560as	17800af	21680as
		21790af			
0900-1000	Germany, Sunrise Radio	5850eu			
0900-1000	Germany, Voice of Hope	5975eu			
0900-1000	Germany,Overcomer Ministr	13810au			
0900-1000 vl	Ghana, Ghana BC Corp	4915do	6130do		
0900-0930	Guam, TWR/KTWR	15330as			
0900-1000	Guyana, GBC/Voice of	5950do			
0900-1000 as/vl	Italy, IRRS	7120va			
0900-1000	Kenya, Kenya BC Corp	4935do			
0900-1000 vl	Lesotho, Radio	4800do			
0900-0915	Liberia,LCN/R Liberia Int	5100do			
0900-1000	Malaysia, Radio	7295do			
0900-1000 vl	Malaysia,RTM KotaKinabalu	5980do			
0900-1000	N Marianas, KFBS Saipan	9495as	11650as	15380as	
0900-1000	N Marianas, KHBI Saipan	11660as	15665as		
0900-1000	New Zealand, R NZ Intl	9700va			
0900-1000 vl	Nigeria, Radio/Ibadan	6050do			
0900-1000 vl	Nigeria, Radio/Kaduna	4770do			
0900-1000	Nigeria, Radio/Lagos	3326do			
0900-1000	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Sierra Leone, SLBS	5980do			
0900-1000	Singapore,RCorp Singapore	6150do			
0900-1000 vl	Solomon Islands, SIBC	5020do			
0900-1000	Tanzania, Radio	5050af			
0900-1000	UK, BBC World Service	6065as	6190af	6195as	9410eu
		9580as	9740as	11760me	11765pa
		11940af	11945as	11955as	12095eu
		15190sa	15310as	15360as	15400af
		15485eu	15565eu	15575as	17640eu
		17705eu	17760as	17790as	17830af
		17885af	21660as		
0900-1000	UK, Merlin Network One	9915eu	13660eu	17630eu	21550af
0900-1000	USA, KAIJ Dallas TX	5810na			
0900-1000	USA, KTBN Salt Lk City UT	7510na			
0900-1000	USA, KWHR Naalehu HI	11565pa	17780as		
0900-1000	USA, Voice of America	11775as	13610as	15150as	15665as
0900-1000	USA, WEWN Birmingham AL	5825va			
0900-1000	USA, WHRA Greenbush ME	11565af			
0900-1000	USA, WHRI Noblesville IN	5745na	7315sa		
0900-1000	USA, WJCR Upton KY	7490na	13595as		
0900-1000	USA, WRNO New Orleans LA	7395na			
0900-1000	USA, WSHB Cypress Crk SC	9455sa	9860eu		
0900-1000	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0900-1000	Zambia, Christian Voice	6065af			
0900-1000	Zambia, Natl BC Corp	6165do	6265do		
0900-1000 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0905-0910 s	Croatia, Croatian Radio	7365eu	9830eu	13830eu	
0930-1000	Canada, CKZN St John's	6160do			
0930-1000	Guam, TWR/KTWR	9865as			
0930-1000	Italy, AWR Europe	7230eu			
0930-1000	Lithuania, Radio Vilnius	9710eu			
0930-1000	Netherlands, Radio	9820au	12065as	13710as	
0930-1000	Philippines, FEBC R Intl	11635as			
0945-1000	Germany, Deutsche Welle	6140eu			
0950-0945 a	UK, BBC World Service	6095as	9580as	11945as	11955as
		15280as			

THANK YOU...

ADDITIONAL CONTRIBUTORS TO THIS MONTH'S SHORTWAVE GUIDE:

Joe Brashier/World Harvest Radio; Bob Fraser, Cohasset, MA; Clyde W. Harmon, Anniston, AL; Glenn Hauser, Enid, OK/*World of Radio & DX Report*; Hans Johnson/Ulis Fleming/*Cumbre DX*;Jack Hubby, Cupertino, CA; Al Quaglieri/*NASWA Journal*; Giovanni Serra/*The Four Winds*; Thomas Sundstrom, Vincetown, NJ; BBCM; *Hard Core DX* ; Usenet Newsgroups.

1000-1100	Anguilla,Caribbean Beacon	11775am			
1000-1030	Armenia, Voice of	4810eu	15270eu		
1000-1100 vl	Australia, ABC/Alice Spgs	2310do			
1000-1100 vl	Australia, ABC/Katherine	2485do			
1000-1100 vl	Australia, ABC/Tent Creek	2325do			
1000-1100	Australia, Radio	11650va	11880as	17750as	21820as
1000-1100 vl	Botswana, Radio	4820do	4830do	7255do	
1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
1000-1100	Canada, CFRX Toronto	6070do			
1000-1100	Canada, CFVP Calgary	6030do			
1000-1100	Canada, CHNX Halifax	6130do			
1000-1100	Canada, CKZN St John's	6160do			
1000-1100	Canada, CKZU Vancouver	6160do			
1000-1056	China, China Radio Intl	15210pa	17755pa		
1000-1100	Costa Rica,RF Peace Intl	6975am			
1000-1100	Ecuador, HCJB	15115pa	21455va		
1000-1100 as/vl	Eqt Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af			
1000-1100	Germany, Deutsche Welle	6140eu			
1000-1100 a	Germany, Good News World	5910eu			
1000-1100	Germany, Sunrise Radio	5850eu			
1000-1100	Germany, Voice of Hope	5975eu			
1000-1100 vl	Ghana, Ghana BC Corp	4915do	6130do		
1000-1100	Guam, AWR/KSDA	11560as			
1000-1030	Guam, AWR/KSDA	11560as			
1000-1100	Guam, TWR/KTWR	9865as			
1000-1100	Guyana, GBC/Voice of	5950do			
1000-1100	India, All India Radio	11585as	11735au	13700as	15020as
		17385au	17840as		
1000-1100 as/vl	Italy, IRRS	7120va			
1000-1100	Japan, Radio/NHK	9695as	11850pa	15590as	
1000-1100	Jordan, Radio	11690eu			
1000-1100	Kenya, Kenya BC Corp	4935do			
1000-1010 fa	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
1000-1100 vl	Lesotho, Radio	4800do			
1000-1100	Malaysia, Radio	7295do			
1000-1100 vl	Malaysia,RTM KotaKinabalu	5980do			
1000-1100	N Marianas, KFBS Saipan	9495as	11650as	15380as	
1000-1100	N Marianas, KHBI Saipan	11660as	15665as		
1000-1030	Netherlands, Radio	9820au	12065as	13710as	
1000-1015	New Zealand, R NZ Intl	9700va			
1000-1100 vl	Nigeria, Radio/Ibadan	6050do			
1000-1100 vl	Nigeria, Radio/Kaduna	4770do			
1000-1100 vl	Nigeria, Voice of	7255af	15120va		
1000-1100	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC R Intl	11635as			
1000-1100	Sierra Leone, SLBS	5980do			
1000-1030	Singapore, RTE Radio	11740as			
1000-1100	Singapore,RCorp Singapore	6150do			
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1030	Switzerland, Swiss R Intl	15315eu			
1000-1030	Tanzania, Radio	5050af			
1000-1100	UK, BBC World Service	5965am	6190af	6195va	9410eu
	9740as 11760me	11765pa	11940af	12095eu	15310as
	15360as 15485eu	15565eu	15575as	17640eu	17705eu
	17760as 17790as	17885af	21660as		
1000-1100 as	UK, BBC World Service	15190sa	15400af	17830af	
1000-1100	UK, Merlin Network One	9915eu	13660eu	17630eu	21550af
1000-1100	USA, KAIJ Dallas TX	5810na			
1000-1100	USA, KTBN Salt Lk City UT	7510na			
1000-1100	USA, KWHR Naalehu HI	9930as	11565pa	17780as	
1000-1100	USA, Voice of America	6165ca	7405ca	9590ca	9770pa
	11660as 11720as	15240as	15425as	15665as	
1000-1100	USA, WEWN Birmingham AL	7425na	15745eu		
1000-1100	USA, WHRI Noblesville IN	6040na	9495am		
1000-1100	USA, WJCR Upton KY	7490na	13595as		
1000-1100	USA, WRNO New Orleans LA	7395na			
1000-1100	USA, WSHB Cypress Crk SC	6095am	9455sa		
1000-1100 as	USA, WWBS Macon GA	11900na			
1000-1100	USA, WWCR Nashville TN	2390na	5070na	5935na	12160na
1000-1100	USA, WYFR Okeechobee FL	5950na			
1000-1027	Vietnam, Voice of	12019as	13740as		
1000-1100	Zambia, Christian Voice	6065af			
1000-1100	Zambia, Natl BC Corp	6165do	6265do		
1000-1100 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1015-1030 mtwhfa	Vatican City, Vatican R	5883eu	9645eu	11740eu	15595eu
		21850va			
1030-1057	Czech Rep, R Prague Intl	9880eu	11615eu		
1030-1100	Ethiopia, Radio	5990do	7110do	9705do	
1030-1035	Israel, Kol Israel	15650va	17535va		
1030-1100	Malaysia, RTM Sarawak	7160do			
1030-1100	Netherlands, Radio	6045eu	9820as	9860eu	12065as
		13710as			
1030-1100	South Korea, R Korea Intl	11715na			
1030-1100 as	Tanzania, Radio	5050af			
1030-1100	UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu

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Frequencies

1100-1200	Anguilla,Caribbean Beacon	11775am			
1100-1200 vl	Australia, ABC/Alice Spgs	2310do			
1100-1200 vl	Australia, ABC/Katherine	2485do			
1100-1200 vl	Australia, ABC/Tent Creek	2325do			
1100-1200	Australia, Radio 5995pa	6020pa	9580va	11650va	21820as
1100-1200 vl	Botswana, Radio	4820do	4830do	7255do	
1100-1200	Bulgaria, Radio	15700eu	17500eu		
1100-1200	Canada, CFRX Toronto	6070do			
1100-1200	Canada, CFVP Calgary	6030do			
1100-1200	Canada, CHNX Halifax	6130do			
1100-1200	Canada, CKZN St John's	6160do			
1100-1200	Canada, CKZU Vancouver	6160do			
1100-1200	Costa Rica,RF Peace Intl	6975am			
1100-1200	Ecuador, HCJB	12005ca	15115am	21455va	
1100-1200 as/vl	Eqt Guinea, R East Africa	15186af			
1100-1145	Germany, Deutsche Welle	6140eu	15370af	15410af	17680af
1100-1200	Germany, Sunrise Radio	5850eu			
1100-1200 vl	Ghana, Ghana BC Corp	4915do	6130do		
1100-1200	Guyana, GBC/Voice of	5950do			
1100-1200	Iran, VOIRI 13710as	15255pa	15430me	17565as	21510as
1100-1200 as/vl	Italy, IRRS	7120va			
1100-1200	Japan, Radio/NHK	6120na	9695as	15590as	
1100-1200	Jordan, Radio	11690eu			
1100-1120 fa	Kazakhstan, R Almaty	9620eu	11840as		
1100-1200	Kenya, Kenya BC Corp	4935do			
1100-1130 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
1100-1200 vl	Lesotho, Radio	4800do			
1100-1110	Liberia,LCN/R Liberia Int	5100do			
1100-1200	Malaysia, Radio	7295do			
1100-1200 vl	Malaysia,RTM KotaKinabalu	5980do			
1100-1200	N Marianas, KFBS Saipan	9495as	11650as	15380as	
1100-1200	N Marianas, KHBI Saipan	9355as			
1100-1125	Netherlands, Radio	6045eu	9820au	9860eu	12065as
		13710as			
1100-1200 vl	Nigeria, Radio/Ibadan	6050do			
1100-1200 vl	Nigeria, Radio/Kaduna	4770do			
1100-1200 vl	Nigeria, Voice of	7255af	15120va		
1100-1200	North Korea, R Pyongyang	3560as	9640va	9850as	9975me
		11335am	13650va		
1100-1200	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1100-1200 vl	Papua New Guinea, NBC	4890do			
1100-1200	Sierra Leone, SLBS	5980do			
1100-1200	Singapore,R Singapore Int	6015as	6150as		
1100-1130 vl	Solomon Islands, SIBC	5020do			
1100-1200	Switzerland, Swiss R Intl	13735as	21770as		
1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200 as	Tanzania, Radio	5050af			
1100-1130 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1100-1200	UK, BBC World Service	5965am	6190af	6195va	9410eu
	9580as 9740as	11760me	11940af	11955as	12095eu
	15280as 15310as	15400af	15485eu	15565eu	15575as
	17640eu 17705va	17790sa	17830af	17885af	21660af
1100-1130 as	UK, BBC World Service	15190sa	15220am		
1100-1200	UK, Merlin Network One	9915eu	13660eu	17650eu	21550af
1100-1200	Ukraine, R Ukraine Intl	12050na	21520au		
1100-1200	USA, KAIJ Dallas TX	5810na			
1100-1200	USA, KTBN Salt Lk City UT	7510na			
1100-1200	USA, KWHR Naalehu HI	9930as	11565pa	17780as	
1100-1200	USA, Voice of America	6160as	9355as	9645as	9760as
	9770as	11720as	15160as	15240as	15425as
1100-1130 mtwhf	USA, Voice of America	13675af	15510af	17690af	17780af
		21705af			
1100-1200	USA, WEWN Birmingham AL	7425na	15745eu		
1100-1200	USA, WHRI Noblesville IN	6040na	9495am		
1100-1200	USA, WJCR Upton KY	7490na	13595as		
1100-1200	USA, WRNO New Orleans LA	7395na			
1100-1200	USA, WSHB Cypress Crk SC	6095am	11600am		
1100-1200 as	USA, WWBS Macon GA	11900na			
1100-1200	USA, WWCR Nashville TN	5070na	5935na	7435na	12160na
1100-1200	USA, WYFR Okeechobee FL	5850na	5950na	6015na	
1100-1200	Zambia, Christian Voice	6065af			
1100-1200	Zambia, Natl BC Corp	6165do	6265do		
1100-1200 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1102-1120	Pakistan, Radio	15530eu	17835eu		
1106-1200 occsnal	New Zealand, R NZ Intl	9700va			
1115-1145	Nepal, Radio	5005as	7165as		
1120-1140 w	Kazakhstan, R Almaty	9620eu	11840as		
1125-1200	Netherlands, Radio	6045eu	9860eu		
1130-1156	Belgium,R Vlaanderen Intl	5985eu			
1130-1200 vl	Libya, Voice of Africa	15235va	15415va	15435va	
1130-1200	Sweden, Radio	18960na	21810na		
1130-1200 as	UK, BBC World Service	15310as			
1130-1200 f	Vatican City, Vatican R	15595au	17550au		
1140-1200 t	Kazakhstan, R Almaty	9620eu	11840as		
1145-1200	Germany, Deutsche Welle	6140eu			

Selected Programs

Sundays

1100 USA, WEWN Birmingham AL: Reflections on the Sacraments. Father Pavone.
1100 Australia, Radio: RA News. See S 0000.
1100 USA, WWCR #1 Nashville TN: Words of Hope. Eugene Brown preaches from McFerrin Missionary Baptist Church of Nashville, Tennessee.
1100 USA, WWCR #3 Nashville TN: USA Radio News. News summary from the USA Radio News Network.
1105 Australia, Radio: Jazz Notes. The best of Australian jazz is introduced by Ivan Lloyd.
1105 USA, WWCR #3 Nashville TN: Inspirations Across America (hour 1). Bert Johnson plays contemporary Christian music.
1115 USA, WWCR #1: Harvest Time. Keith Driller.
1130 USA, WEWN Birmingham AL: The Catholic Broadcast. Sandra McDevitt hosts a program of inspirational stories, music, interviews, and scripture readings.
1130 Australia, Radio: In Conversation. See S 0530.
1130 USA, WWCR #1 Nashville TN: Staff of Life. Irene Armstrong evangelizes from Zion, Illinois.
1145 USA, WWCR #1 Nashville TN: Bible Prophecy for Today. Tom Benvenutti analyzes the news and its application to Bible prophecy.

Monday-Friday

1100 Australia, Radio: RA News. See S 0000.
1110 Australia, Radio: Asia Pacific (repeat). News and analysis with Di Martin.
1130 Australia, Radio: Sport. See M 0530.
1130 USA, WEWN Birmingham AL: Morning Prayer. A half-hour of devotion to begin the day.
1135 Australia, Radio: Life Matters. Geraldine Doogue and Norman Swan talk with the main people behind Australia's social policies.

Mondays

1100 USA, WEWN Birmingham AL: The Spirituality of the Catholic Church. Father Paul Keenan teaches on God and man and the new catechism.
1100 USA, WWCR #1: Voice of the Past. Lewis Franklin.
1100 USA, WWCR #3 Nashville TN: Newswatch Magazine. David Smith compares world news to bible prophecy and is anti-United Nation.
1115 USA, WWCR #1 Nashville TN: Phil Hensler Ministry.
1130 USA, WWCR #1: Grace and Truth. RJ Bruno.

Tuesdays

1100 USA, WEWN Birmingham AL: Reflections on the Sacraments. See S 1100.
1100 USA, WWCR #1 Nashville TN: Afterglow. Don Johnson plays beautiful sacred music.
1100 USA, WWCR #3: Newswatch Magazine. See M 1100.
1130 USA, WWCR #1: Christ is the Answer. Elvin Wheelis
1145 USA, WWCR #1 Nashville TN: Wind of the Spirit. Barbara Jennison with a pro-life story.

Wednesdays

1100 USA, WEWN: A Closer Walk. Father Cohen.
1100 USA, WWCR #1 Nashville TN: We Believe. Jim Walsh focuses on bringing Christians back together.
1100 USA, WWCR #3: Newswatch Magazine. See M 1100.
1130 USA, WWCR #1 Nashville TN: Faith for Today. William Rowe of Pennsylvania with a bible-teaching program.
1135 Australia, Radio: Life Matters. See M 1135.

Thursdays

1100 USA, WEWN Birmingham AL: Crisis Magazine. NEW! Host Deal Hudson probes current issues from a distinctly Catholic perspective.
1100 USA, WWCR #1 Nashville TN: The Big Backyard. Thirty minutes of rock music from Australia.
1100 USA, WWCR #3 Nashville TN: Newswatch Magazine. See M 1100.
1115 USA, WWCR #1 Nashville TN: Willingheart. Rick Booye of Trail Christian Fellowship in Medford, Oregon teaches the New Testament.

Fridays

1100 USA, WEWN Birmingham AL: Answering Common Objections. Scott Hahn explains and defends the teachings of the Catholic faith.
1100 USA, WWCR #1: Spiritual Awakening. James Bean with wisdom from the scriptures.
1100 USA, WWCR #3 Nashville TN: Newswatch Magazine. See M 1100.
1130 USA, WWCR #1: World Crusade. Kent Clark.
1145 USA, WWCR #1 Nashville TN: Walking with the Word. ReAnne Hyde.

Saturdays

1100 USA, WEWN Birmingham AL: St. Francis - Mirror of Christ. See H 2300.
1100 Australia, Radio: RA News. See S 0000.
1100 USA, WWCR #1: USA Radio News. See S 1100.
1100 USA, WWCR #3: USA Radio News. See S 1100.
1105 USA, WWCR #1 Nashville TN: Word of Wisdom. Howard Kirkwood evangelizes from Arkansas.
1105 USA, WWCR #3 Nashville TN: The Bible's Greatest Heroes. See S 0405.
1110 Australia, Radio: Lingua Franca. See F 2320.
1110 USA, WWCR #1 Nashville TN: The View from Europe. Harvey Thomas presents the European point of view on current events.
1115 USA, WWCR #1 Nashville TN: Eco Watch.
1120 Australia, Radio: Book Reading. See F 2305.
1130 USA, WEWN: Kids Sing-A-Long. Adrianne teaches, through joyous music, about the Catholic faith.
1130 Australia, Radio: Fine Music Australia. See S 0210.
1130 USA, WWCR #1: World of Radio. See S 0230.

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Frequencies

1200-1300	Anguilla,Caribbean Beacon	11775am			
1200-1300 vl	Australia, ABC/Alice Spgs	2310do			
1200-1300 vl	Australia, ABC/Katherine	2485do			
1200-1300 vl	Australia, ABC/Tent Creek	2325do			
1200-1300	Australia, Radio	5995pa	6020pa	9580va	11650va
		17750pa	21820as		
1200-1300 vl	Botswana, Radio	4820do	4830do	7255do	
1200-1300	Brazil, R Nacional Bras	15445am			
1200-1215	Cambodia, Natl Radio Of	11940as			
1200-1300 vl	Canada, CBC N Quebec Svc	9625do			
1200-1300	Canada, CFRX Toronto	6070do			
1200-1300	Canada, CFVP Calgary	6030do			
1200-1300	Canada, CHNX Halifax	6130do			
1200-1300	Canada, CKZN St John's	6160do			
1200-1300	Canada, CKZU Vancouver	6160do			
1200-1229	Canada, R Canada Intl	9660as	13650na	15195as	17765na
		17820na			
1200-1256	China, China Radio Intl	6950pa	7265pa	9715as	9945pa
		11660as	11675pa	15180as	
1200-1300	Ecuador, HCJB	12005ca	15115am	21455va	
1200-1300 as/vl	Eqt Guinea, R East Africa	15186af			
1200-1300	France, Radio France Intl	9805eu	11600as	15155eu	15195eu
		15540af			
1200-1300	Germany, Deutsche Welle	6140eu			
1200-1300	Germany, Sunrise Radio	5850eu			
1200-1300 vl	Ghana, Ghana BC Corp	4915do			
1200-1300	Guyana, GBC/Voice of	5950do			
1200-1230	Iran, VOIRI 13710as	15255pa	15430me	17565as	21510as
1200-1300	Jordan, Radio	11690eu			
1200-1300	Kenya, Kenya BC Corp	4935do			
1200-1300 vl	Lesotho, Radio	4800do			
1200-1300	Malaysia, Radio	7295do			
1200-1300 vl	Malaysia,RTM KotaKinabalu	5980do			
1200-1300	Mongolia, Voice of	12015au			
1200-1300	N Marianas, KFBS Saipan	11650as	15380as		
1200-1300	N Marianas, KHBI Saipan	9355as			
1200-1225	Netherlands, Radio	6045eu	9860eu		
1200-1205 occsnal	New Zealand, R NZ Intl	9700va			
1200-1300 vl	Nigeria, Radio/Ibadan	6050do			
1200-1300 vl	Nigeria, Radio/Kaduna	4770do			
1200-1300	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1200-1300 m-a/vl	Papua New Guinea, NBC	4890do			
1200-1255	Poland, Polish R Warsaw	6095eu	7270eu	9525eu	11820eu
1200-1300	Sierra Leone, SLBS	5980do			
1200-1300	Singapore,R Singapore Int	6015as	6150as		
1200-1230	Switzerland, Swiss R Intl	15315eu			
1200-1300	Taiwan, Radio Taipei Intl	7130as	9610au		
1200-1300 as	Tanzania, Radio	5050af			
1200-1300	UK, BBC World Service	5965am	6190af	6195va	9410eu
	9515am 9580as	9740as	11760me	11940af	11955as
	12095eu 15220am	15280as	15310as	15485eu	15565eu
	15575me 17640eu	17705va	17830af	17885af	21660af
1200-1300	UK, Merlin Network One	9915eu	13645eu	17650eu	21550af
1200-1300	USA, KAIJ Dallas TX	5810na			
1200-1300	USA, KTBN Salt Lk City UT	7510na			
1200-1300	USA, KWHR Naalehu HI	9930as	11565pa		
1200-1300	USA, Voice of America	6160as	9355as	9645as	9760as
	11705as	11715as	15160as	15240as	15425as
1200-1300	USA, WEWN Birmingham AL	7425na	15745eu		
1200-1300	USA, WGTG McCaysville GA	9400am			
1200-1300	USA, WHRI Noblesville IN	6040na	9495am		
1200-1300	USA, WJCR Upton KY	7490na	13595as		
1200-1300 s	USA, WRMI/R Miami Intl	9955am			
1200-1300	USA, WRNO New Orleans LA	7395na			
1200-1300	USA, WSHB Cypress Crk SC	6095am	11660am		
1200-1300	USA, WWCR Nashville TN	5070na	7435na	12160na	13845na
1200-1245	USA, WYFR Okeechobee FL	5850eu	5950na	6015na	17750na
1200-1228	Uzbekistan, R Tashkent	5060as	5975as	6025as	9715as
		11905as	15295as	17775as	
1200-1300	Zambia, Christian Voice	6065af			
1200-1300	Zambia, Natl BC Corp	6165do	6265do		
1200-1300 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1204-1216 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1204-1216 as	UK, BBC World Service	15220am			
1205-1210	Croatia, Croatian Radio	7365eu	9830eu	13830eu	
1206-1300 occsnal	New Zealand, R NZ Intl	6100va			
1215-1300	Egypt, Radio Cairo	17595as			
1229-1300	Canada, R Canada Intl	9640na	13650na	17765na	17820na
1230-1300	Austria, R Austria Intl	6155eu	13730na		
1230-1300	Bangladesh, Bangla Betar	7185as	9548as		
1230-1300	Finland, YLE/R Finland	15400na	17670na		
1230-1300	Guam, AWR/KSDA	15330as			
1230-1300	Italy, AWR Europe	11800eu			
1230-1300	South Korea, R Korea Intl	9570as	9640om	13670as	
1230-1300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1230-1300	Sweden, Radio	17895as	21810as		
1230-1300	Thailand, Radio	9655as	9810as	11905as	
1230-1300	Turkey, Voice of	17560va	17830as		
1230-1257	Vietnam, Voice of	12019as	13740as		
1240-1250	Greece, Voice of	17525af			
1245-1300	USA, WYFR Okeechobee FL	5950na	17750na		

Selected Programs

Sundays

1200 USA, WEWN Birmingham AL: Sunday Mass Live. From Our Lady of the Angels Monastery.
1200 Australia, Radio: RA News. See S 0000.
1200 USA, WWCR #1 Nashville TN: Voice of Hope. Oliver Fenison.
1200 USA, WWCR #3 Nashville TN: USA Radio News. See S 1100.
1205 Australia, Radio: Country Club (Part 1). ABC's program of contemporary and traditional country music with Richard Porteous (1st Hour).
1205 USA, WWCR #3 Nashville TN: Inspirations Across America (hour 2). See S 1105.
1230 Finland, YLE Radio: News/Weather. See S 0630.
1230 USA, WWCR #1 Nashville TN: Words of Hope. See S 1100.
1235 Finland, YLE Radio: Capital Cafe. Conversation around the coffeetable with an interesting guest.

Monday-Friday

1200 Australia, Radio: RA News. See S 0000.
1200 USA, WEWN Birmingham AL: Daily Mass Live. From Our Lady of the Angels Monastery in Alabama.
1200 USA, WWCR #3 Nashville TN: The Overcomer Broadcast (live). Brother R. G. Stair preaches about the last days.
1230 Finland, YLE Radio: News/Weather. See S 0630.
1238 Finland, YLE Radio: Compass North. See M 0640.
1244 Finland, YLE Radio: Finnish Press Review. See M 0644.

Mondays

1200 USA, WWCR #1 Nashville TN: New Harvest International. Dennis Deruz.
1205 Australia, Radio: Late Night Live. Topical, political, cultural and philosophical issues with Phillip Adams of Radio National.
1215 USA, WWCR #1 Nashville TN: Cross Talk. Lenny Meyer.
1230 USA, WWCR #1 Nashville TN: Victory Baptist Church (2/4). David Robinson preaches from Hildebrand, NC.
1245 USA, WWCR #1 Nashville TN: Walking Through the Land of Promises. Bobbie Lively evangelizes from Tennessee.

Tuesdays

1200 USA, WWCR #1 Nashville TN: The King is Coming. Steve Johnson evangelizes from the Faith Covenant Community Church of America in Florida.
1205 Australia, Radio: Late Night Live. See M 1205.
1215 USA, WWCR #1 Nashville TN: One Nation Under God. TJ Rodriguez.
1230 USA, WWCR #1 Nashville TN: World of Radio. See S 0230.

Wednesdays

1200 USA, WWCR #1 Nashville TN: Faith and Truth. Ken Megilligan.
1205 Australia, Radio: Late Night Live. See M 1205.
1215 USA, WWCR #1 Nashville TN: Faith Revival Ministries. Randolph Scott.
1230 USA, WWCR #1 Nashville TN: The Chapel Hour. Otis Tillman evangelizes from Buffalo, New York.

Thursdays

1200 USA, WWCR #1 Nashville TN: Abounding Grace. Gary Jones of the Charismatic Teaching Center near Orlando, Florida.
1205 Australia, Radio: Late Night Live. See M 1205.
1215 USA, WWCR #1 Nashville TN: Roberta Reads the Word. Roberta Lightfoot with 15 minutes of scripture reading.
1230 USA, WWCR #1 Nashville TN: Communications World ABC. See S 0200.

Fridays

1200 USA, WWCR #1 Nashville TN: Faith for Today. See W 1130.
1205 Australia, Radio: Sound Quality. Tim Ritchie of National Radio presents innovations in contemporary music.
1230 USA, WWCR #1 Nashville TN: Battle Cry Sounding. Deborah Green evangelizes from El Paso, Texas.

Saturdays

1200 USA, WEWN Birmingham AL: Daily Mass Live. See M-F 1200.
1200 Australia, Radio: RA News. See S 0000.
1200 USA, WWCR #1 Nashville TN: The Baptist Hour. A half-hour of sermon and song from Fort Worth, Texas.
1200 USA, WWCR #3 Nashville TN: Rock the Universe. See S 0605.
1205 Australia, Radio: Spirit of Things. See S 0030.
1230 Finland, YLE Radio: News/Weather. See S 0630.
1230 USA, WWCR #1 Nashville TN: Battle Cry Sounding. See F 1230.
1238 Finland, YLE Radio: Starting Finnish. Finnish language lessons for English speakers.
1253 Finland, YLE Radio: Nunti Latini. News. The only program on shortwave in Latin.

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Frequencies

1300-1400	Anguilla,Caribbean Beacon	11775am			
1300-1400 vl	Australia, ABC/Alice Spgs	2310do			
1300-1400 vl	Australia, ABC/Katherine	2485do			
1300-1400 vl	Australia, ABC/Tent Creek	2325do			
1300-1400	Australia, Radio	5995pa	6020pa	9580va	11650va
		17750pa	21820as		
1300-1400 vl	Botswana, Radio	4820do	4830do	7255do	
1300-1320	Brazil, R Nacional Bras	15445am			
1300-1400 vl	Canada, CBC N Quebec Svc	9625do			
1300-1400	Canada, CFRX Toronto	6070do			
1300-1400	Canada, CFVP Calgary	6030do			
1300-1400	Canada, CHNX Halifax	6130do			
1300-1400	Canada, CKZN St John's	6160do			
1300-1400	Canada, CKZU Vancouver	6160do			
1300-1400 mtwhf	Canada, R Canada Intl	17765na	17820na		
1300-1400 s	Canada, R Canada Intl	13650na	17800na		
1300-1330	China, China Radio Intl	6950pa	7265pa	7405na	9570va
	9945pa 11660as	11675pa	11715pa	11980as	15180as
1300-1329	Czech Rep, R Prague Intl	13580eu	17485as		
1300-1400	Ecuador, HCJB	12005ca	15115am	21455va	
1300-1330	Egypt, Radio Cairo	17595as			
1300-1400 as/vl	Eqt Guinea, R East Africa	15186af			
1300-1329	Germany, Deutsche Welle	6140eu			
1300-1400 a	Germany, Good News World	15190as			
1300-1400	Germany, Sunrise Radio	5850eu			
1300-1400 vl	Ghana, Ghana BC Corp	4915do	6130do		
1300-1400	Guyana, GBC/Voice of	5950do			
1300-1400	Jordan, Radio	11690eu			
1300-1400	Kenya, Kenya BC Corp	4935do			
1300-1400 vl	Lesotho, Radio	4800do			
1300-1310	Liberia,LCN/R Liberia Int	5100do			
1300-1400	Malaysia, Radio	7295do			
1300-1400 vl	Malaysia,RTM KotaKinabalu	5980do			
1300-1400	N Marianas, KFBS Saipan	9670as	11650as		
1300-1400	N Marianas, KHBI Saipan	9355as			
1300-1400 occsnal	New Zealand, R NZ Intl	6100va			
1300-1400 vl	Nigeria, Radio/Ibadan	6050do			
1300-1400 vl	Nigeria, Radio/Kaduna	4770do			
1300-1400	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1300-1400 vl	Papua New Guinea, NBC	4890do			
1300-1356	Romania, R Romania Intl	9690eu	15390eu	15445eu	17720na
1300-1400 as	S Africa, Channel Africa	11900af	17860af	21530af	
1300-1400	Sierra Leone, SLBS	5980do			
1300-1400	Singapore,R Singapore Int	6015as	6150as		
1300-1330	South Korea, R Korea Intl	9570as	9640om	13670as	
1300-1400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1300-1400	Taiwan, Radio Taipei Intl	15125as			
1300-1400 as	Tanzania, Radio	5050af			
1300-1330	Turkey, Voice of	17560as	17830eu		
1300-1400	Uganda, Radio	4976do			
1300-1400	UK, BBC World Service	5965am	5990as	6190af	6195va
	9410eu 9515am	9740as	11760me	11940af	12095eu
	15220am 15310as	15420af	15485eu	15565eu	15575me
	17640eu 17705va	17830af	17885af	21660af	
1300-1400	UK, Merlin Network One	9915eu	13645eu	17650eu	21550af
1300-1400	USA, KAIJ Dallas TX	5810na			
1300-1400	USA, KJES Vado NM	11715na			
1300-1400	USA, KNLS Anchor Point AK	9615as			
1300-1400	USA, KTBN Salt Lk City UT	7510na			
1300-1400	USA, KWHR Naalehu HI	9930as	11565pa		
1300-1400	USA, Voice of America	6160as	9355as	9645as	9760as
		11715as	15160as	15425as	
1300-1400	USA, WEWN Birmingham AL	11875na	15745eu		
1300-1400	USA, WGTG McCaysville GA	9400am			
1300-1400	USA, WHRI Noblesville IN	6040na	15105am		
1300-1400	USA, WJCR Upton KY	7490na	13595as		
1300-1400 s	USA, WRMI/R Miami Intl	9955am			
1300-1400	USA, WRNO New Orleans LA	7395na			
1300-1400	USA, WSHB Cypress Crk SC	9430na	11660am		
1300-1400	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1300-1400	USA, WYFR Okeechobee FL	11550as	11830na	11970na	13695na
		17750na			
1300-1400	Zambia, Christian Voice	6065af			
1300-1400	Zambia, Natl BC Corp	6165do	6265do		
1300-1400 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1315-1325 mtwhfa	Bhutan, Bhutan BC Service	5030do			
1325-1400	Germany, Voice of Hope	15715as			
1330-1400	Austria, R Austria Intl	13730am			
1330-1400	Canada, R Canada Intl	9535as	9640as	11795as	11935eu
		15325eu			
1330-1356	China, China Radio Intl	7405na	9570va	9945pa	11660as
		11675pa	11715pa	11980as	15180as
1330-1400	Guam, AWR/KSDA	11705as			
1330-1400	India, All India Radio	9545as	11620as	13710as	
1330-1400	Sweden, Radio	15240na	17505as		
1330-1400	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1330-1400	Uzbekistan, R Tashkent	5060as	5975as	6025as	9715as
		11905as	15295as	17775as	
1330-1357	Vietnam, Voice of	9730eu	9840eu		
1345-1400	Vatican City, Vatican R	15500as	17550as		

Selected Programs

Sundays

1300 Australia, Radio: RA News. See S 0000.
1300 USA, WWCR #1 Nashville TN: Wings of Healing. Evelyn Wyatt directs this international broadcast from Los Angeles.
1300 USA, WWCR #3 Nashville TN: Answers for Life. Gospel music and a sermon by Pastor Hoover of Wichita, Kansas.
1305 Australia, Radio: Country Club (Part 2). ABC's program of contemporary and traditional country music with Richard Porteous (2nd Hour).
1330 USA, WEWN Birmingham AL: The Holy Rosary (Glorious). See S 0300.
1330 India, All India Radio: News and Commentary.
1330 USA, WWCR #1 Nashville TN: Wayne Avenue Church of God. J.C. Wilber preaches from Columbus, Ohio.
1345 India, All India Radio: Program Preview.
1346 India, All India Radio: Musical Interlude.

Monday-Friday

1300 Australia, Radio: RA News. See S 0000.
1300 USA, WEWN Birmingham AL: The Chaplet of Divine Mercy. See S 0300.
1300 USA, WWCR #3 Nashville TN: The Free American (live). Clay Douglas hosts the program that promotes America for Americans.
1315 Australia, Radio: The Planet (Part 1). Lucky Oceans plays richly varied music from around the world.
1330 India, All India Radio: News and Commentary.
1330 USA, WWCR #1 Nashville TN: Bible Pathway. See M-F 0520.
1335 USA, WWCR #1 Nashville TN: The Bright Spot Hour. Music and meditation by Harold Sightler of Greenville, South Carolina.
1345 India, All India Radio: Program Preview.
1359 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. Jonathan Cahn.

Mondays

1330 USA, WEWN Birmingham AL: The Holy Rosary (Joyful). See S 0300.

Tuesdays

1330 USA, WEWN Birmingham AL: The Holy Rosary (Sorrowful). See S 0300.

Wednesdays

1330 USA, WEWN Birmingham AL: The Holy Rosary (Glorious). See S 0300.
1346 India, All India Radio: Indian Music.

Thursdays

1330 USA, WEWN Birmingham AL: The Holy Rosary (Joyful). See S 0300.
1346 India, All India Radio: Listeners' Choice.

Fridays

1330 USA, WEWN Birmingham AL: The Holy Rosary (Sorrowful). See S 0300.
1346 India, All India Radio: Indian Music.

Saturdays

1300 USA, WEWN Birmingham AL: EWTN Bookmark. See S 1500.
1300 Australia, Radio: Radio National News. See F 1400.
1300 USA, WWCR #1 Nashville TN: The Jesus Time Network. See M 0000.
1300 USA, WWCR #3 Nashville TN: Lyon Gold and Silver Magnet Program (repeat). See M 0430.
1305 Australia, Radio: Science Show. See T 0110.
1330 USA, WEWN Birmingham AL: The Holy Rosary (Living). See S 0300.
1330 India, All India Radio: News and Commentary.
1330 USA, WWCR #1 Nashville TN: The Hour of Reasoning. Pete Mobley preaches to his congregation in Oakland, California.
1345 India, All India Radio: Program Preview.
1346 India, All India Radio: UN News Magazine.

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Grundig leads shortwave radio into the new Millennium!
When radio was introduced, back in the 1920's — to pluck voices and music out of thin air — people thought it was magic. With Grundig, it still is! No other manufacturer rivals Grundig for *"that European sound."* Voices have an *"in-the-room"* quality and clarity — even from half a world away.

German-engineered quality... German-engineered sound... when people think of shortwave, they think of Grundig. Grundig has specialized in shortwave since the late 1950's, and in North America, shortwave radios are all we sell.

Critics reviews of Grundig models include
Best of Category... Superior Performance... Ergonomically Better... Superb Sound Quality... An Excellent Choice

We listen, too.
We're very good at listening — to our customers. Our engineers design each model so it's easy, intuitive, and convenient to use. Critics call this *"great ergonomics!"* And Grundig models always deliver top performance for the price. Critics call this *"bang for the buck."*

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GRUNDIG

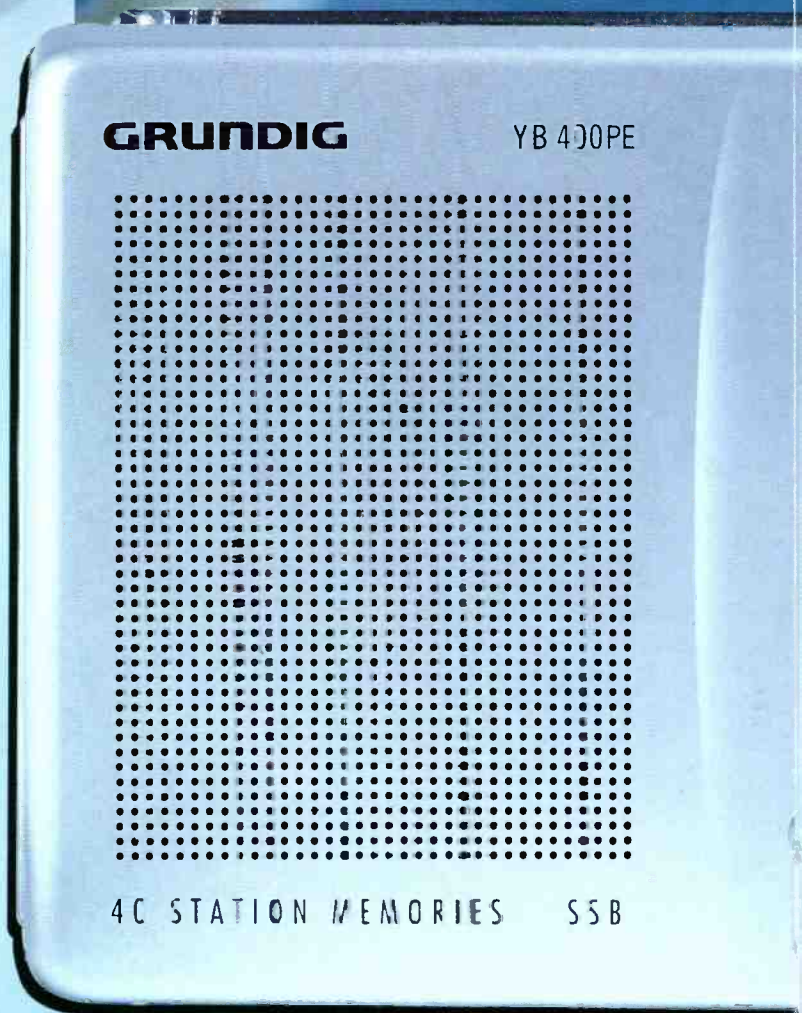
The Latest in Technology

Rated Best in Its Class.
Grundig's Yacht Boy 400PE has received rave reviews from the shortwave press for combining a wealth of sophisticated features in a sleek titanium-look package that doesn't cost a fortune. It incorporates features found on stationary shortwave systems that cost thousands, such as outstanding audio quality, precise 1 kHz increment tuning, up/down slewing, frequency scanning, signal strength indication, and single-sideband signal demodulation.

But the advantage mentioned most often in the reviews is its ease of use for the novice listener. In moments you can listen to foreign broadcasts beamed to North America.

Soon, you will be scanning the airwaves to tune in exotic music programs and sports events from faraway locales. The YB-400PE even picks up shortwave amateur (ham radio) broadcasts and shortwave aviation/military frequencies (cockpit-to-tower communications). The possibilities for family fun, education, and enjoyment are boundless.

For travel or home use, Grundig adds a dual-time travel clock with snooze and sleep timer. The FM band is stereophonic with your headphones. The lighted LCD panel is easy to read in the



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Yacht Boy 400PE

The Best in Value!

dark. Comes with a form-fitting pouch, integral telescoping antenna and advanced external antenna on a compact reel, carry-strap, ac-adapter, earphones and complete instructions.

Made by Germany's Grundig.
World leader in shortwave radios, the 400PE measures just 7-3/4"L x 4-1/4"H x 1-1/4"W; weighs only 20 oz. It slips easily into your carry-on for travel and fits on a nightstand, office credenza, or yacht cabin console. One-year warranty.

Grundig's Yacht Boy 400PE Named Editor's Choice.
Passport To World Band Radio is regarded as the leading authority of the shortwave industry. Here's what their testing expert wrote about the Grundig Yacht Boy 400PE:

"Best performance for price size category, and among the choicest portables of any size, at any price."

"The 400's FM performance is right up there with the very best among world band radios."

Please call our shortwave hotline and talk to the experts: 800-872-2228.

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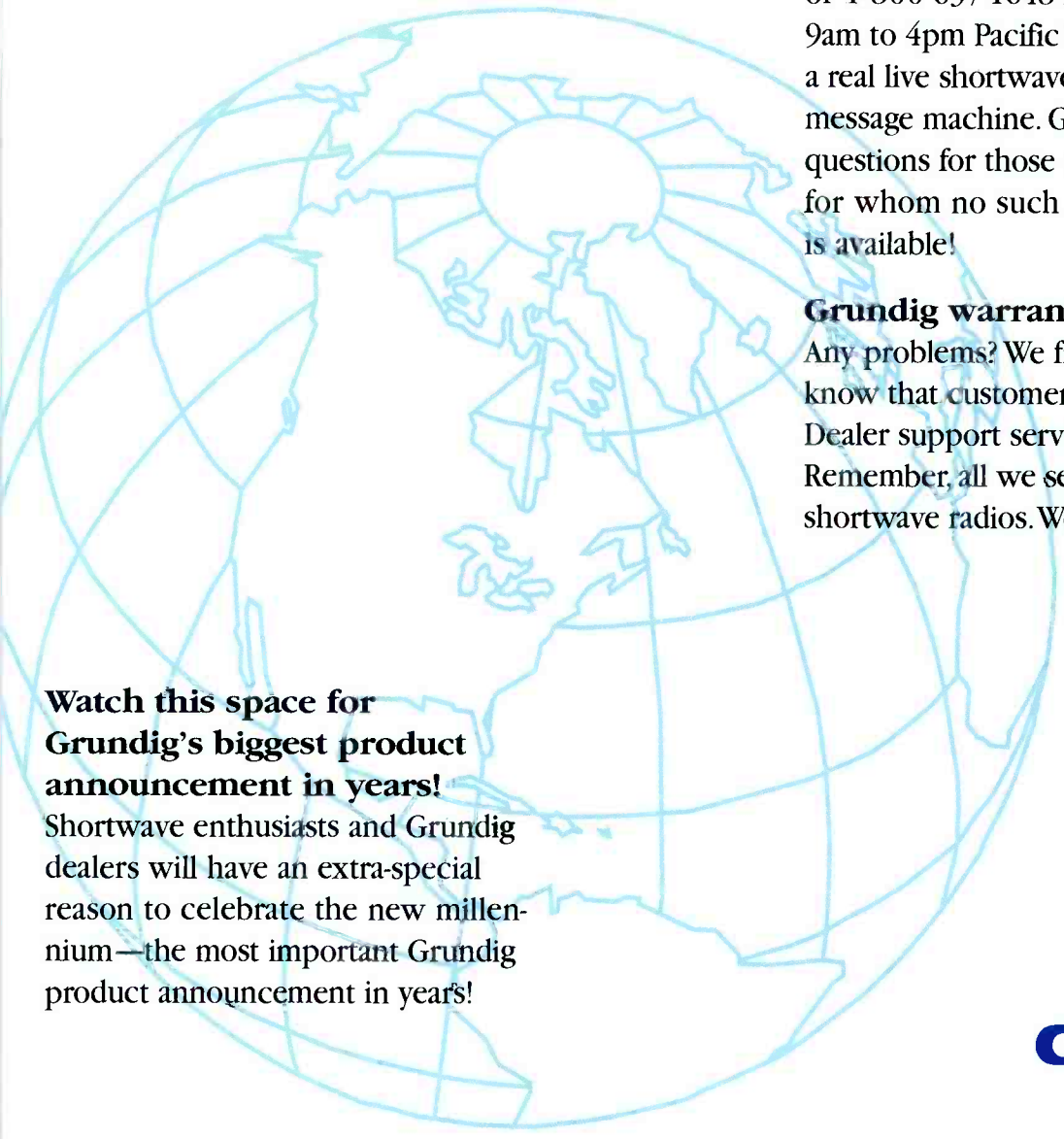
Grundig sets the standard for customer service.
Grundig supports the industry's only Toll-free Shortwave Hotline. Consumers and dealers can call 1-800-872-2228 in the United States or 1-800-637-1648 in Canada weekdays from 9am to 4pm Pacific Time. You can speak with a real live shortwave expert, not an automatic message machine. Grundig even answers questions for those who own other brands, for whom no such toll-free hotline service is available!

Grundig warranty service is the best.
Any problems? We fix them fast. Dealers know that customers will be taken care of! Dealer support service is first-rate, too. Remember, all we sell in North America are shortwave radios. We specialize! We do it best!



Watch this space for Grundig's biggest product announcement in years!
Shortwave enthusiasts and Grundig dealers will have an extra-special reason to celebrate the new millennium—the most important Grundig product announcement in years!

GRUNDIG
made for you

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Frequencies

1400-1500	Anguilla,Caribbean Beacon	11775am			
1400-1500 vl	Australia, ABC/Alice Spgs	2310do			
1400-1500 vl	Australia, ABC/Katherine	2485do			
1400-1500 vl	Australia, ABC/Tent Creek	2325do			
1400-1430	Australia, Radio 5995as	6180va	9580va	11650va	17750pa
1400-1500 vl	Botswana, Radio	4820do	4830do	7255do	
1400-1500 vl	Canada, CBC N Quebec Svc	9625do			
1400-1500	Canada, CFRX Toronto	6070do			
1400-1500	Canada, CFVP Calgary	6030do			
1400-1500	Canada, CHNX Halifax	6130do			
1400-1500	Canada, CKZN St John's	6160do			
1400-1500	Canada, CKZU Vancouver	6160do			
1400-1500 s	Canada, R Canada Intl	13650na	17800na		
1400-1456	China, China Radio Intl	7405na	9535as	9700as	11675as
		11825as	13685af	15110af	15125af
1400-1500	Costa Rica,RF Peace Intl	21460am			
1400-1500	Ecuador, HCJB	12005ca	15115am	21455va	
1400-1500 as/vl	Eqt Guinea, R East Africa	15186af			
1400-1500	France, Radio France Intl	11910as	17560va	17680as	
1400-1500	Germany, RTE Radio	15625eu			
1400-1500	Germany, Sunrise Radio	5850eu			
1400-1500	Germany, Voice of Hope	15715as			
1400-1500 vl	Ghana, Ghana BC Corp	4915do	6130do		
1400-1500	Guyana, GBC/Voice of	5950do			
1400-1500	India, All India Radio	9545as	11620as	13710as	
1400-1430	Israel, Kol Israel	15650va	17535va		
1400-1500	Japan, Radio/NHK	9505na	11730as	11880me	
1400-1500	Jordan, Radio	11690eu			
1400-1500	Kenya, Kenya BC Corp	4935do			
1400-1500 vl	Lesotho, Radio	4800do			
1400-1500	Malaysia, Radio	7295do			
1400-1500	Malaysia, RTM Sarawak	7160do			
1400-1500 vl	Malaysia,RTM KotaKinabalu	5980do			
1400-1430	Mexico, Radio Mexico Intl	9705am			
1400-1500	N Marianas, KFBS Saipan	9465as	9495as	9670as	
1400-1500 occsnal	New Zealand, R NZ Intl	6100va			
1400-1500 vl	Nigeria, Radio/Ibadan	6050do			
1400-1500 vl	Nigeria, Radio/Kaduna	4770do			
1400-1414	Pakistan, Radio	15464af	15570af	17535af	
1400-1500	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1400-1500 vl	Papua New Guinea, NBC	4890do			
1400-1500	Philippines, FEBC R Intl	11995as			
1400-1500	Russia,Voice of Russia WS	12025as	15550as		
1400-1455 as	S Africa, Channel Africa	11900af	17860af	21530af	
1400-1500	Sierra Leone, SLBS	5980do			
1400-1500	Singapore,RCorp Singapore	6150do			
1400-1500	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1400-1500	Switzerland, Swiss R Intl	9575as	17670as		
1400-1500	Taiwan, Radio Taipei Intl	15125as			
1400-1500 as	Tanzania, Radio	5050af			
1400-1430	Thailand, Radio	9530as	9655as	11905as	
1400-1500	Uganda, Radio	4976do			
1400-1500	UK, BBC World Service	3990as	6190af	6195as	9410eu
	9515am 9740as	11865am	11940af	12095eu	15220am
	15310as 15485eu	15565eu	15575ma	17640eu	17705va
	17830af 17840am	21470af	21660af		
1400-1500	UK, Merlin Network One	9915eu	13645eu	17630eu	21550af
1400-1500	USA, KAIJ Dallas TX	13815na			
1400-1500	USA, KJES Vado NM	11715na			
1400-1500	USA, KTBN Salt Lk City UT	7510na			
1400-1500	USA, KWHR Naalehu HI	9930as	11565pa		
1400-1500	USA, Voice of America	6160as	7125as	7215as	9645as
	9760as	15160as	15255va	15395as	15425as
1400-1500	USA, WEWN Birmingham AL	11875na	15745eu		
1400-1500	USA, WGTG McCaysville GA	9400am			
1400-1500	USA, WHRI Noblesville IN	6040na	15105am		
1400-1500	USA, WJCR Upton KY	7490na	13595as		
1400-1500 irreg	USA, WMLK Bethel PA	9465am			
1400-1500	USA, WRNO New Orleans LA	7395na			
1400-1500	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1400-1500	USA, WYFR Okeechobee FL	11550as	11830na	11970na	17750na
1400-1405	Vatican City, Vatican R	15500as	17550as		
1400-1500	Zambia, Christian Voice	6065af			
1400-1500	Zambia, Natl BC Corp	6165do	6265do		
1400-1500 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1410-1420	Greece, Voice of	9425eu	15630eu		
1415-1420	Nepal, Radio	5005as	7165as		
1430-1500	Australia, Radio	5995as	6180va	9500as	9580va
		11650va	11660as	17750pa	
1430-1500	Guam, AWR/KSDA	11980as			
1430-1500	Guam, TWR/KTWR	15330as			
1430-1500	Netherlands, Radio	9890as	12075as	15590as	
1430-1500	S Africa, RTE Radio	21745af			
1430-1500	Slovakia, AWR Europe	17525as			
1450-1500	Vatican City, Vatican R	12065om	13765au	15500au	

Selected Programs

Sundays

1400 USA, WEWN Birmingham AL: Life on the Rock (encore). Jeff Cavins and his weekly guest as they meet at a coffee house to discuss the joys and challenges of being a young Christian in the 90's.
1400 Australia, Radio: RA News. See S 0000.
1400 India, All India Radio: Feature Program.
1400 Radio Mexico Intl: Regional Roots and Rhythms. The history and music of Mexico.
1400 USA, WWCR #1 Nashville TN: Foursquare Gospel Tidings. J.E. Cartier of Saskatchewan presents a half-hour of gospel music and meditation.
1400 USA, WWCR #3 Nashville TN: Harvestfire. Clarence McClendon preaches from the Church of the Harvest in Los Angeles.
1405 Australia, Radio: Books and Writing. Ramona Koval conducts in-depth interviews with writers and analyzes their work.
1420 India, All India Radio: Press Review.
1430 USA, WWCR #1 Nashville TN: A Temple of Jesus Christ. Cleveland Waters preaches from Philadelphia.
1445 India, All India Radio: News.
1453 India, All India Radio: Program Preview.

Monday-Friday

1400 Australia, Radio: RA News. See S 0000.
1400 Radio Mexico Intl: Antenna Radio Summary. A 15-minute magazine of news, finance, and culture.
1400 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M-F 1359.
1400 USA, WWCR #3 Nashville TN: USA Radio News. See S 1100.
1402 USA, WWCR #1 Nashville TN: The Grace Hour (live). Carl Stevens of Baltimore answers listener questions about religion.
1405 Australia, Radio: The Planet (Part 2). See M 1315.
1405 USA, WWCR #3 Nashville TN: Patriot Radio News Hour (live). Robby Noel talks about the vast right-wing conspiracy with a program from the American Freedom Network (AFN).
1420 India, All India Radio: Press Review.
1445 India, All India Radio: News.
1453 India, All India Radio: Program Preview.

Mondays

1400 India, All India Radio: Radio Newsreel.
1400 USA, WEWN Birmingham AL: Teaching of Jesus Christ. Father Groeschel hosts this series.
1425 India, All India Radio: DX-ers Corner (2/4).

Tuesdays

1400 USA, WEWN Birmingham AL: Truth Talks. See T 0100.

Wednesdays

1400 USA, WEWN Birmingham AL: The Journey Home (encore). A call-in show that examines why so many people are being drawn home to the Catholic Church.
1400 India, All India Radio: Radio Newsreel.

Thursdays

1400 USA, WEWN Birmingham AL: Pillars of Faith (encore). See T 0000.

Fridays

1400 USA, WEWN Birmingham AL: LiveWire (encore). Repeat of live call-in program.
1400 India, All India Radio: Radio Newsreel.

Saturdays

1400 Australia, Radio: Radio National News. See F 1400.
1400 India, All India Radio: Feature.
1400 Radio Mexico Intl: Mirror of Mexico. See M 1500.
1400 USA, WWCR #1 Nashville TN: The Infalible Truth. John Standifer.
1400 USA, WWCR #3 Nashville TN: USA Radio News. See S 1100.
1405 Australia, Radio: New Dimensions. No program - no information available.
1405 USA, WWCR #3 Nashville TN: Travel Smart (live). Jaqueline Wolfer offers tips and ideas for traveling safely and economically.
1420 India, All India Radio: Press Review.
1430 USA, WWCR #1 Nashville TN: Sonrise. Larry Reichardt evangelizes.
1445 India, All India Radio: News.
1453 India, All India Radio: Program Preview.

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Frequencies

1500-1600	Anguilla,Caribbean Beacon	11775am			
1500-1600 vl	Australia, ABC/Alice Spgs	2310do			
1500-1600 vl	Australia, ABC/Katherine	2485do			
1500-1600 vl	Australia, ABC/Tent Creek	2325do			
1500-1600	Australia, Radio	5995as	6180va	9500as	9580va
		11650va	11660as	17750pa	
1500-1600 vl	Botswana, Radio	4820do	4830do	7255do	
1500-1600 vl	Canada, CBC N Quebec Svc	9625do			
1500-1600	Canada, CFRX Toronto	6070do			
1500-1600	Canada, CFVP Calgary	6030do			
1500-1600	Canada, CHNX Halifax	6130do			
1500-1600	Canada, CKZN St John's	6160do			
1500-1600	Canada, CKZU Vancouver	6160do			
1500-1600 s	Canada, R Canada Intl	13650na	17800na		
1500-1556	China, China Radio Intl	7160as	9785as	13685af	15125af
1500-1600	Costa Rica,RF Peace Intl	15050am	21460am		
1500-1600	Ecuador, HCJB	12005ca	15115am	21455va	
1500-1600 as/vl	Eqt Guinea, R East Africa	15186af			
1500-1600	Germany, Sunrise Radio	5850eu			
1500-1530	Germany, Voice of Hope	15715as			
1500-1600 vl	Ghana, Ghana BC Corp	4915do	6130do		
1500-1600	Guyana, GBC/Voice of	5950do			
1500-1600	Japan, Radio/NHK	7200as	9505na	9750as	11730as
1500-1600	Jordan, Radio	11690eu			
1500-1600	Kenya, Kenya BC Corp	4935do			
1500-1600 vl	Lesotho, Radio	4800do			
1500-1510	Liberia,LCN/R Liberia Int	5100do			
1500-1600	Malaysia, Radio	7295do			
1500-1600	Malaysia, RTM Sarawak	7160do			
1500-1600 vl	Malaysia,RTM KotaKinabalu	5980do			
1500-1530	Mexico, Radio Mexico Intl	9705am			
1500-1530	Mongolia, Voice of	9720as	12015as		
1500-1600	Myanmar, Radio	5986do			
1500-1600	N Marianas, KFBS Saipan	9465as	9495as	9670as	
1500-1600	Netherlands, Radio	9890as	12075as	15590as	
1500-1600 occsnal	New Zealand, R NZ Intl	6100va			
1500-1600 vl	Nigeria, Radio/Ibadan	6050do			
1500-1600 vl	Nigeria, Radio/Kaduna	4770do			
1500-1600 vl	Nigeria, Voice of	7255af	15120va		
1500-1600	North Korea, R Pyongyang	3560as	9640va	9975me	11335am
		11735am	13650va		
1500-1600	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
1500-1600 vl	Papua New Guinea, NBC	4890do			
1500-1600	Philippines, FEBC R Intl	11995as			
1500-1600 vl	Russia, Voice of Assyria	6005me	9480me		
1500-1600	Russia,Voice of Russia WS	4730me	4940me	4975me	7325me
		9730eu	11500as	12070me	15545eu
1500-1530	S Africa, Channel Africa	17870af			
1500-1600	Seychelles, FEBA Radio	11600as			
1500-1600	Sierra Leone, SLBS	5980do			
1500-1600	Singapore,RCorp Singapore	6150do			
1500-1600	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1500-1600 as	Tanzania, Radio	5050af			
1500-1600	Uganda, Radio	4976do			
1500-1600	UK, BBC World Service	5975as	5990as	6190af	6195as
	9410eu 9515am	9740as	11860af	11940af	12095eu
	15220am 15310as	15400af	15420af	15485eu	15575eu
	17705va 17830af	17840am	21470af	21490af	21660af
1500-1600	UK, Merlin Network One	9915eu	13645eu	21550af	
1500-1600	USA, KAIJ Dallas TX	13815na			
1500-1600	USA, KTBN Salt Lk City UT	15590na			
1500-1600	USA, KWHR Naalehu HI	9930as	11565pa		
1500-1600	USA, Voice of America	7125as	7215as	9645as	9700me
		15205va	15255va	15395as	
1500-1600	USA, WEWN Birmingham AL	11875na	15745eu		
1500-1600	USA, WGTG McCaysville GA	9400am			
1500-1600	USA, WHRI Noblesville IN	6040af	13760na	15105sa	
1500-1600	USA, WINB Red Lion PA	13800am			
1500-1600	USA, WJCR Upton KY	7490na	13595as		
1500-1600 irreg	USA, WMLK Bethel PA	9465am			
1500-1600	USA, WRNO New Orleans LA	7395na			
1500-1600	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1500-1600	USA, WYFR Okeechobee FL	11830na	17750na		
1500-1510	Vatican City, Vatican R	12065om	13795au	15500au	
1500-1600	Zambia, Christian Voice	6065af			
1500-1600	Zambia, Natl BC Corp	6165do	6265do		
1500-1600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1530-1540	Bangladesh, Bangla Betar	4880as	15520as		
1530-1600	Georgia, Georgian Radio	6180me			
1530-1600	Guam, AWR/KSDA	9355as	11920as		
1530-1600	Iran, VOIRI	11680as	13605as	15150as	
1530-1600	Tanzania, Radio	5050af			
1545-1600 sh	Bangladesh, Bangla Betar	4880as	15520as		
1545-1600 m	Guam, TWR/KTWR	15330as			
1550-1600 a	Vatican City, Vatican R	12065om	13765au	15500au	

Selected Programs

Sundays

1500 USA, WEWN Birmingham AL: Salvation and Grace. No information available.
1500 Australia, Radio: RA News. See S 0000.
1500 Radio Mexico Intl: Mail Box. A typical mailbag program in which letters from English-speaking listeners are discussed on the air.
1500 USA, WWCR #1 Nashville TN: Prophetic Word Program. A message of salvation from Dan Kubish of the House of Yaweh.
1500 USA, WWCR #3 Nashville TN: The Whole Truth. Anthonee Patterson conducts services from Pennsylvania.
1505 Australia, Radio: Encounter. This highly acclaimed Radio National series explores the connections between religion and life.
1530 USA, WEWN Birmingham AL: Moral Decisions. See S 1500.
1530 USA, WWCR #1 Nashville TN: Cross Roads Baptist Church. Lloyd Ferguson preaches from Lawrenceville, Georgia.
1555 Australia, Radio: On This Day. Anniversaries worth remembering.

Monday-Friday

1500 Australia, Radio: RA News. See S 0000.
1500 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. Brother Hogan will send you a Bible from Athens, Tennessee.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See S 1100.
1505 Australia, Radio: Asia Pacific. See M 1110.
1506 USA, WWCR #3 Nashville TN: Freedom Calls (live). See M-5 0605.
1515 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. Father Bob Guste evangelizes from Louisiana.
1530 USA, WWCR #1 Nashville TN: The Time of Deliverance. Benjamin Smith preaches from the Time of Deliverance Evangelistic Church in Philadelphia.
1545 USA, WWCR #1 Nashville TN: Focus on the Kingdom. Anthony Buzzard.

Mondays

1500 USA, WEWN Birmingham AL: The Best of Journey Home. See S 1500.
1500 Radio Mexico Intl: Mirror of Mexico. Focus on manufacturing and industry in Mexico.
1530 Australia, Radio: The Health Report. See M 0030.

Tuesdays

1500 USA, WEWN Birmingham AL: The Abundant Life. Johnnette Benkovic with challenging subjects dealing with improving family life.
1500 Radio Mexico Intl: Eternally Mexico. See M 2300.
1530 Australia, Radio: The Law Report. See T 0030.

Wednesdays

1500 USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1400.
1500 Radio Mexico Intl: Mail Box. See S 1500.
1530 Australia, Radio: The Religion Report. See W 0030.

Thursdays

1500 USA, WEWN Birmingham AL: Faith and Family (live). Steve Wood, president of the Family Life Center International and St. Joseph's Covenant Keepers, and his guests take listeners' calls, faxes and e-mails.
1500 Radio Mexico Intl: DXperience. See S 0300.
1530 Australia, Radio: Media Report. See H 0030.

Fridays

1500 USA, WEWN Birmingham AL: Introduction to Mariology. See S 1500.
1500 Radio Mexico Intl: Eternally Mexico. See M 2300.
1530 Australia, Radio: The Sports Factor. See F 0030.

Saturdays

1500 USA, WEWN Birmingham AL: The Catholic Broadcast. See S 1130.
1500 Australia, Radio: Radio National News. See F 1400.
1500 Radio Mexico Intl: The Sounds of Mexico. See M 2300.
1500 USA, WWCR #1 Nashville TN: Let the Bible Speak. James Hickey with a program from New Testament Christianity in Oklahoma.
1500 USA, WWCR #3 Nashville TN: The Free American (live). See M-F 1300.
1505 Australia, Radio: Melisma (Part 1). Musical revelations (1st hour).
1530 USA, WEWN Birmingham AL: The Little Flower. See W 0230.
1530 USA, WWCR #1 Nashville TN: The Showers of Blessings Broadcast. Ed McAbee sermonizes before a live congregation.
1545 USA, WWCR #1 Nashville TN: Words of Hope. See S 1100.

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Frequencies

1600-1700	Algeria, R Algiers Intl	6160af	11715af	15160me	
1600-1700	Anguilla,Caribbean Beacon	11775am			
1600-1700 vl	Australia, ABC/Alice Spgs	2310do			
1600-1700 vl	Australia, ABC/Katherine	2485do			
1600-1700 vl	Australia, ABC/Tent Creek	2325do			
1600-1700	Australia, Radio	5995as	6180va	9500as	9580va
		11650va	11660as	17750pa	
1600-1700 vl	Botswana, Radio	4820do	4830do	7255do	
1600-1700 vl	Canada, CBC N Quebec Svc	9625do			
1600-1700	Canada, CFRX Toronto	6070do			
1600-1700	Canada, CFVP Calgary	6030do			
1600-1700	Canada, CHNX Halifax	6130do			
1600-1700	Canada, CKZN St John's	6160do			
1600-1700	Canada, CKZU Vancouver	6160do			
1600-1656	China, China Radio Intl	7190af	9565af	9870af	
1600-1700	Costa Rica,RF Peace Intl	15050am	21460am		
1600-1627	Czech Rep, R Prague Intl	5930eu	21745af		
1600-1630	Ecuador, HCJB	12005ca	15115am	21455va	
1600-1700	Ethiopia, Radio	7165af	9560af		
1600-1700	France, Radio France Intl	11615af	11995af	12015af	15210af
		17605af			
1600-1645	Germany, Deutsche Welle	6140eu	6170as	7225as	9735af
	9875as	11810af	15135af	17595as	21695af
1600-1700 s	Germany, Good News World	6155va			
1600-1700	Germany, Sunrise Radio	5850eu			
1600-1630 s	Germany, Universal Life	15105af			
1600-1700	Germany,Overcomer Ministr	13810me			
1600-1700 vl	Ghana, Ghana BC Corp	4915do	6130do		
1600-1700	Guam, AWR/KSDA	9355as	11920as		
1600-1630 as	Guam, TWR/KTWR	15330as			
1600-1700	Guyana, GBC/Voice of	5950do			
1600-1630	Iran, VOIRI	7250as	11680as	13605as	15150as
1600-1630	Jordan, Radio	11690eu			
1600-1700	Kenya, Kenya BC Corp	4935do			
1600-1700	Lebanon, Voice of Hope	6280me	9985me		
1600-1700 vl	Lesotho, Radio	4800do			
1600-1700	Malaysia, Radio	7295do			
1600-1700	N Marianas, KFBS Saipan	9465as	9495as		
1600-1625	Netherlands, Radio	9890as	12075as	15590as	
1600-1650 occsnal	New Zealand, R NZ Intl	6100va			
1600-1700 vl	Nigeria, Radio/Ibadan	6050do			
1600-1700 vl	Nigeria, Radio/Kaduna	4770do			
1600-1700	Nigeria, Voice of	7255af	15120va		
1600-1630	Pakistan, Radio	15464me	15535af	17535af	17720af
1600-1700	Palau, KHBN/Voice of Hope	9955as	9965as		
1600-1700 vl	Papua New Guinea, NBC	4890do			
1600-1700	Russia,Voice of Russia WS	9730eu	12070me	15490me	15550as
1600-1630	S Africa, Channel Africa	6150af			
1600-1700	Sierra Leone, SLBS	5980do			
1600-1700	South Korea, R Korea Intl	5975om	9515af	9870af	
1600-1700	Swaziland, Trans World R	9500af			
1600-1615	Switzerland, Swiss R Intl	9575as	17670as		
1600-1700	Tanzania, Radio	5050af			
1600-1645	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1600-1700	Uganda, Radio	4976do			
1600-1700	UK, BBC World Service	3915as	5975as	5990as	6190af
	6195as 7160as	9410eu	9515am	9740as	11940af
	12095eu 15310as	15400af	15485eu	15575eu	17705as
	17830af 17840am	21470af	21660af		
1600-1700	UK, Merlin Network One	6175eu	21550af		
1600-1700	USA, KAIJ Dallas TX	13815na			
1600-1700	USA, KTBN Salt Lk City UT	15590na			
1600-1700	USA, KWHR Naalehu HI	9930as	11565pa		
1600-1700	USA, Voice of America	6035af	6110as	6160as	7125as
	7215as	9645as	9700as	9760as	13710af
	15205va	15225af	15255va	15395as	15410af
1600-1700	USA, WEWN Birmingham AL	13615na	15745eu		
1600-1700	USA, WGTG McCaysville GA	9400am			
1600-1700	USA, WHRA Greenbush ME	17650af			
1600-1700	USA, WHRI Noblesville IN	13760na	15105sa		
1600-1700	USA, WINB Red Lion PA	13800am			
1600-1700	USA, WJCR Upton KY	7490na	13595as		
1600-1700 irreg	USA, WMLK Bethel PA	9465am			
1600-1700	USA, WRNO New Orleans LA	7395na			
1600-1700	USA, WSHB Cypress Crk SC	18910af			
1600-1700	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1600-1700	USA, WYFR Okeechobee FL	11830na	15600na	15695eu	17555eu
		17750na	21525af		
1600-1615 a	Vatican City, Vatican R	12065om	13765au	15500au	
1600-1700	Zambia, Christian Voice	3330af	4965af		
1600-1700	Zambia, Natl BC Corp	6165do	6265do		
1600-1630 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1615-1645 a	UK, BBC World Service	11860af			
1615-1700 a	UK, BBC World Service	9515am			
1615-1630	Vatican City, Vatican R	4005eu	5883eu	7250eu	9645eu
		15595eu			
1630-1700	Austria, R Austria Intl	6155va	13730va	15240va	17560va
1630-1657	Canada, R Canada Intl	6140as	7150as		
1630-1700	Egypt, Radio Cairo	15255af			
1630-1700 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
1630-1700 a	Germany, Universal Life	15105af			
1630-1700 s	Seychelles, FEBA Radio	11665as			
1630-1700	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1630-1657	Vietnam, Voice of	9730eu	9840eu		
1630-1700 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1645-1700	Germany, Deutsche Welle	6140eu			
1645-1700	Tajikistan, Radio	7245as			
1645-1700 smwf	UK, BBC World Service	11860af			
1650-1700 mtwhf	New Zealand, R NZ Intl	6145va			

Selected Programs

Sundays

1600 USA, WEWN Birmingham AL: Spanish Mass (live). Catholic Mass in Spanish.
1600 Australia, Radio: RA News. See S 0000.
1600 USA, WWCR #1 Nashville TN: Latin Catholic Mass. Father Gommar De Pauw conducts the traditional Latin Mass.
1600 USA, WWCR #3 Nashville TN: Apostolic Assembly. Lonnie Wollard preaches from Milltown, Connecticut.
1605 Australia, Radio: The National Interest. Terry Lane takes an incisive look at the week's major events.
1630 USA, WWCR #1 Nashville TN: Blessed Assurance Ministry. Edward Maloof conducts services from Massachusetts.

Monday-Friday

1600 Australia, Radio: RA News. See S 0000.
1600 USA, WEWN Birmingham AL: Daily Mass (encore). From Our Lady of the Angels Monastery in Birmingham, Alabama.
1600 USA, WWCR #1 Nashville TN: USA Radio News. See S 1100.
1600 USA, WWCR #3 Nashville TN: USA Radio News. See S 1100.
1605 USA, WWCR #1 Nashville TN: The Overcomer Broadcast (live). See M-F 1200.

Mondays

1603 USA, WWCR #3 Nashville TN: Scriptures for America (live). Peter J. Peters hosts this outreach ministry of the LaPorte Church of Christ in Colorado.
1605 Australia, Radio: Music Deli. Paul Petran present music from a variety of cultures.

Tuesdays

1603 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.
1605 Australia, Radio: The Comfort Zone. Architecture and design, gardens, food and travel with Alan Saunders.

Wednesdays

1603 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.
1605 Australia, Radio: Verbatim. New program--no information available.
1630 Australia, Radio: Earshot. See W 1605.

Thursdays

1603 USA, WWCR #3 Nashville TN: Scriptures for America (live). See M 1603.
1605 Australia, Radio: Hindsight. Michelle Rayner presents current events from an historical perspective.
1605 USA, WWCR #1 Nashville TN: The Overcomer Broadcast (live). See M-F 1200.

Fridays

1603 USA, WWCR #3 Nashville TN: Health Programming (live). Various hosts.
1605 Australia, Radio: Awaye. See M 0110.

Saturdays

1600 USA, WEWN Birmingham AL: Daily Mass (encore). See M 1600.
1600 Australia, Radio: RA News. See S 0000.
1600 USA, WWCR #1 Nashville TN: A Brighter Day. Jane Rogowski evangelizes from Maryland.
1600 USA, WWCR #3 Nashville TN: Strength for Today. Lane Brown.
1605 Australia, Radio: Melisma (Part 2). Musical revelations (2nd hour).
1615 USA, WWCR #1 Nashville TN: The End Day Prophecy Broadcast. Brother Sharpe evangelizes from Georgia.
1630 USA, WWCR #1 Nashville TN: The Word of Victory. Joyce Corbitt preaches from Great Britain.
1630 USA, WWCR #3 Nashville TN: Born to Win. Ronald Dart of Texas discusses a current issue.
1645 USA, WWCR #1 Nashville TN: Hope for Today. J. Otis Yoder of Pennsylvania with a spiritual message.

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FREQUENCIES

1700-1800	Anguilla,Caribbean Beacon	11775am			
1700-1800 vl	Australia, ABC/Alice Spgs	2310do			
1700-1800 vl	Australia, ABC/Katherine	2485do			
1700-1800 vl	Australia, ABC/Tent Creek	2325do			
1700-1800	Australia, Radio	5995as	6180va	9500as	9580va
		9660va	11880va		
1700-1730	Azerbaijan, R Dada Gorgud	9165me			
1700-1800 vl	Botswana, Radio	4820do	4830do	7255do	
1700-1800 vl	Canada, CBC N Quebec Svc	9625do			
1700-1800	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZN St John's	6160do			
1700-1800	Canada, CKZU Vancouver	6160do			
1700-1756	China, China Radio Intl	7150af	7405af	9570af	9745af
		11910af	15300af		
1700-1800	Costa Rica,RF Peace Intl	15050am	21460am		
1700-1727	Czech Rep, R Prague Intl	5930eu	21745af		
1700-1800	Egypt, Radio Cairo	15255af			
1700-1800 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
1700-1730	France, Radio France Intl	15210af	17605af		
1700-1730	Georgia, Georgian Radio	11910eu			
1700-1800	Germany, Deutsche Welle	6140eu			
1700-1800 a	Germany, Good News World	11725va			
1700-1800	Germany, Sunrise Radio	5850eu			
1700-1730	Germany,Overcomer Ministr	3965eu	13810me		
1700-1800 vl	Ghana, Ghana BC Corp	3366do	4915do		
1700-1800	Guyana, GBC/Voice of	5950do			
1700-1800 vl	Italy, IRRS	3985va			
1700-1800	Japan, Radio/NHK	7110eu	9535na	9825as	15355af
1700-1800	Kenya, Kenya BC Corp	4935do			
1700-1800	Lebanon, Voice of Hope	6280me	9985me		
1700-1800 vl	Lesotho, Radio	4800do			
1700-1800	Malaysia, Radio	7295do			
1700-1800	N Marianas, KFBS Saipan	9465as			
1700-1800 mtwhf	New Zealand, R NZ Intl	6145va			
1700-1800 vl	Nigeria, Radio/Ibadan	6070do			
1700-1800 vl	Nigeria, Radio/Kaduna	4770do			
1700-1800	Nigeria, Radio/Lagos	3326do			
1700-1800	Palau, KHBN/Voice of Hope	9955as	9965as		
1700-1800 vl	Papua New Guinea, NBC	4890do			
1700-1755	Poland, Polish R Warsaw	6095eu	7285eu		
1700-1756	Romania, R Romania Intl	15270eu	15380eu	17735eu	17865eu
1700-1800	Russia,Voice of Russia WS	9720eu	9775eu	11510af	12065af
		15545eu	15735eu		
1700-1800 smwhfa	Russia,Voice of Russia WS	9820eu	11675eu		
1700-1730	S Africa, Channel Africa	17860af			
1700-1800	Sierra Leone, SLBS	5980do			
1700-1800	Tanzania, Radio	5050af			
1700-1800	Uganda, Radio	4976do			
1700-1800	UK, BBC World Service	3255af	3915as	5975as	6005af
	6190af 7160as	9410eu	9510as	9630af	9740as
	11995me 12095eu	15400af	15420af	15485eu	15575eu
	17830af 17840am				
1700-1800	UK, Merlin Network One	6175eu	21550af		
1700-1800	USA, KAIJ Dallas TX	13815na			
1700-1800	USA, KTBN Salt Lk City UT	15590na			
1700-1800	USA, KWHR Naalehu HI	9930as			
1700-1800	USA, Voice of America	6110as	6190as	7125as	7170as
		9645as	9700me	9760af	15255va
		15395as	15410af	15445af	17895af
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	7150as	9550as
		9770as	11870as		
1700-1800	USA, WEWN Birmingham AL	13615na	15745eu		
1700-1800	USA, WGTG McCaysville GA	9400am			
1700-1800	USA, WHRA Greenbush ME	17650af			
1700-1800	USA, WHRI Noblesville IN	9495sa	13760na		
1700-1800	USA, WINB Red Lion PA	13800am			
1700-1800	USA, WJCR Upton KY	7490na	13595as		
1700-1800 irreg	USA, WMLK Bethel PA	9465am			
1700-1800	USA, WRNO New Orleans LA	7395na			
1700-1800	USA, WSHB Cypress Crk SC	18910af			
1700-1800	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1700-1800	USA, WYFR Okeechobee FL	15695eu	17555eu		
1700-1727	Vietnam, Voice of	12070eu			
1700-1800	Zambia, Christian Voice	3330af	4965af		
1700-1800	Zambia, Natl BC Corp	6165do	6265do		
1700-1800 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1715-1800 vl	Libya, Voice of Africa	15235va	15415va	15435va	
1715-1800	Swaziland, Trans World R	3200af			
1730-1756	Belgium,R Vlaanderen Intl	5910eu	9925eu	11840af	13685eu
1730-1800 as	Georgia, Georgian Radio	6080me			
1730-1800 a	Germany, Universal Life	6195eu			
1730-1800	Guam, AWR/KSDA	11965as			
1730-1800	Netherlands, Radio	6020af	7120af	11655af	
1730-1800	Philippines, R Pilipinas	11720as	11890as	15190as	
1730-1800	S Africa, AWR Africa	12130af			
1730-1800 mtwhfa	Sweden, Radio	6065eu			
1730-1800 s	Sweden, Radio	9590eu			
1730-1800 s	UK, BBC World Service	12045as	15310as		
1730-1800	Vatican City, Vatican R	13765af	15570af	17550af	
1745-1800	Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu
1745-1800	India, All India Radio	9635af	9950eu	11620eu	11935af
		13780af	15200af		

1800-1900	Anguilla,Caribbean Beacon	11775am			
1800-1900 mtwhf	Argentina, RAE	15345eu			
1800-1900 vl	Australia, ABC/Alice Spgs	2310do			
1800-1900 vl	Australia, ABC/Katherine	2485do			
1800-1900 vl	Australia, ABC/Tent Creek	2325do			
1800-1900	Australia, Radio	6080pa	7240va	9500as	9580va
		9660va	11880va		
1800-1900	Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu
1800-1900 vl	Botswana, Radio	4820do	4830do		
1800-1900	Brazil, R Nacional Bras	15265eu			
1800-1900	Canada, CFRX Toronto	6070do			
1800-1900	Canada, CFVP Calgary	6030do			
1800-1900	Canada, CHNX Halifax	6130do			
1800-1900	Canada, CKZN St John's	6160do			
1800-1900	Canada, CKZU Vancouver	6160do			
1800-1900	Costa Rica,RF Peace Intl	15050am	21460am		
1800-1830	Egypt, Radio Cairo	15255af			
1800-1900 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
1800-1900	Germany, Deutsche Welle	6140eu			
1800-1900	Germany, Sunrise Radio	5850eu			
1800-1830 s	Germany, Universal Life	11830af			
1800-1900	Germany,Overcomer Ministr	3965eu			
1800-1900 vl	Ghana, Ghana BC Corp	3366do	4915do		
1800-1815	Greece, Voice of	7450eu	9425eu	17705na	17765sa
1800-1900	Guyana, GBC/Voice of	5950do			
1800-1900	India, All India Radio	9635af	9950eu	11620eu	11935af
		15200af			
1800-1900 vl	Italy, IRRS	3985va			
1800-1900	Kenya, Kenya BC Corp	4935do			
1800-1900	Kuwait, Radio	11990am			
1800-1900	Lebanon, Voice of Hope	6280me	9985me		
1800-1900 vl	Lesotho, Radio	4800do			
1800-1815	Liberia,LCN/R Liberia Int	5100do			
1800-1900	Malaysia, Radio	7295do			
1800-1900	N Marianas, KFBS Saipan	9465as			
1800-1900	N Marianas, KHBI Saipan	13820as			
1800-1830	Netherlands, Radio	6020af	7120af	11655af	
1800-1850 mtwhf	New Zealand, R NZ Intl	6145va			
1800-1900 vl	Nigeria, Radio/Ibadan	6050do			
1800-1900 vl	Nigeria, Radio/Kaduna	4770do			
1800-1900	Nigeria, Radio/Lagos	3326do			
1800-1900 vl	Nigeria, Voice of	7255af	15120va		
1800-1900	North Korea, R Pyongyang	4405as	6575eu	9335eu	11710am
		13760am			
1800-1900	Palau, KHBN/Voice of Hope	9965as			
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900	Philippines, R Pilipinas	11720as	11890as	15190as	
1800-1900	Russia,Voice of Russia WS	7310eu	9640af	9720eu	9775eu
		9820eu	9865eu	11510af	11675eu
		12025af	12065af	15545eu	15735eu
1800-1830	S Africa, AWR Africa	5960af	6100af		
1800-1830	S Africa, Channel Africa	17870af			
1800-1900	Sierra Leone, SLBS	3316do			
1800-1900 vl	Solomon Islands, SIBC	5020do			
1800-1900	Sudan, Radio Omdurman	9200va			
1800-1830	Swaziland, Trans World R	9500af			
1800-1900	Swaziland, Trans World R	3200af			
1800-1900	Tanzania, Radio	5050af			
1800-1900	UK, BBC World Service	3255af	5975as	6005as	6180eu
	6190af 6195eu	9410eu	9510as	9740pa	11995me
	12095eu 15400af	15420af	15575eu	17830af	17840am
1800-1900	UK, Merlin Network One	6175eu	21550af		
1800-1900	USA, KAIJ Dallas TX	13815na			
1800-1900	USA, KJES Vado NM	15385na			
1800-1900	USA, KTBN Salt Lk City UT	15590na			
1800-1900	USA, KWHR Naalehu HI	17510as			
1800-1900	USA, Voice of America	6035af	7415af	9760af	9770me
	11975af	13820as	15410af	15580af	17895af
1800-1900	USA, WEWN Birmingham AL	13615na	15745eu		
1800-1900	USA, WGTG McCaysville GA	9400am			
1800-1900	USA, WHRA Greenbush ME	17650af			
1800-1900	USA, WHRI Noblesville IN	9495sa	13760na		
1800-1900	USA, WINB Red Lion PA	13800am			
1800-1900	USA, WJCR Upton KY	7490na	13595as		
1800-1900 irreg	USA, WMLK Bethel PA	9465am			
1800-1900	USA, WRNO New Orleans LA	7395na			
1800-1900	USA, WSHB Cypress Crk SC	15665eu	18910af		
1800-1900	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1800-1845	USA, WYFR Okeechobee FL	15695eu			
1800-1900 vl	Vanuatu, Radio	4960do			
1800-1827	Vietnam, Voice of	9730eu	9840eu		
1800-1900	Yemen, Rep of Yemen Radio	9780do			
1800-1900	Zambia, Christian Voice	3330af	4965af		
1800-1900	Zambia, Natl BC Corp	6165do	6265do		
1800-1900 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1805-1810	Croatia, Croatian Radio	13830eu			
1830-1900	Ascension Is,RTE Radio	17885af			
1830-1900	Georgia, Georgian Radio	11760eu			
1830-1900 s	Germany, Universal Life	11785af			
1830-1900	Netherlands, Radio	6020af	7120af	9895af	11655af
		13700af	17605af	21590af	
1830-1900 w	Philippines, FEBC R Intl	9465eu			
1830-1900 irreg	Serbia, Radio Yugoslavia	6100eu	9720af		
1830-1900	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1830-1900	Turkey, Voice of	9670eu	11765eu	13695eu	
1830-1900 as	USA, Voice of America	7170af	11940af	15435af	
1840-1850	Greece, Voice of	9375af	12105af		
1851-1900 mtwhf	New Zealand, R NZ Intl	11695va			
1855-1900 as	New Zealand, R NZ Intl	11695va			

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FREQUENCIES

1900-2000	Anguilla,Caribbean Beacon	11775am			
1900-2000 vl	Australia, ABC/Katherine	2485do			
1900-2000 vl	Australia, ABC/Tent Creek	2325do			
1900-2000	Australia, Radio	6080pa	7240va	9500as	9580va
		9660va	11880va		
1900-2000 vl	Botswana, Radio	4820do	4830do		
1900-1920	Brazil, R Nacional Bras	15265eu			
1900-2000	Bulgaria, Radio	9400eu	11720eu		
1900-2000	Canada, CFRX Toronto	6070do			
1900-2000	Canada, CFVP Calgary	6030do			
1900-2000	Canada, CHNX Halifax	6130do			
1900-2000	Canada, CKZN St John's	6160do			
1900-2000	Canada, CKZU Vancouver	6160do			
1900-1956	China, China Radio Intl	6955af	9440af	9600af	11840af
1900-2000	Costa Rica,RF Peace Intl	15050am	21460am		
1900-2000	Ecuador, HCJB	17660eu	21455va		
1900-2000 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
1900-1930	Finland, YLE/R Finland	6135eu			
1900-1945	Germany, Deutsche Welle	9640af	11785af	11810af	13790af
		15390af	17810af		
1900-2000	Germany, Sunrise Radio	5850eu			
1900-2000	Germany,Overcomer Ministr	3965eu			
1900-2000 vl	Ghana, Ghana BC Corp	3366do	4915do		
1900-1910	Greece, Voice of	7475eu	9375eu		
1900-2000	Guatemala, Adv World R	5980am			
1900-2000	Guyana, GBC/Voice of	5950do			
1900-1930	Hungary, Radio Budapest	6025eu	7170eu		
1900-1945	India, All India Radio	9635af	9950eu	11620eu	11935af
		13780af	15200af		
1900-1925	Israel, Kol Israel	11605va	15640af	17545va	
1900-2000 vl	Italy, IRRS	3985va			
1900-2000	Kenya, Kenya BC Corp	4885do	4935do		
1900-2000	Kuwait, Radio	11990am			
1900-2000	Lebanon, Voice of Hope	6280me	9985me		
1900-2000 vl	Lesotho, Radio	4800do			
1900-1915	Liberia,LCN/R Liberia Int	5100do			
1900-2000	Malaysia, Radio	7295do			
1900-2000 smtwha	Malta, VO Mediterranean	12060eu			
1900-1930	Mongolia, Voice of	9720eu	12015eu		
1900-2000	N Marianas, KFBS Saipan	9465as			
1900-2000	Netherlands, Radio	6020af	7120af	9895af	11655af
		13700af	17605af	21590af	
1900-1950 mtwhf	New Zealand, R NZ Intl	11695va			
1900-1958 as	New Zealand, R NZ Intl	11695va			
1900-2000 vl	Nigeria, Radio/Ibadan	6050do			
1900-2000 vl	Nigeria, Radio/Kaduna	4770do			
1900-2000	Nigeria, Radio/Lagos	3326do			
1900-2000	Nigeria, Voice of	7255af	15120va		
1900-2000	North Korea, R Pyongyang	6520va	9600va	9975af	
1900-1930 vl	Papua New Guinea, NBC	9675do			
1900-1930 m-a/vl	Papua New Guinea, NBC	4890do			
1900-1930	Philippines, R Pilipinas	11720as	11890as	15190as	
1900-2000	Russia,Voice of Russia WS	9480eu	9720eu	9775eu	9820eu
		11675eu	12070eu	15545eu	15735eu
1900-1930 irreg	Serbia, Radio Yugoslavia	7230au			
1900-2000	Sierra Leone, SLBS	3316do			
1900-2000 vl	Solomon Islands, SIBC	5020do			
1900-2000	South Korea, R Korea Intl	5975om	7275eu		
1900-2000	Swaziland, Trans World R	3200af			
1900-1930	Switzerland, Swiss R Intl	9885eu			
1900-1930	Tanzania, Radio	5050af			
1900-2000	Thailand, Radio	9535eu	9655eu	11905eu	
1900-1930	Turkey, Voice of	9670eu	11765eu	13695eu	
1900-2000	Uganda, Radio	4976do			
1900-2000	UK, BBC World Service	3255af	6005af	6180eu	6180eu
	6190af 6195eu	9410eu	9630af	9740pa	11835af
	11995me 12095eu	15400af	15485eu	17830af	
1900-2000	UK, Merlin Network One	6175eu	13690eu		
1900-2000	USA, KAIJ Dallas TX	13815na			
1900-2000	USA, KTBN Salt Lk City UT	15590na			
1900-2000	USA, KWHR Naalehu HI	17510as			
1900-2000	USA, Voice of America	4950af	6035af	7375af	7415af
	9525pa	9760af	9770af	11870pa	11975af
	15180pa	15410af	15445af	15580af	
1900-1930 a	USA, Voice of America	4950af			
1900-2000	USA, WEWN Birmingham AL	13615na	15745eu		
1900-2000	USA, WGTG McCaysville GA	9400am			
1900-2000	USA, WHRA Greenbush ME	17650af			
1900-2000	USA, WHRI Noblesville IN	9495sa	13760na		
1900-2000	USA, WINB Red Lion PA	13800am			
1900-2000	USA, WJCR Upton KY	7490na	13595as		
1900-2000	USA, WRNO New Orleans LA	7395na			
1900-2000	USA, WSHB Cypress Crk SC	15665eu	18910af		
1900-2000	USA, WWCR Nashville TN	9475na	12160va	13845na	15685na
1900-1945	USA, WYFR Okeechobee FL	15695eu			
1900-2000 vl	Vanuatu, Radio	4960do			
1900-1927	Vietnam, Voice of	9730eu	9840eu		
1900-2000	Zambia, Christian Voice	3330af	4965af		
1900-2000	Zambia, Natl BC Corp	6165do	6265do		
1900-2000 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1915-1930	Albania, R Tirana Intl	7180eu	9510eu		
1930-2000 th	Belarus, R Minsk	7210va	11960va		
1930-1956	Belgium,R Vlaanderen Intl	5960eu			
1930-2000	Iran, VOIRI	7215eu	9022eu	9880as	
1930-2000	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu
1930-2000	Sweden, Radio	6065eu			
1935-1955	Italy, RAI Intl	5970eu	7160eu	9760eu	
1950-2000	Vatican City, Vatican R	4005eu	5883eu	7250eu	9645eu
1951-2000	New Zealand, R NZ Intl	17675va			
1956-2000	S Africa, Voice of Hope	6290af			
1959-2000 s	New Zealand, R NZ Intl	11675va			

2000-2100	Algeria, R Algiers Intl	11715af	11750af		
2000-2100	Anguilla,Caribbean Beacon	11775am			
2000-2100 vl	Australia, ABC/Alice Spgs	2310do			
2000-2100 vl	Australia, ABC/Katherine	2485do			
2000-2100 vl	Australia, ABC/Tent Creek	2325do			
2000-2100	Australia, Radio 9500as	9580va	9660va	11880va	12080va
2000-2100 vl	Botswana, Radio	4820do	4830do		
2000-2100	Canada, CFRX Toronto	6070do			
2000-2100	Canada, CFVP Calgary	6030do			
2000-2100	Canada, CHNX Halifax	6130do			
2000-2100	Canada, CKZN St John's	6160do			
2000-2100	Canada, CKZU Vancouver	6160do			
2000-2100	Canada, R Canada Intl	5995eu	11690eu	13650eu	13670eu
	15150eu	15325eu	15470eu	17570eu	17820eu
2000-2056	China, China Radio Intl	6950eu	7170af	9440af	9535eu
		11840af	11975af	15500af	
2000-2100	Costa Rica,RF Peace Intl	15050am	21460am		
2000-2005	Croatia, Croatian Radio	13810af			
2000-2027	Czech Rep, R Prague Intl	5930eu	11600va		
2000-2100	Ecuador, HCJB	17660eu	21455va		
2000-2100 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
2000-2045	Germany, Deutsche Welle	11970eu			
2000-2100	Germany,Overcomer Ministr	3965eu			
2000-2100 vl	Ghana, Ghana BC Corp	3366do	4915do		
2000-2100	Guatemala, Adv World R	5980am			
2000-2100	Guyana, GBC/Voice of	5950do			
2000-2100	Indonesia, Voice of	15150va			
2000-2030	Iran, VOIRI	7215eu	9022eu	9880eu	
2000-2100 vl	Italy, IRRS	3985va			
2000-2100	Kenya, Kenya BC Corp	4885do	4935do		
2000-2100	Kuwait, Radio	11990am			
2000-2100	Lebanon, Voice of Hope	6280me	9985me		
2000-2100 vl	Lesotho, Radio	4800do			
2000-2055	Liberia,LCN/R Liberia Int	5100do			
2000-2100	Malaysia, Radio	7295do			
2000-2100	Namibia, NBC	3270af	3289af		
2000-2025	Netherlands, Radio	6020af	7120af	9895af	11655af
		13700af	17605af	21590af	
2000-2100	New Zealand, R NZ Intl	17675va			
2000-2015 vl	Niger, Voice du Sahel	5019do			
2000-2100 vl	Nigeria, Radio/Ibadan	6050do			
2000-2100 vl	Nigeria, Radio/Kaduna	4770do			
2000-2100	Nigeria, Radio/Lagos	3326do			
2000-2100	Nigeria, Voice of	7255af	15120va		
2000-2100 vl	Papua New Guinea, NBC	9675do			
2000-2025	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu
2000-2100	Russia,Voice of Russia WS	9720eu	9775eu	9820eu	11675eu
		15485eu	15735eu		
2000-2005	S Africa, Voice of Hope	6290af			
2000-2100	Sierra Leone, SLBS	3316do			
2000-2100 vl	Solomon Islands, SIBC	5020do			
2000-2100 mtwhf	Spain, R Exterior Espana	9595af	15285eu		
2000-2100	Swaziland, Trans World R	3200af			
2000-2030	Switzerland, Swiss R Intl	13710af	13770af	15220af	17580af
2000-2100	Uganda, Radio	4976do			
2000-2100	UK, BBC World Service	3255af	3955eu	5975pa	6005af
	6180eu 6190af	6195va	7325eu	9410eu	9630af
	9740pa 11835af	12095sa	15400af	17830af	
2000-2100	UK, Merlin Network One	7235eu	13690na	17695eu	
2000-2100	USA, KAIJ Dallas TX	13815na			
2000-2100	USA, KTBN Salt Lk City UT	15590na			
2000-2100	USA, KWHR Naalehu HI	17510as			
2000-2100	USA, Voice of America	4950af	6035af	6095me	7375af
	7415af 9760af	9770af	11855af	11975af	15410af
	15445af 15580af	17725af	17745af		
2000-2100	USA, WBCQ Monticello ME	7415na			
2000-2100	USA, WEWN Birmingham AL	13615na	15745eu		
2000-2100	USA, WGTG McCaysville GA	9400am			
2000-2100	USA, WHRA Greenbush ME	17650af			
2000-2100	USA, WHRI Noblesville IN	5745sa	9495na		
2000-2100	USA, WINB Red Lion PA	13800am			
2000-2100	USA, WJCR Upton KY	7490na	13595as		
2000-2045 as	USA, WRMI/R Miami Intl	9955am			
2000-2100	USA, WRNO New Orleans LA	7395na			
2000-2100	USA, WSHB Cypress Crk SC	15665eu	18910af		
2000-2100	USA, WWCR Nashville TN	9475na	12160va	13845na	15685na
2000-2045	USA, WYFR Okeechobee FL	15695eu	17750va	17845af	
2000-2100 vl	Vanuatu, Radio	4960do			
2000-2010	Vatican City, Vatican R	4005eu	5883eu	7250eu	9645eu
		9660af	11625af	13765va	
2000-2100	Zambia, Christian Voice	3330af	4965af		
2000-2100	Zambia, Natl BC Corp	6165do	6265do		
2000-2100 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2005-2100	Syria, Radio Damascus	12085eu	13605eu		
2010-2030	Vatican City, Vatican R	9660af	11625af	13765va	
2015-2100 vl	Libya, Voice of Africa	15235va	15415va	15435va	
2025-2045	Italy, RAI Intl	7220af	9710af	11880af	
2030-2100 th	Belarus, R Minsk	7210va	11960va		
2030-2100	Cuba, Radio Havana	13720eu	13750eu		
2030-2100	Egypt, Radio Cairo	15375af			
2030-2100	Germany, AWR Europe	15560af			
2030-2035 mtwhf	Latvia, Radio Latvia Intl	5935eu			
2030-2055	Moldova, R Moldova Intl	7520eu			
2030-2100	S Africa, AWR Africa	9745af			
2030-2045	Thailand, Radio	9535eu	9655eu	11905eu	
2030-2100	Turkey, Voice of	7170va			
2030-2100 as	USA, Voice of America	4950af			
2030-2100	Uzbekistan, R Tashkent	4850eu	5995eu	7105eu	9540eu
		9540eu			
2030-2057	Vietnam, Voice of	9730eu	9840eu		
2045-2100	India, All India Radio	7150au	7410eu	9910au	9950eu
		11620eu			
2045-2100 a	USA, WRMI/R Miami Intl	9955am			
2045-2100	USA, WYFR Okeechobee FL	15695na	17845va		

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Frequencies

2100-2200	Anguilla,Caribbean Beacon	11775am			
2100-2130 vl	Australia, ABC/Alice Spgs	2310do			
2100-2130 vl	Australia, ABC/Katherine	2485do			
2100-2200 vl	Australia, ABC/Katherine	5025do			
2100-2130 vl	Australia, ABC/Tent Creek	2325do			
2100-2130	Australia, Radio	7240pa	9500as	9580va	9660pa
		11880va	12080va	17580va	21740va
2100-2200 vl	Botswana, Radio	3356do	4820do		
2100-2200	Bulgaria, Radio	9400eu	11720eu		
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2129	Canada, R Canada Intl	7235eu	11690eu	13650eu	13670eu
	15150eu	15325eu	15470eu	17570eu	17820eu
2100-2130	China, China Radio Intl	6950eu	9535eu	11975af	15415af
		15500af			
2100-2200	Costa Rica,RF Peace Intl	15050am	21460am		
2100-2130	Cuba, Radio Havana	13720eu	13750eu		
2100-2200	Ecuador, HCJB	17660eu			
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
2100-2145	Germany, Deutsche Welle	9670as	9765as	9875af	11865af
		11915as	13780as	15135va	
2100-2200 vl	Ghana, Ghana BC Corp	3366do	4915do		
2100-2200	Guyana, GBC/Voice of	5950do			
2100-2130	Hungary, Radio Budapest	6025eu			
2100-2200	India, All India Radio	7150au	7410eu	9910au	9950eu
		11620eu			
2100-2130 irreg	Iraq, Radio Iraq Intl	9685va			
2100-2200 vl	Italy, IRRS	3985va			
2100-2200	Japan, Radio/NHK	6035pa	9725eu	17825na	21610pa
2100-2130	Kenya, Kenya BC Corp	4885do	4935do		
2100-2200 vl	Lesotho, Radio	4800do			
2100-2115	Liberia,LCN/R Liberia Int	5100do			
2100-2200	Malaysia, Radio	7295do			
2100-2200	Namibia, NBC	3270af	3289af		
2100-2200	New Zealand, R NZ Intl	17675va			
2100-2200 vl	Nigeria, Radio/Ibadan	6050do			
2100-2200 vl	Nigeria, Radio/Kaduna	4770do			
2100-2200	Nigeria, Radio/Lagos	3326do			
2100-2200	North Korea, R Pyongyang	4405as	6575eu	9335eu	11710am
		13760am			
2100-2200	Palau, KHBN/Voice of Hope	9985as			
2100-2200 vl	Papua New Guinea, NBC	9675do			
2100-2200	Romania, R Romania Intl	9570eu	11810eu	11840eu	15180eu
2100-2130 irreg	Serbia, Radio Yugoslavia	6100eu	6185eu		
2100-2200	Sierra Leone, SLBS	3316do			
2100-2200 vl	Solomon Islands, SIBC	5020do			
2100-2130	South Korea, R Korea Intl	3970eu	6480eu	15575eu	
2100-2200 s	Spain, R Exterior Espana	9595af	15105eu		
2100-2200	Swaziland, Trans World R	3200af			
2100-2200	Syria, Radio Damascus	12085na	13605na		
2100-2130	Turkey, Voice of	7170va			
2100-2200	UK, BBC World Service	3255af	3915as	3955eu	5965as
	5975va 6005af	6180eu	6190af	6195va	7325eu
	9410eu 9740pa	11835af	11945as	12095sa	15400af
2100-2200	UK, Merlin Network One	13690na	17695eu		
2100-2200	Ukraine, R Ukraine Intl	5905eu	6020eu	6090eu	7410eu
		9550na	9560eu	12040na	13590eu
2100-2200	USA, KAIJ Dallas TX	13815na			
2100-2200	USA, KTBN Salt Lk City UT	15590na			
2100-2200	USA, KWHR Naalehu HI	17510as			
2100-2200	USA, Voice of America	6035af	6040me	7375af	7415af
	9535af	9705as	11870pa	11975af	15185as
	15410af	15445af	15580af	17725af	17735as
2100-2200	USA, WBCQ Monticello ME	7415na			
2100-2200	USA, WEWN Birmingham AL	13615na	15745eu		
2100-2200	USA, WGTG McCaysville GA	9400am			
2100-2200	USA, WHRA Greenbush ME	17650af			
2100-2200	USA, WHRI Noblesville IN	5745na	9495sa		
2100-2200	USA, WINB Red Lion PA	13790am			
2100-2200	USA, WJCR Upton KY	7490na	13595as		
2100-2130 a	USA, WRMI/R Miami Intl	9955am			
2100-2200	USA, WRNO New Orleans LA	7395na			
2100-2200	USA, WSHB Cypress Crk SC	11890af	15665eu		
2100-2200	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
2100-2200	USA, WYFR Okeechobee FL	15215eu	15695af	17845va	
2100-2200 vl	Vanuatu, Radio	4960do			
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200	Zambia, Natl BC Corp	6165do	6265do		
2100-2200 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2105-2200 a	Spain, R Exterior Espana	9595af	15105eu		
2115-2145 mtwhfa	Armenia, Voice of	4810va	9965va		
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130 mtwhf	UK, BBC Caribbean Report	5975ca	15390ca	17715ca	
2115-2130 as	UK, BBC World Service	5975am			
2130-2200	Albania, R Tirana Intl	7160eu	9635eu		
2130-2200 vl	Australia, ABC/Tent Creek	4910do			
2130-2200	Australia, Radio	7240pa	9660pa	11880va	12080va
		17580va	21740va		
2130-2200	Austria, R Austria Intl	6155eu			
2130-2200 smtwha	Austria, R Austria Intl	5945eu	13730af		
2130-2156	China, China Radio Intl	6950eu	9535eu		
2130-2157	Czech Rep, R Prague Intl	11600va	15545af		
2130-2200	Guam, AWR/KSDA	15550as			
2130-2200	Hungary, Radio Budapest	3975eu			
2130-2200	Iran, VOIRI	11740as	13720as	13745as	
2130-2155	Moldova, R Moldova Intl	7520eu			
2130-2200	South Korea, R Korea Intl	15575eu			
2130-2200	Sweden, Radio	6065eu	9430eu		
2130-2145 tf	UK, BBC Calling Falklands	11680sa			
2130-2200	USA, Voice of America	6040me	9535af	9705as	11870pa
		15185as	17735as		
2130-2200 smtwhf	USA, Voice of America	6035af	7375af	7415af	11975af
		15410af	15445af	15580af	17725af

2200 UTC

2200-2300	Anguilla,Caribbean Beacon	6090am			
2200-2300 vl	Australia, ABC/Katherine	5025do			
2200-2300 vl	Australia, ABC/Tent Creek	4910do			
2200-2300	Australia, Radio	17580va	17795va	21740va	
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2229	Canada, R Canada Intl	5960na	9755na	11705as	13670am
		15305am			
2200-2256	China, China Radio Intl	9880eu			
2200-2300	Costa Rica,RF Peace Intl	15050am	21460am		
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
2200-2300 vl	Ghana, Ghana BC Corp	3366do	4915do		
2200-2300	Guyana, GBC/Voice of	5950do			
2200-2230	India, All India Radio	7150au	7410eu	9910au	9950eu
		11620eu			
2200-2230	Iran, VOIRI	11740as	13720as	13745as	
2200-2225	Italy, RAI Intl	9675as	11900as	15240as	
2200-2215	Liberia,LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2230	Mexico, Radio Mexico Intl	9705am			
2200-2300	Namibia, NBC	3270af	3289af		
2200-2300	New Zealand, R NZ Intl	17675va			
2200-2300 vl	Nigeria, Radio/Ibadan	6050do			
2200-2300 vl	Nigeria, Radio/Kaduna	4770do			
2200-2300	Nigeria, Radio/Lagos	3326do			
2200-2300	Palau, KHBN/Voice of Hope	9985as			
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2300	Sierra Leone, SLBS	3316do			
2200-2300 vl	Solomon Islands, SIBC	5020do			
2200-2215	Swaziland, Trans World R	3200af			
2200-2205	Syria, Radio Damascus	12085eu	13605na		
2200-2300	Taiwan, Radio Taipei Intl	15600eu	17750eu		
2200-2300	Turkey, Voice of	7190eu	13640na		
2200-2300	UK, BBC World Service	5965as	5975am	6175am	6195va
	7110as	9590am	9660as	9890as	9915sa
	11835af	11955as	12080pa	12095sa	15400af
2200-2300	UK, Merlin Network One	3985eu	9850as	11985na	
2200-2300	USA, KAIJ Dallas TX	13815na			
2200-2300	USA, KTBN Salt Lk City UT	15590na			
2200-2300	USA, KWHR Naalehu HI	17510as			
2200-2230 mtwhf	USA, Voice of America	6035af	7215as	7340af	7375as
	7415af	9705as	9770as	11760as	11975af
	15185as	15290as	15305as	17735as	17820as
2200-2300	USA, WBCQ Monticello ME	7415na			
2200-2300	USA, WEWN Birmingham AL	9975eu			
2200-2300	USA, WGTG McCaysville GA	6890am	9400am		
2200-2300	USA, WHRA Greenbush ME	17650af			
2200-2300	USA, WHRI Noblesville IN	5745na	9495sa		
2200-2300	USA, WINB Red Lion PA	13790am			
2200-2300	USA, WJCR Upton KY	7490na	13595as		
2200-2230 a	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	7395na			
2200-2300	USA, WSHB Cypress Crk SC	13770eu	15285sa		
2200-2300	USA, WWCR Nashville TN	7435na	9475na	12160na	13845na
2200-2245	USA, WYFR Okeechobee FL	11740na	15215af	17845va	
2200-2300 vl	Vanuatu, Radio	4960do			
2200-2210	Zambia, Natl BC Corp	6165do	6265do		
2229-2300	Canada, R Canada Intl	5960na	9755na	13670na	
2230-2256	Belgium,R Vlaanderen Intl	15565na			
2230-2300	Cuba, Radio Havana	9550am			
2230-2257	Czech Rep, R Prague Intl	11600na	15545na		
2230-2300	USA, Voice of America	7215as	9705as	9770as	11760as
	15185as	15290as	15305as	17735as	17820as
2240-2250	Greece, Voice of	9425au	11645au		
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
		13625as			
2245-2300	USA, WYFR Okeechobee FL	11740na			
2245-2300	Vatican City, Vatican R	9600as	11830as		

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Frequencies

2300-0000	Anguilla,Caribbean Beacon	6090am				
2300-0000 vl	Australia, ABC/Katherine	5025do				
2300-0000 vl	Australia, ABC/Tent Creek	4910do				
2300-0000	Australia, Radio 9660pa	12080va	17580va	17795va	21740va	
2300-0000	Bulgaria, Radio	9400na	11700na			
2300-0000	Canada, CBC N Quebec Svc	9625do				
2300-0000	Canada, CFRX Toronto	6070do				
2300-0000	Canada, CFVP Calgary	6030do				
2300-0000	Canada, CHNX Halifax	6130do				
2300-0000	Canada, CKZN St John's	6160do				
2300-0000	Canada, CKZU Vancouver	6160do				
2300-2330	Canada, R Canada Intl	5960na	9755na	11895am	13670am	
		15305am				
2300-0000	China, China Radio Intl	5990na				
2300-0000	Costa Rica,RF Peace Intl	15050am	21460am			
2300-2330	Cuba, Radio Havana	9550am				
2300-0000	Egypt, Radio Cairo	9900am				
2300-2345	Germany, Deutsche Welle	9715as	9815as	11965as		
2300-0000 s	Germany, Good News World	9405sa				
2300-0000 vl	Ghana, Ghana BC Corp	3366do	4915do			
2300-0000	Guyana, GBC/Voice of	5950do				
2300-0000	India, All India Radio	7410as	9705as	9950as	11620as	
		13625as				
2300-2315	Liberia,LCN/R Liberia Int	5100do				
2300-0000	Malaysia, Radio	7295do				
2300-2330	Mexico, Radio Mexico Intl	9705am				
2300-0000	Namibia, NBC	3270af	3289af			
2300-0000	New Zealand, R NZ Intl	17675va				
2300-2330 vl	Nigeria, Radio/Ibadan	6050do				
2300-2330 vl	Nigeria, Radio/Kaduna	4770do				
2300-2330	Nigeria, Radio/Lagos	3326do				
2300-0000	North Korea, R Pyongyang	4405as	11335am	13760am	15130am	
2300-0000	Palau, KHBN/Voice of Hope	9955as	9965as	9985as		
2300-0000 vl	Papua New Guinea, NBC	9675do				
2300-0000	Romania, R Romania Intl	9570eu	11810eu	11830na	15105na	
2300-0000	Sierra Leone, SLBS	3316do				
2300-0000	Singapore,RCorp Singapore	6150do				
2300-0000 vl	Solomon Islands, SIBC	5020do				
2300-0000	UK, BBC World Service	3915as	5965as	5975am	6035as	
	6175am	6195as	7110as	9590am	9915sa	
	11945as	11955as	12095sa	15280as		
2300-0000	UK, Merlin Network One	3985eu	9850as	11985na		
2300-0000	USA, KAIJ Dallas TX	13815na				
2300-0000	USA, KTBN Salt Lk City UT	15590na				
2300-0000	USA, KWHR Naalehu HI	17510as				
2300-0000	USA, Voice of America	7215as	9705as	9770as	11760as	
	15185as	15290as	15305as	17735as	17820as	
2300-0000	USA, WBCQ Monticello ME	7415na				
2300-0000	USA, WEWN Birmingham AL	9975eu				
2300-0000	USA, WGTG McCaysville GA	5085am	6890am			
2300-0000	USA, WHRA Greenbush ME	17650af				
2300-0000	USA, WHRI Noblesville IN	5745na	9495sa			
2300-0000	USA, WINB Red Lion PA	13790am				
2300-0000	USA, WJCR Upton KY	7490na	13595as			
2300-0000	USA, WRNO New Orleans LA	7355na				
2300-0000	USA, WSHB Cypress Crk SC	13770va	15285am			
2300-0000	USA, WWCR Nashville TN	7435na	9475na	12160na	13845na	
2300-2345	USA, WYFR Okeechobee FL	11740na				
2300-0000 vl	Vanuatu, Radio	4960do				
2300-2305	Vatican City, Vatican R	9600as	11830as			
2310-2320	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			
2315-0000 vl	Libya, Voice of Africa	15235va	15415va	15435va		
2330-0000	Canada, R Canada Intl	5960na	9755na	13670am		
2330-0000 as	Canada, R Canada Intl	11895am	15305am			
2330-0000 vl	Guatemala, Radio Cultural	3300do				
2330-0000	Malaysia, RTM Sarawak	7160do				
2330-0000	Netherlands, Radio	6165na	9845na			
2330-2357	Vietnam, Voice of	12019as	13740as			
2340-2350	Greece, Voice of 7450sa	9375sa	9420sa	11645sa	12105sa	

Selected Programs

Sundays

2300 USA, WEWN Birmingham AL: Feminism and Feminity. Dr. Alice Von Hildebrand and her guests discuss how the philosophy of some feminists have denigrated women's feminine nature.
2300 Australia, Radio: RA News. See S 0000.
2300 India, All India Radio: News and Commentary.
2300 Radio Mexico Intl: DXperience. See S 0300.
2300 USA, WWCR #1 Nashville TN: The Down Home Gospel Program. Brother Gary and Sister Wanda evangelize from California.
2300 USA, WWCR #3 Nashville TN: Discoveries in Health (hour 1) (live). A health and herbs show from the American Freedom Network in which new treatments are discussed.
2310 Australia, Radio: Australia All Over. Join listeners across the island continent as Ian McNamara throws the spotlight on life in Australia.
2315 India, All India Radio: Program Preview.
2330 USA, WEWN Birmingham AL: Off the Shelf. A weekly program with lively interviews of authors and others on topics important to the life and mission of the Catholic Church.
2330 USA, WWCR #1: Lighthouse Prophetic All Nations Ministry. Elma Lei preaches from Colorado.

Monday-Friday

2300 Australia, Radio: RA News. See S 0000.
2300 India, All India Radio: News and Commentary.
2300 USA, WWCR #1 Nashville TN: Freedom Now (live). Irwin Schiff, a self-professed leading authority on federal income tax.
2315 India, All India Radio: Program Preview.

Mondays

2300 Radio Mexico Intl: The Sounds of Mexico. New program - no information available.
2300 USA, WWCR #3 Nashville TN: Perspectives on America (live). Jeff Bennett of Republic Radio talks about preparedness issues.
2310 Australia: Correspondents' Report. See S 0010.
2330 USA, WEWN: Scandal of the Cross and Its Triumph. Bob and Penny Lord examine heresies through the ages.
2330 Australia, Radio: Earthbeat. Peter Jacklyn examines environmental issues of the region.

Tuesdays

2300 USA, WEWN Birmingham AL: Catholic History in the U.S.. Father Charles Conner surveys the growth and development of the Catholic Church in the United States.
2300 Radio Mexico Intl: DXperience. See S 0300.
2300 WWCR #3: On Common Ground (live). Wyndan Skye.
2310 Australia, Radio: Asia Pacific. See M 1110.
2328 USA, WEWN Birmingham AL: Pro-Life Issues. Dr. John Wilke, president of the International Right to Life.
2330 USA, WEWN Birmingham AL: Franciscan University Connection. Father Michael Scanlon and guests.
2330 Australia, Radio: Innovations. See S 0230.
2340 India, All India Radio: DX-ers Corner (2/4).
2350 USA, WEWN: Precious Blood Litany. See S 1500.

Wednesdays

2300 USA, WEWN Birmingham AL: Crisis in Culture. Father George Rutler examines a current issue.
2300 Radio Mexico: Regional Roots and Rhythms. S 1400.
2300 USA, WWCR #3 Nashville TN: Perspectives on America (live). See M 2300.
2310 Australia, Radio: Asia Pacific. See M 1110.
2328 USA, WEWN: Pro-Life Issues. See T 2328.
2330 USA, WEWN Birmingham AL: Franciscan University Connection. See T 2330.
2330 Australia, Radio: Arts Talk. Julie Copeland discusses arts and cultural ideas with a studio guest.
2350 USA, WEWN: Precious Blood Litany. See S 1500.

Thursdays

2300 USA, WEWN Birmingham AL: St. Francis - Mirror of Christ. Father Andrew Apostoli discusses St. Francis and his teachings.
2300 Radio Mexico Intl: Mirror of Mexico. See M 1500.
2300 USA, WWCR #3 Nashville TN: Perspectives on America (live). See M 2300.
2310 Australia, Radio: Asia Pacific. See M 1110.
2328 USA, WEWN: Pro-Life Issues. See T 2328.
2330 USA, WEWN Birmingham AL: Franciscan University Connection. See T 2330.
2330 Australia, Radio: Rural Reporter. See S 0030.
2350 USA, WEWN Birmingham AL: Precious Blood Litany. See S 1500.

Fridays

2300 USA, WEWN Birmingham AL: Our Lady in Scripture and Tradition. This series draws from the rich teachings found in scripture and tradition about Mary and her many apparitions (Fr. Andrew Apostoli).
2300 Radio Mexico: The Sounds of Mexico. See M 2300.
2300 USA, WWCR #3 Nashville TN: Perspectives on America (live). See M 2300.
2305 Australia, Radio: Book Reading. Serialized readings of the best Australian novels.
2320 Australia: Lingua Franca. Words and their stories.
2328 USA, WEWN: Pro-Life Issues. See T 2328.
2330 USA, WEWN Birmingham AL: Franciscan University Connection. See T 2330.
2330 Australia, Radio: In Conversation. See S 0530.
2350 USA, WEWN Birmingham AL: Precious Blood Litany. See S 1500.

Saturdays

2300 USA, WEWN: Moments of Truth. See S 1500.
2300 Australia, Radio: RA News. See S 0000.
2300 India, All India Radio: News and Commentary.
2300 Radio Mexico Intl: Eternally Mexico. See M 2300.
2300 USA, WWCR #1 Nashville TN: Weekly Presidential Radio Address (repeat). A repeat of Bill Clinton's weekly report to the nation.
2300 USA, WWCR #3 Nashville TN: The Hour of Courage. See M-F 0530.
2307 USA, WWCR #1 Nashville TN: The Republican Response. A noted Republican rebuts the President's weekly radio message.
2310 Australia, Radio: Book Reading. See F 2305.
2315 India, All India Radio: Program Preview.
2315 USA, WWCR #1 Nashville TN: The Blessed Word of Life. Perry L. Johnson preaches in Spanish and English from Washington, DC.
2320 Australia, Radio: Lingua Franca. See F 2320.
2328 USA, WEWN: Pro-Life Issues. See T 2328.
2330 USA, WEWN Birmingham AL: Franciscan University Connection. See T 2330.
2330 Australia, Radio: In Conversation. See S 0530.
2330 USA, WWCR #1 Nashville TN: The People's Gospel Hour. From Nova Scotia, Canada, Perry Rockwood interprets scripture for Christian life.
2350 USA, WEWN: Precious Blood Litany. See S 1500.

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ELF/VLF/LF Propagation Modes - Part 1

Most listeners assume that the propagation modes of radio waves are the same in all parts of the electromagnetic spectrum. This is an easy assumption to make but it is not totally correct. As we have seen in previous columns (March and June 1999), VHF (Very High Frequency) transmissions can become unorthodox under certain atmospheric or topographic conditions.

In the HF (High Frequency) and broadcast segments of the spectrum between VHF and ELF/VLF/LF (Extremely Low, Very Low, and Low Frequency), radio propagation follows the "normal" propagation modes that we are accustomed to: refraction from the ionosphere and reflection from the ground, and, in some instances, direct ground wave propagation. When we look at propagation in the lowest frequency part of the spectrum, we need to revise our thinking.

The US Navy transmitters located in Clam Lake, Wisconsin, and Republic, Michigan, operate on a frequency of 76 Hz – the lowest man-generated signal used for the conveyance of intelligent information. Apparently it takes three minutes to transmit a single letter – definitely not a high speed circuit! Both transmitters are keyed simultaneously and transmit the same message.

I consider this frequency to be part of the audio spectrum. The transmission mode of this frequency is unusual, and the transmissions from these two sites do not follow any normal radio wave behavior. A few years ago it was postulated that at such a low frequency the earth was resonating and acting as an echo chamber, carrying the "tune" around the world. This unusual transmission setup is for alerting deeply submerged submarines.

These are the only transmitter sites in the ELF range that use horizontal polarization: the horizontal antennas are about 30 miles long. There seems to be nobody else in that really low area of the radio spectrum. (By the way, I have not heard of any reported intercepts of these 76 Hz transmissions by amateurs.)

The next transmissions are to be found in the "basement" between 10 and 500 kHz. First we hear the only remaining worldwide radio navigation system: the Alpha system operated by Russia around 12 kHz. The American Omega system operating in the same frequency band was decommissioned in 1997. Alpha transmissions can easily be heard in North America if you are listening from a quiet location.

Then between 15 kHz and 150 kHz we can hear the following users: radio teletype stations operated by various armed forces, time standard stations such as WWVB, weather facsimile stations like CFH in Halifax, the pesky "rat tat tat" of the Loran "C" navigation system transmitting exactly on 100 kHz in many areas of the world, and some broadcasters. In ITU (International Telecommunications Union) Region 1, North Africa and Europe, the slice between 153 and 279 kHz band is allocated to broadcasting using very high power: 500 to 5000 kW.

Overlapping the ITU region 1 broadcasters slice, are North American beacons for air and marine navigation and the new DGPS stations (Differential Global Positioning System). In many areas of the USA, these use the old Ground Wave Emergency Network (GWEN) transmitters. All these stations operate in the 200 to 530 kHz part of the band.

And let's not forget the "lowfers," fully legal, low power radio beacons operated by experimenters between 160 to 190 kHz. This last group completes the snapshot of what services reside in radio's basement bands.

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 July to 14 August 1999 Flux=180 SSN=140

Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
SOUTH AMERICA	21	22	22	20	18	16	14	14	14	13	12	12	11	14	18	20	20	20	21	22	22	22	21	21
WESTERN EUROPE	12	11	11	10	10	10	11	11	10	*	*	*	*	*	14	16	17	16	15	16	16	15	14	13
EASTERN EUROPE (P)	*	11	12	13	14	15	14	*	*	*	*	*	*	*	14	15	16	17	17	17	16	14	14	*
MEDITERRANEAN	18	18	16	16	15	16	14	13	*	*	*	*	*	*	16	17	18	18	19	19	19	19	19	18
MIDDLE EAST (P)	14	14	16	18	18	17	15	*	*	*	*	*	*	13	15	16	17	18	18	17	17	16	15	14
CENTRAL AFRICA	19	20	18	18	15	15	14	13	*	*	*	*	*	*	17	19	20	21	21	22	21	21	20	19
SOUTH AFRICA	14	12	11	10	10	9	14	13	14	*	*	*	*	16	17	19	20	21	22	22	22	20	17	16
SOUTH EAST ASIA (P)	19	18	19	19	20	19	17	15	*	*	12	11	11	11	12	14	17	18	20	20	18	17	17	20
FAR EAST	18	18	18	18	19	18	16	14	12	11	11	10	10	10	11	13	14	14	14	14	16	18	19	19
AUSTRALIA	23	23	23	24	24	23	20	19	18	17	16	15	14	13	13	16	15	14	*	*	16	24	24	23
TO/FROM US MIDWEST																								
SOUTH AMERICA	19	20	18	16	14	13	13	13	12	11	11	10	13	16	18	18	18	19	19	20	19	19	19	19
WESTERN EUROPE	14	13	12	11	11	11	11	11	11	*	*	*	14	15	16	17	17	17	16	17	17	17	16	15
EASTERN EUROPE	12	11	11	12	13	13	12	*	*	*	*	*	*	14	15	16	16	17	16	16	16	15	13	12
MEDITERRANEAN	18	17	16	16	15	13	12	*	*	*	*	*	*	16	17	18	18	19	19	19	19	19	18	18
MIDDLE EAST (P)	14	14	15	17	15	14	13	*	*	*	*	*	14	16	17	18	19	19	19	18	17	16	16	15
CENTRAL AFRICA	22	21	19	17	15	14	15	14	*	*	*	*	16	18	19	21	21	22	22	21	21	19	19	21
SOUTH AFRICA	14	12	11	10	10	9	15	15	14	*	*	14	17	18	19	21	22	22	22	22	21	20	18	16
SOUTH EAST ASIA (P)	17	18	19	19	17	15	*	*	*	*	*	10	11	13	16	18	19	20	21	19	17	16	16	18
FAR EAST	17	18	19	19	18	16	14	12	11	11	10	10	10	12	14	15	15	14	14	15	16	17	18	18
AUSTRALIA	22	22	23	23	21	18	16	15	15	14	14	13	12	13	16	16	15	*	*	*	17	22	21	22
TO/FROM US EAST COAST																								
SOUTH AMERICA	17	16	15	14	13	13	12	12	11	10	10	11	15	16	17	16	17	17	18	18	18	17	18	18
WESTERN EUROPE	14	13	12	12	11	10	11	11	10	*	12	14	16	18	19	19	18	17	17	17	18	17	17	16
EASTERN EUROPE	12	11	11	11	13	13	12	*	*	*	*	14	16	17	17	18	18	19	19	18	17	16	14	13
MEDITERRANEAN	18	17	15	15	15	14	13	12	*	*	14	16	17	19	20	20	21	21	20	19	18	18	19	18
MIDDLE EAST (P)	15	14	15	16	15	14	*	*	*	*	*	16	17	18	19	19	19	19	19	19	18	17	16	15
CENTRAL AFRICA	22	21	19	18	16	14	16	14	13	14	18	22	22	23	23	23	23	24	23	23	22	22	23	24
SOUTH AFRICA	14	12	11	10	10	9	16	14	13	14	16	21	22	23	22	23	24	24	24	24	23	20	17	16
SOUTH EAST ASIA (P)	19	19	18	17	*	*	*	*	*	*	*	13	16	18	19	20	21	21	21	20	18	16	16	17
FAR EAST	20	20	20	19	16	14	13	12	11	11	11	12	14	16	16	16	15	15	15	15	16	18	19	19
AUSTRALIA	23	23	21	19	17	16	15	15	14	13	13	12	15	16	16	15	*	*	*	*	17	23	22	22

* *Unfavorable conditions: Search around the last listed frequency for activity.*

(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

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Traditional Life

Australia All Over
on *Radio Australia*,
UTC Saturdays 2010 to 0000

Last August, while in a place called Beerwah (a rural town about an hour northwest of Brisbane, Australia) visiting a wildlife park, I had occasion to have a very pleasant lunchtime conversation with the fellow running the canteen. He noticed my wearing a recently acquired *Radio Australia* tee shirt and mentioned that, during his years in the outback, being much too far away from civilization to hear the domestic channels, he was a regular listener to the station.

To feel a little like a native, I ordered some local fare – a meat pie and some damper. However, he suggested that, if I *really* wanted to learn about Australia and the Australians, I needed to listen to what he called "'Macca' on a Sunday Morning."

"Macca" is Ian McNamara and he hosts **Australia All Over**, which is the highest rated program on *ABC* domestic radio and is broadcast every Sunday morning on the network's local and regional stations. Fortunately for us, it is now relayed to an international audience via *Radio Australia* on shortwave and via the Internet.

I say "fortunately" because this is a truly unique program that deserves to be heard. The format is simple and straightforward. Aussies phone in and talk about their lives, their activities, their travels, their homes, their appreciation of their heritage, their concern that things are changing in ways that seem threatening to all they love. At the center of it all is "Macca," obviously a trusted friend to them all, who listens, commiserates and cajoles. The calls come from both within and outside Australia. They may not even be able to listen from where they are, but they know what time the program is on and when to call. It's almost as if they need to call – like a regular phone call home.

Australia All Over host Macca

Interspersed among the calls are traditional Australian songs, poems and stories – many of them with rural themes or about life in the outback – and regular segments like "Why I Live Where I Live." One time I look forward to on the program is the few minutes set aside for a very relaxing and rejuvenating short instrumental music piece complete with the soft sounds of nature and some backyard birds.

But the true beauty of this program is that, rather than just listening to almost academic-sounding descriptions of a culture and its traditions, one gets to really experience them in a much more personal and immersed way. The people that populate this program really love what is best about their culture and traditions. They are struggling to hold on to them in a world that, to many of them, is spinning so fast that it threatens to shake them off and render them meaningless.

This is a feeling with which we can all identify. One piece of advice, though – to have the full experience, you must take the time to listen to the whole program. Unlike so much of North American domestic commercial radio, ten minutes will not do it justice.

Fresh Air
on *CBC North Quebec Shortwave Service*,
UTC Sundays 1100 to 1300

The only other program I have heard that even comes close to doing what **Australia All Over** does, is **Fresh Air**. This, too, is a domestic program, in this case produced by *CBC Radio*, Toronto. The program's host, Jeff Goodes, presides over a show with a variety of Canadian music, stories and characters.

Whether one hears first person accounts of rural and farm life, the stories behind songs that listeners have requested, or folklore brought to life, the tone is always relaxed, friendly and appreciative. The program's web site says that "listening to the show is like sitting around the kitchen table with old friends." This is a most apt description.

Fresh Air host Tom Allen

Fresh Air has been a mainstay of *CBC Radio* in Ontario and Quebec for many years and has had several hosts that have carried on this particular tradition. To me, the most valued segments of the program are those given over to oral history – conversations with ordinary people who experienced things, both ordinary and extraordinary, first-hand in years past that give perspective and insight into aspects of present-day Canada. But whether through serious discussion, folk singing, or local recipes, **Fresh Air** does a fine service to its listeners by giving them keen insight into what it is that makes a Canadian a Canadian.

I have observed before that both Australia and Canada share some striking similarities in their immense surroundings and small and dispersed populations. Their public service broadcasting systems have historically been given the task of serving as catalysts for unity and national identity. Perhaps this explains their careful attention to subjects so often taken for granted here in the U.S.

The best shortwave frequency for **Australia All Over** in North America for some months now has been 21740 kHz from 2100 UTC. The entire program can also be heard in *RealAudio* over the Internet from **http://www.abc.net.au/ra**.

Fresh Air can be heard via shortwave on 9625 kHz or via the Internet from **http://www.radio.cbc.ca/cbcradio.ram**. If listening via the Internet, the program is three hours long starting at 1000 UTC, and two editions can be heard each weekend on both Saturdays and Sundays.

www.americanradiohistory.com

AUDIO SUBCARRIERS

By Robert Smathers, roberts@nmia.com

Audio frequencies in MHz. All satellite/transponder coordinates are C-band unless otherwise noted.
DS=Discrete Stereo

Classical Music		
SuperAudio–Classical Collections	G5, 21	6.30/6.48 (DS)
WCPE-FM (89.7) Raleigh/Durham/Chapel Hill, NC	G5, 7	5.58/6.12 (DS)
WFMT-FM (98.7) Chicago, IL–Fine Arts	G5, 7	6.30/6.48 (DS)
WQXR-FM (96.3) New York, NY	S4, 14	6.20/6.80 (DS)
Satellite Computer Services		
Superguide	G5, 7	5.48
Contemporary Music		
Radio Desjardins 1	T5, 14	6.80
Radio Desjardins 2	T5, 14	6.20
SuperAudio–*Light and Lively Rock*	G5, 21	5.96, 6.12 (DS)
WBES-FM (94.5) "Charleston's Soft Rock B94.5" Charleston, WV	GE1, 12	5.90
WPHZ-FM (96.9) Bremen, IN (South Bend market)	G6, 15	6.48, 7.30 (DS)
Country Music		
SuperAudio–*American Country Favorites*	G5, 21	5.04/7.74 (DS)
WSM-AM (650) Nashville, TN	C4, 24	7.38, 7.56
Easy Listening Music		
FCC mandated safe-harbor program audio-easy listening music	G3R, 9	6.80
	G5, 2	6.80
SuperAudio–*Soft Sounds*	G5, 21	5.58/5.76 (DS)
United Video–easy listening music	C4, 8	5.895 (N)
Foreign Language Programming		
Antenna Radio (Greek)	S4, 14	7.80
Arab Network of America radio network	GE2, 22	5.80
La Cadena CNN Radio Noticias (CNN Radio News in Spanish)	G5, 17	7.56
KAZN-AM (1300) Pasadena, CA–Radio Chinese (Chinese)	GE1, 22 (Ku-band)	6.20
Radio Sedaye Iran	GE3, 15	6.16
	GE1, 22 (Ku-band)	5.80
Radio Tropical	G7, 12	7.60
SRC AM Network	E2, 1	7.38
SRC FM Network	E2, 1	5.41/5.58 (DS)
WCRP-FM (88.1) Guyama, PR–religious (Spanish)	G6, 6	6.53
Jazz Music		
KLON-FM (88.1) Long Beach, CA., ID-*Jazz-88*	G5, 2	5.58/5.76 (DS)
Superaudio–*New Age of Jazz*	G5, 21	7.38/7.56 (DS)
News and Information Programming		
Broadcast News	E2, 1	5.78
Cable Radio Network	G5, 2	7.30 (N)
	G7,6	7.30
CNN Headline News	G5, 22	7.58
CNN Radio News	G5, 5	7.58
	G5,5	6.30
	G5, 22	6.30
USA Radio Network–news, talk and information	GE3, 13	5.01 , 5.20
WCBS-AM (880) New York, NY–news	G7, 19	7.38
WCCO-AM (830) Minneapolis, MN	GE3, 6	6.20
Religious Programming		
Ambassasor Inspirational Radio	GE3, 15	5.96, 6.48
Brother Staire Radio	G5, 6	6.48
KHCB-FM (105.7) Houston, TX	GE1,9	7.28
	C1, 9	7.38
KHVN-AM (1240) Charlotte, NC	G1R, 17	7.92
LDS Radio Network	C1, 6 5.58	
Radio 74 International	G3R, 23	5.58
Salem Radio Network	GE3, 17	5.01, 5.20
Trinity Broadcasting radio service	G5, 3	5.58/5.78 (DS)
WROL-AM (950) Boston, MA (occasional Spanish)	GE3, 3	6.20
Rock Music		
SuperAudio–*Classic Hits*-oldies	G5, 21	8.10/8.30 (DS)
SuperAudio–*Prime Demo*-mellow rock	G5, 21	5.22/5.40 (DS)
Shortwave Broadcasters via Satellite		
C-SPAN Audio 1: Various shortwave broadcasters	C3, 7	5.20
C-SPAN Audio 2: British Broadcasting Corp. (BBC)	C3, 7	5.41
Deutsche Welle	GE1, 22	7.38, 7.56, 7.74, 7.92
RAI Satelradio Italy (Italian)	G7, 14	7.38
WEWN–Worldwide Catholic Radio, Vandiver, AL	G1R, 11	5.40, 7.20, 7.38 (English), 5.58 (Spanish)
WHRA Africa/Middle East–World Harvest Radio, South Bend, IN	G6, 15	7.82
WHRI Americas–World Harvest Radio, South Bend, IN	G6, 15	7.46
WHRI Europe –World Harvest Radio, South Bend, IN	G6, 15	7.55
KWHR Asia–World Harvest Radio, South Bend, IN	G6, 15	7.64
KWHR South Pacific–World Harvest Radio, South Bend, IN	G6, 15	7.73
World Radio Network: WRN1 North America	G5, 6	6.80
World Radio Network: WRN2 North America	G5, 6	6.20 (Multi-lingual)
Speciality Formats		
Aries In Touch Reading Service	C4,10	7.87
Colorado Talking Book Network	C1,3	5.60
SuperAudio–Big Bands (Sun 0200-0600 UTC)	G5, 21	5.58/5.76 (DS)
Weather Channel–background music	C3, 13	7.78
Wisdom Radio Network	GE1, 12	7.10
	GE1, 12	7.92
Yesterday USA–nostalgia radio	G5, 7	6.80
Talk Programming		
American Freedom radio network	S4, 19	5.80
Amerinet Broadcasting	G1R, 17	5.58
Business Radio Network	C4, 10	8.06
For the People radio network	C1, 6	7.50
Friday Night Live (Fridays)	GE1, 12	5.70 (N)
Orbit 7 Radio Network	C1, 14	7.48
Radio America Network	C1, 2	5.58
Republic Radio International	G7, 14	7.70
Talk America Radio Network #1–talk programs	GE3, 9	6.80
Talk America Radio Network #2–talk programs	GE3, 9	5.41
Talk Radio Network (TRN)	C1, 14	5.80
Truth Radio	S4, 19	7.56
TVRO.NET (featuring Keith Lamonica)	S4, 16	5.80
United Broadcasting Network	C1, 2	7.50
	C1, 2	6.80
W0KIE Radio Network	GE1, 12	5.70 (N)
WWTN-FM (99.7) Manchester, TN–news and talk	G5, 18	7.38, 7.56
Variety Programming		
CBM-FM (88.5) Montreal, PQ Canada–variety/fine arts	E2, 1	6.12
KBVA-FM (106.5) Bella Vista, AR., ID-*Variety 106.5*	G6, 6	5.58/5.76 (DS)
WUSF-FM (89.7) Tampa-St. Petersburg, FL (Public Radio)	C4, 10	8.26

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AUDIO SUBCARRIERS / SCPC SERVICES

FM SQUARED (FM²) AUDIO GUIDE

GE-3 Transponder 13 (C-band)

Ambassador Inspirational Radio	4.47 and 4.65 MHz
Blank audio carriers	1.05 and 3.57 MHz
Focus on the Family	1.23 and 1.41 MHz
Information Radio Network	3.39 MHz
International Broadcasting Network (IBN)	4.83 MHz
USA Radio Network	4.30, 5.01 and 5.20 MHz
Various Religious Programs (no common ministry)	.33 and 3.75 MHz
VCY/America (channel 1)	.51 MHz
VCY/America (channel 2)	.78 MHz

GE-3 Transponder 17 (C-band)

Blank audio carriers	1.28 and 3.57 MHz
Data Transmission	.80, 1.14, 1.21, and 2.06 MHz
Focus on the Family	1.05 and 1.40 MHz
In-Touch Ministries	4.47 MHz
Salem Satellite Network	4.65, 4.84, 5.01, and 5.20 MHz
SRN News	.33 MHz
USA Radio Network	1.77 MHz

Galaxy 3R Transponder 3 (Ku-band)

Blank Audio Carriers	.15, 2.06, 3.14, and 3.25 MHz
Data transmissions	.06, .62, 2.93, 3.07 and 3.17 MHz
AP Network News	3.53 MHz
In-Store audio network ads (various companies)	.62, .71, .81, .91, .98, 1.05, 1.15, 1.26, 3.44, 3.62, 3.70, 3.80, 3.88, 3.97 and 4.20 MHz
Muzak Services	.27, .39, .51, 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, and 4.45 MHz

Galaxy 3R Transponder 16 (Ku-band)

Data transmissions	.64, 1.95, 2.18, 2.40, 2.52, 2.73, 2.82, 2.92, 3.20, 3.24, 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

Telstar 5 Transponder 28 (Ku-band)

Data Transmissions	.06, .15, .23, .30, .35, .38 .47, .57, .65, .71, .74, .76, .84, .89, .93, .96, 1.05, 1.12, and 1.22 MHz

Single Channel Per Carrier (SCPC) Services

By Robert Smathers
roberts@nmia.com

An SCPC transmitted signal is transmitted with its own carrier, thus eliminating the need for a video carrier to be present. Dozens of SCPC signals can be transmitted on a single transponder. In addition to a standard TVRO satellite system, an additional receiver is required to receive SCPC signals.

The frequency in the first column is the 1st IF (typical LNB frequency) and the second column frequency (in parentheses) is the 2nd IF (commercial receiver readout) for the SCPC listing. Both frequencies are in MHz.

GE-2 Transponder-Vertical 13 (C-band)

1178.70 (81.3)	NASA space shuttle audio

GE-3 Transponder-Horizontal 13 (C-band)

1207.90 (52.1)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1204.25 (55.75)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1201.50 (58.5)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1201.30 (58.7)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming

Galaxy 6 Transponder 1-Horizontal (C-band)

1443.80 (56.2)	Voice of Free China (International Shortwave Broacaster) Taipei, Taiwan
1443.60 (56.4)	KBLA-AM (1580) Santa Monica, CA–*Radio Korea*
1443.40 (56.6)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7)	WWRV-AM (1330) New York, NY–Spanish religious programming and music, ID–*Radio Vision Christiana de Internacional*
1436.50 (63.5)	West Virginia Metro News

Galaxy 6 Transponder 3-Horizontal (C-band)

1404.80 (55.2)	KOA-AM (850)/KTLK-AM (760) Denver, Colo–news and talk radio/Rockies MLB radio network
1404.60 (55.4)	WGN-AM (720) Chicago, IL–news and talk radio/Cubs MLB radio network
1404.40 (55.6)	Illinois News Network/WMVP-AM (1000) Chicago, IL–"ESPN Radio 1000"/White Sox MLB radio network

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SINGLE CHANNEL PER CARRIER (SCPC) SERVICES

1404.20 (55.8) Tribune Radio Networks/Wisconsin Radio Network
1402.90 (57.1) USA Radio Network
1402.70 (57.3) WLAC-AM (1510) Nashville, TN–news and talk/*Road Gang* trucker program (overnight)
1402.20 (57.8) NorthWest Ag News Network - Agriculture info for the Pacific Northwest
1402.00 (58.0) Occasional audio
1401.80 (58.2) For the People Radio Network with Chuck Harder – talk radio format
1401.50 (58.5) Agrinet Ag info/USA Radio Network
1399.00 (61.0) Sports Byline USA/Sports Byline Weekend
1398.80 (61.2) Talk Radio Network (TRN) – talk radio format
1398.50 (61.5) Occasional audio
1398.30 (61.7) WSB-AM (750) Atlanta, GA– news/talk/Atlanta Braves MLB radio network
1398.00 (62.0) Occasional audio
1397.80 (62.2) Occasional audio
1397.50 (62.5) Minnesota Talking Book Radio Network–reading service for the blind
1397.10 (62.9) Wisconsin Radio Network/Wisconsin college sports
1396.90 (63.1) KRLD-AM (1080), Dallas, Ft. Worth, TX – Texas State Network/Rangers MLB radio network
1396.70 (63.3) Radio America Network/Business News Network
1396.40 (63.4) Georgia News Network (GNN)–network news feeds
1396.00 (64.0) WHO-AM (1040) Des Moines, IA–talk radio/Iowa News Network
1395.80 (64.2) WTMJ-AM (620) Milwaukee, WI–talk radio/Brewers MLB radio network
1395.60 (64.4) WGST-AM/FM (640/105.7) Atlanta, GA ID *Planet Radio*–news and talk radio
1395.40 (64.6) Michigan News Network–network news feeds
1395.00 (65.0) Occasional audio
1394.70 (65.3) WJR-AM (760) Detroit, MI–news and talk radio/Michigan News Network/Tigers MLB radio network
1394.30 (65.7) Michigan News Network – network news feeds
1385.40 (74.6) WDUQ-FM (90.5) Pittsburgh, PA – Jazz format
1384.60 (75.4) WDUQ-FM (90.5) Pittsburgh, PA – Jazz format
1384.40 (75.6) KOA-AM (850)/KTLK-AM (760) Denver, CO–news and talk radio sports/Rockies MLB radio network
1384.20 (75.8) WSB-AM (750) Atlanta, GA – news/talk/Braves MLB radio network
1383.10 (76.9) KIRO-AM (710) Seattle, WA–news and talk radio/Mariners MLB radio network
1382.60 (77.4) Soldiers Radio Satellite (SRS) network–U.S. Army information and entertainment radio/Army college sports
1382.30 (77.7) Motor Racing Network (occasional audio) NASCAR racing
1382.00 (78.0) Occasional audio
1381.60 (78.4) KEX-AM (1190) Portland, OR–news and talk radio/Forest Dragons football radio network
1381.40 (78.6) Occasional audio
1381.20 (78.8) KJR-AM (950) Seattle, WA– sports talk radio
1377.10 (82.9) In-Touch–reading service
1376.00 (84.0) Kansas Audio Reader Network–reading service

Galaxy 6 Transponder 4-Vertical (C-band)

1376.00 (64.0) Data Transmissions

Galaxy 6 Transponder 6-Vertical (C-band)

1347.00 (53.0) WCRP-FM (88.1) Guayama, PR–Spanish language religious programming

Anik E2 Transponder 1-Horizontal (C-band)

1446.00 (54.0) Canadian Broadcasting Corporation (CBC) Radio–North (Quebec) service

Anik E2 Transponder 7-Horizontal (C-band)

1326.00 (54.0) Canadian Broadcasting Corporation (CBC) Radio–North (Eastern Arctic) service

Anik E2 Transponder 13-Horizontal (C-band)

1206.00 (54.0) Canadian Broadcasting Corporation (CBC) Radio–North (MacKenzie) service
1205.00 (54.5) Canadian Broadcasting Corporation (CBS) Radio–Occasional feeds/events

Anik E2 Transponder 17-Horizontal (C-band)

1126.00 (54.0) Canadian Broadcasting Corporation (CBC) Radio–North (Western Arctic) service
1125.50 (54.5) Canadian Broadcasting Corporation (CBC) Radio–North (Newfoundland and Labrador) service

Anik E2 Transponder 23-Horizontal (C-band)

1006.00 (54.0) Societe Radio-Canada (SRC) Radio–AM Network
1005.50 (54.5) Canadian Broadcasting Corporation (CBC) Radio-North (Yukon) service

Solidaridad 1 Transponder 1-Vertical (C-band)

1447.90 (52.1) Antenna Radio Noticias/Dodgers Radio Network (Spanish language)
1447.60 (52.4) Antenna Radio Noticias
1447.20 (52.8) La Grande Cadena Raza
1447.00 (53.0) XEMZA-AM 560, Manzanillo, Mexico

Anik E1 Transponder 21-Horizontal (C-band)

1036.70 (63.3) In-store music
1037.00 (63.0) In-store music
1037.50 (62.5) In-store music

SBS5 Transponder 2-Horizontal (Ku-band)

1013.60 (80.4) Wal-Mart in-store network
1013.20 (80.8) Wal-Mart in-store network
1012.80 (81.2) Sam's Wholesale Club in-store network
1004.50 (89.5) Wal-Mart in-store network
1004.00 (90.0) Wal-Mart in-store network
1003.60 (90.4) Sam's Wholesale Club in-store network
1003.20 (90.8) Wal-Mart in-store network

RCA C5 Transponder 3-Vertical (C-band)

1404.60 (55.4) Wyoming News Network–network news feeds
1400.60 (59.4) Learfield Communications
1400.40 (59.6) Learfield Communications/MissouriNet
1400.20 (59.8) Occasional audio
1400.00 (60.0) Learfield Communications
1396.60 (63.4) Kansas Information Network/Kansas Agnet–network news feeds
1396.40 (63.6) Liberty Works Radio Network – talk radio
1396.20 (63.8) MissouriNet/St Louis Cardinals MLB radio network
1396.10 (63.9) MissouriNet
1395.90 (64.1) Western Montana Radio Network/Red River Farm Network
1395.70 (64.3) MissouriNet/Kansas City Royals MLB radio network
1386.40 (73.6) Learfield Communications
1386.20 (73.8) Radio Iowa/Iowa college sports
1384.60 (75.4) Capitol Radio Network
1384.00 (76.0) Occasional audio/ABC Direction Network–network news feeds
1383.80 (76.2) Occasional Audio
1383.40 (76.6) Capitol Radio Network
1382.90 (77.1) MissouriNet
1382.50 (77.5) Virginia News Network–network news feeds/
1382.10 (77.9) Learfield Communications/MissouriNet

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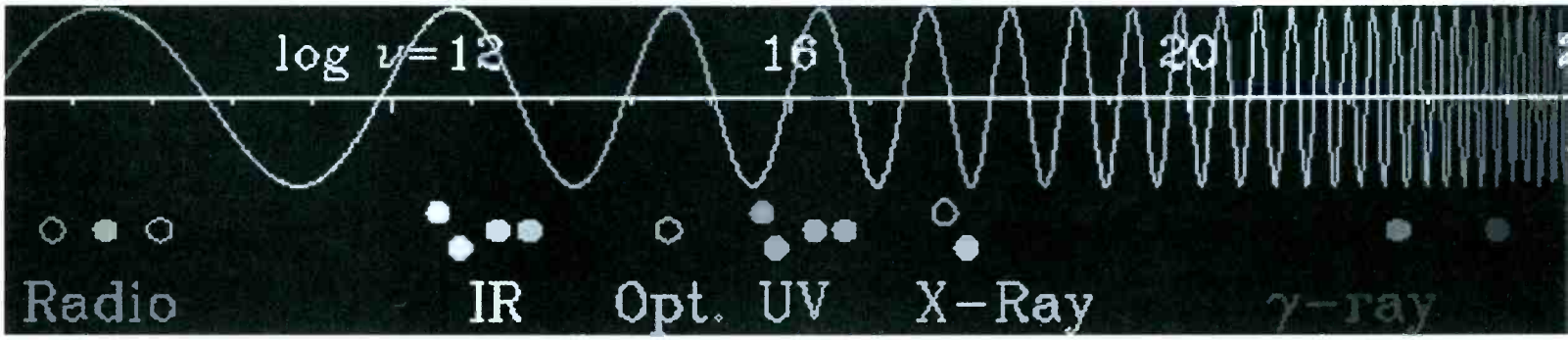

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Touring the Atlantic Satellites

As you look through the C-band satellite TV guides on the newsstand you'll notice that they show the satellite belt ending abruptly at Spacenet 3 (83° W) or SBS-6 (74° W), the easternmost Ku-band satellite. If you had a long enough actuator arm and ran your dish over to that area of the Clarke Belt to scan the available channels you might be ready to confirm that there is indeed nothing there!

Until a few years ago there were quite a number of active analog C-band channels to be seen in that region of the sky. The fact that they were lower powered, circularly polarized, Intelsat satellites with little to be seen, made them more or less forgotten. But, times change and a new generation of much more versatile Intelsat birds have replaced the antiques. That, and the introduction of digital MPEGII technology, has made these satellites the most interesting viewing in our sky.

What You'll See–What You Won't

There are, in fact, more than 20 satellites which dot the Clarke Belt between SBS-6 and the horizon as seen from the East Coast. But, before you get too excited, there are a couple of caveats. Many of these satellites have transponders which are spot-beamed into Central or South America, and therefore are not viewable from the States. Some may have few or no active transponders in use. In addition, the bulk of the digital channels are also encrypted with no provision for out-of-country viewers to access the programming. That said, there are several which are so packed with viewable channels that it's worth investigating.

The closest satellite with viewable programming is **Panamsat 5** at 58° W. While there are occasionally analog NTSC (American) and PAL (European) transmissions found on a few channels on this satellite, the bulk of the transmissions are in the Digital Video Broadcast (DVB) MPEGII standard. There is also some programming in DigicipherII but they are encrypted.

Of those in MPEGII, 36 are unencrypted and easily receivable by any of the available "Free-to-Air" DVB receivers such as I've reviewed in this column (see April '99 and next month's *Launching Pad*). Panamsat 5 has linearly polarized transponders (just as the U.S. birds have) and considerable output power which makes it very easy to receive on small C-band dishes.

The next most populated satellite is **Intelsat 806** at 40.5° W. The big difference with this satellite is that its transponders are circularly polarized. That presents some initial problems, but nothing we can't cheaply overcome. Circularly polarized signals can be received with a standard American-style linear feed horn, but it's not very efficient and the result is signal loss. You could buy an expensive linear/circular feed horn capable of receiving both types of polarizations. That works the best, but expect to pay around $300 for such a feed horn.

The next best, and far cheaper solution is to install a block of Teflon® in the throat of the feed horn, which makes the signal appear to be linear to the feed horn. This block is available from Skyvision whose ad appears in each issue of *MT*. After playing with the block and getting it set just right, you'll be able to receive both left and right hand circular polarization. The key here is to be patient.

There are more than 20 Free-to-Air DVB channels on Intelsat 806, not including the dozen or more channels of WorldNet, WorldNet Europe, and WorldNet Latin America and Africa. There are also some 19 audio services which makes it even more interesting.

One very helpful point in receiving this satellite is that it has one active, full-time analog channel, ATC (Argentina Televisora Color), which also features Radio Nacional Argentina as an audio subcarrier. While ATC is transmitted in the PAL format, the audio is clear, which makes it easy to zero in on this satellite.

The third most populated slot over the Atlantic is occupied by the combined Ku-

WorldView from across the Atlantic

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band birds known as **Hispasat 1A/1B** at 30° W. These are two co-located, Ku-band-only satellites which feature channels from Spain exclusively and are spot beamed mostly back to Spain, except for two transponders which are beamed to the Americas. Included here are seven video channels and six audio channels. Even if you don't know a word of Spanish you'll appreciate some of the great music found here.

There are several other satellites of note in between those detailed above, but, while some appear to be loaded with programming, their spot beams make them not viewable from the U.S. However, there are times when programming pops up from apparently nowhere and then just as quickly disappears. For instance, **Intelsat 805** at 55.5° W ordinarily has only two active transponders, but it recently hosted a bundle of DVB channels including Muslim TV, Fox Kids Russia, and BET on Jazz International. They've since disappeared.

Panamsat 3R at 43° W has over 90 channels of programming listed, but virtually all of it isn't viewable because it's either encrypted or spot beamed elsewhere. The same holds true for **Orion 1** at 37.5° W or **Intelsat 605** at 27.5° W.

How to Tune In

There are a number of obstacles to receiving these satellites. First, you'll need a clear view to the south and east. Just as with our own segment of the Clarke Belt, the closer to the horizon you need to see, the harder it often becomes.

Second, you'll need an extra long actuator arm to be able to steer your dish that far east. I've found that a 36-inch arm works well for as far east as Intelsat K at 21.5° W.

Third, it will be helpful to have the above-mentioned circular polarity capability. And, finally, you'll have to be very patient, because finding these satellites, when they have no analog programming on them, can be like picking lottery numbers.

Assuming you have a clear view to the south and east, the way to get around the actuator limitations is to do a little experimenting. You can check these satellites out without investing in any more expensive equipment by running your dish all the way to the westernmost satellite. Now, with the help of a friend, go out to the dish and pull the bolt out of the end of the arm that attaches to the dish (your friend is there to hold the dish; use one friend if you have an aluminum mesh dish and two or three if you have a fiberglass dish). Now, while you hold the actuator, have your friend walk the dish on its pivots until it's pointing south. Place the end of the actuator arm back where it connects to the dish and put the bolt back on.

Your receiver thinks it's still looking at Satcom C5 at 139°W and says so on its display, but it's actually looking at Spacenet 3 at 83° W (make sure it is). Now, it's possible to do some calculations. If you press the actuator motor button on your remote once, the dish will move east or west and one count will show on your screen.

Now find how many counts you need to move west until you get to GE2 at 85° W. That number is how many counts it takes to cover 2 degrees. With that figure you can sit down with a calculator and determine how many counts it will take to get to Panamsat 5, Intelsat 806, etc. This is the easiest way to find a satellite without the aid of a spectrum analyzer or a signal meter.

Remember, to receive any DVB MPEGII digital programming on any of these satellites you'll need to use a Free-to-Air DVB MPEGII receiver. Keep in mind, too, that these receivers do not have the capability to drive a dish and must be used in loop-through capacity with a 950-1450 MHz splitter from the LNB. Check out the partial list of DVB channels which you will be able to see and audio services you'll hear on the accompanying chart.

DVB MPEGII ON PANAMSAT 5 (58° W)

Video Services
EWTN Latin America (religious)
CCTV 4 (China)
CCTV 3 (China)
CCTV 9 (China)
APTN Newswire
BBC World (England)
Deutsche Welle TV (Germany)
NHK World TV (Japan)
Enlace (religious Costa Rica)
Caracol (Colombia)
Many other NTSC feeds and Arabic programming in PAL format.

Audio Services
EWTN Catholic Radio
WACC-AM (Miami)
Deutsche Welle 1 (Germany)
Deutsche Welle 2
Deutsche Welle 7
Al Ddkir Channel (Arabic)
RAI International (Italy)

INTELSAT 806 (40.5° W)

DVB MPEGII
Infinito (Argentina)
RAI International (Italy)
Solo Tango (Argentina)
Cadena Sur (Peru)
RFO 1 (France)
Syria Satellite Channel (Syria)
MTA International (Muslim)
Fashion TV (Paris)
MCM Europe (Paris)
Video Italia (Italy PAL)
Globovision (Venezuela)
Marte TV (Venezuela)
Red Uno De Bolivia (Bolivia)
Bolivision (Bolivia)
Sitel (Bolivia)
Claravision (Mexico Religious)
TeleCaribe
TeleAntioquia
RCN-Canal 4 (Columbia)
WorldNet Europe (USIA)
WorldNet Latin America (USIA)
WorldNet Africa (USIA)

Audio Services on Intelsat 806
Radio La Red (Argentina)
Radio Panda (Argentina)
Radio Rock & Pop (Argentina)
RAI International (Italy)
FM News (Argentina)
Radio10 (Argentina)
RPP-Radioprgogrammas del Peru (Peru)
WQBA (Miami)
France International (France)
Syrian Radio (Syria)
Radio Italia (Italy)
Radio Dimensione Suono (Italy)
Radio Capital (Venezuela)
Radio Panamericana (Bolivia)
Radio Cadena Nacional (Bolivia)
Radio Fides (La Paz)
La Mega (Bogota, Colombia)
VOA Music Mix (USIA)
VOA Latin America (USIA)
VOA News Now (USIA)

HISPASAT 1A/1B (ALL FROM SPAIN AT 30° W)

Video Services
TVE Internacional
Canal 24 Horas
Hispavision
Mundo Musical
TVE Internacional America
TVC Internacional
ETB Sat America

Audio Services on Hispasat 1A/1B
RNE Radio Clasica
RNE Radio 3
REE Radio Exterior de Espana
RNE Radio 5 Todo Noticias
RNE Radio 1
Catalunya Radio

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Special Summer Listening

I have always maintained that radio monitoring people have more fun than everyone else. During the summer months, many interesting and exciting events go on all around this great country of ours. While we will no doubt spend some time enjoying these events with "regular" folks, we can tap into a whole different level of fun by monitoring some of the behind the scenes activities associated with all this summer fun.

If you are like many scanner users, you probably have your memories packed with a fairly familiar group of frequencies such as your local police, fire and emergency medical service organizations. If you remember back through previous columns, Old Uncle Skip recommends that you always keep at least 10% of your available memory clear for chasing down unusual stuff when it presents itself. Summertime activities are filled with scanning opportunities you may not have considered. Just tracking a few of these resources will put that 10% to very good use.

Before we get on to the purely fun stuff, tragically, summer brings about a number of emergencies that can result in some exciting listening. In my part of the country, summer means *forest fires*. I add a whole bank of Forest Fire Service frequencies into my scanner during this part of the year. Things are probably a bit different in your part of the world, but consider hurricanes, tornadoes and floods and load your scanner accordingly.

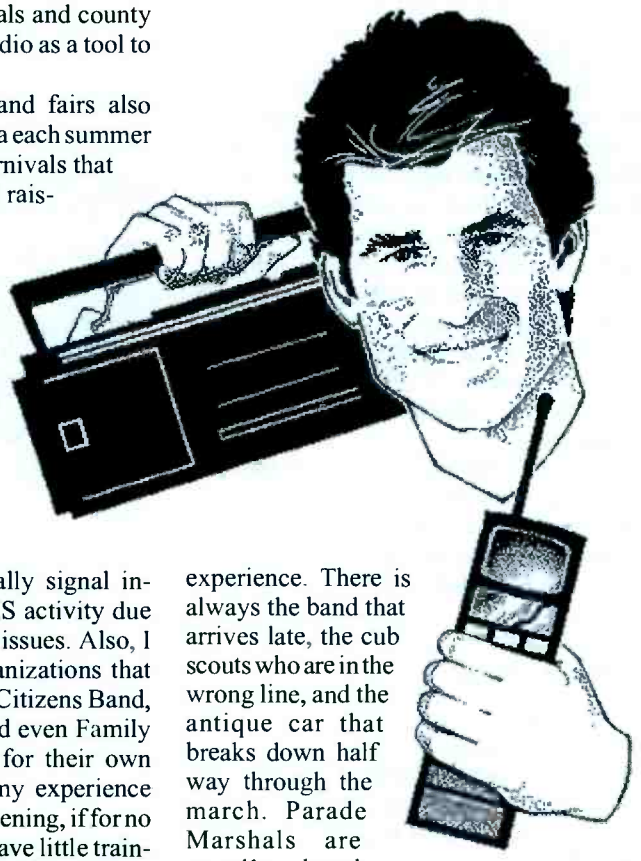
Also, if you live near water, summer means an increased amount of personal watercraft use. This will also involve more activity by Coast Guard and maritime law enforcement in your area. If you can search the maritime frequencies you will hear some interesting stuff during the summer months.

But enough of the emergency event scanning; we talked about having some fun here, and so let's move on to some less intense monitoring opportunities.

Hay, ho, come to the fair!

One of the easiest ways to find new things to listen to is to think back to what was fun in the summer when you were young. For example, every summer the circus comes to town! Like most modern businesses, circuses, carnivals and county fairs have come to rely on radio as a tool to get the job done.

Circuses and carnivals and fairs also benefit from radio. In my area each summer there are no less than ten carnivals that come out in support of fund raising activities for churches and civic associations. A little frequency hunting will turn up some very different and enjoyable listening (though hearing the Carneys talking about the female customers may lead you to lock up your daughters whenever the carnival is in town).



Don't forget that circus and carnival activities usually signal increased police, fire and EMS activity due to traffic and crowd control issues. Also, I have seen some of the organizations that bring in the carnivals using Citizens Band, Itinerant Business Radio and even Family Radio Service frequencies for their own command and control. In my experience this makes for interesting listening, if for no other reason than the users have little training in radio discipline. Listening to these folks try to convey their wants and needs will give you new appreciation for folks who volunteer for such duty.

All the major amusement parks in the country make heavy use of radio in support of their operations. The larger organizations, such as Disney, have even gone over to trunked radio systems to manage their extensive radio operations. Officially, most of these parks frown on people bringing scanners into their parks, but there is nothing to stop you from monitoring any non-ECPA protected communications from outside of the park.

I happen to live close enough to a major amusement park that I can monitor their daily operations at my leisure. When we go camping, we may stay at a site near an amusement park (I love roller coasters) and I can then listen to park operations without getting park security all excited.

Parades are always fun, especially if you are a radio monitor. Listening in on the process of "forming up" a parade is a real experience. There is always the band that arrives late, the cub scouts who are in the wrong line, and the antique car that breaks down half way through the march. Parade Marshals are usually local public officials utilizing township frequencies that you already have tracked down, so listening in is a breeze. In most parts of the country, the parade's final units are often area fire departments. I always find the ongoing chatter on the engine-to-engine channels interesting. You get a feel for what it's like to be in the parade instead of just watching it.

The sport of scanning

While football fans will probably disagree, summertime seems to bring a lot of people outside to attend sporting events of all types. Almost any sport, from little league through professional, may be served by radio support. In some cases radio has even revolutionized the sporting event itself. Back when Uncle Skip was a pup you could attend an auto racing event and see guys holding up big blackboards to tell the driver important information about what was going on.

Today's modern auto racing benefits

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from two way radio communication between the driver and his or her crew. The pit crew can give the driver information and strategy while the driver can advise the team of the condition of the car and the track. This communication can be picked right out of the sky by anyone with a scanner. Now you can find out what the race leader really thinks about the driver who just passed and took the lead. Most of the major racing leagues such as NASCAR, CART, IRL and such have lists of frequencies for their various drivers that can be found in any number of places on the World Wide Web.

While few other sports have taken direct radio communication with the athletes to the degree that motorsports has, you will find radio being used for dozens of reasons at most other sporting events. Also, any sporting event is a gathering of people that requires special care and consideration. Stadium support personnel and security can also be fun to monitor with one ear while enjoying the game with the other. If the event is covered by local or national TV and radio, be sure to try to listen in on the feed frequencies for even more fun.

Summer also brings more than a few airshows around. If any of the major performers are going to appear, such as the Golden Knights, Thunderbirds, Blue Angels or Snow Birds, you will want to search the World Wide Web for the latest operations frequencies for these acts. When in doubt, any good scanner that covers air and military air frequencies can just be put on wide search and you should find plenty of great listening. Regardless of the airshow you are attending, 123.400 and 123.450 MHz are common frequencies used for control at most airshows. These frequencies are usually buzzing because of the many planes and scheduled flybys that must occur with some semblance of order and decorum.

The summer brings out all manner of walking, running and bicycling events that cover extended distances. No matter if it is the local churches' 5 mile walkathon or a professionally organized 150 mile bike ride, you can find radio in use for control, organization and safety. In many cases the radio support for such events is provided by local amateur radio clubs. Monitoring the area 2 meter repeater frequencies should point you in the right direction for this sort of listening fun.

Monitoring special events on HF

Speaking of amateur radio, it is high time I talked about some light listening for people with shortwave receivers. A great place to have fun listening throughout the summer is the lower 25 kHz of the General class phone subbands 3850-3875 kHz LSB, 7225-7250 kHz LSB, 14225-14250 kHz USB, 21300-21325 kHz USB and the Novice/Technician class phone subband 28300-28500 kHz USB.

While all the ham bands can be fun to tune anytime, weekends on these frequencies will put you in touch with "Special Events" stations that operate to commemorate all manner of events past and present. Hams will get together and transmit from historic locations, state and county fairs, places with unusual names, and on local or national holidays just for the fun of talking to other hams. All of these stations are likely to welcome SWL (shortwave listener) verification queries and most offer special certificates in commemoration of the events.

For some folks, doing something special with the amateur radio hobby is their vacation. This is the time of year to keep your ears open for "DXpeditions" to all parts of the globe. You see, some parts of the world do not have regular amateur radio operation. Dedicated hams will get together and travel to these locations to provide the rest of the amateur radio community with these rare contacts. Many of these places have no other form of radio service either so SWL monitoring can be a blast, too. If you also have a scanner, monitoring the local 2 meter repeaters will turn up hams talking about rare DX activity.

Or maybe you'll run across somebody like Good Old Uncle Skip. When I go on vacation or weekend camping these days, I bring along my Small Wonder Labs SW40+ QRP transceiver. I throw a wire up in a tree and make contacts on or near 7040 kHz CW. If you hear me send a report. I always QSL 100%.

Random entertainment

Okay, we have discussed a whole list of unusual listening opportunities guaranteed to jog your log book. But even these activities, while fun, can be too much work for a dedicated vacation loafer. Does this mean you should abandon the radio monitoring hobby totally for the duration of your vacation? Perish the thought, old son! Allow Old Uncle Skip to put forth what some would see as a preposterous notion . . .

What is wrong with just turning on the receiver and listening at random?! No log books, no tape recorders, no reference materials, no cares, no worries! Pure listening pleasure unbound by the ties that bind us to the monitoring hobby. Your vacation can be a great time to retrogress to those first days when you started to play radio. We all really enjoyed that time when we didn't really know what we were doing. Remember how much fun you had before you got organized? Not only might you rediscover the hidden joys of listening, you might take the opportunity to show a new person how much fun monitoring can be.

Spin the dial, listen to some music, tune in to a foreign language just to hear the rhythm of the speech patterns. Listen to the programming content instead of worrying about logging and QSLing. Fall asleep to a fading broadcast from who knows (or cares) where.

Vacations are meant to be breaks from our labors. That includes our labors of love such as radio monitoring. Have fun folks. Don't forget the sunscreen!

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VIEW FROM ABOVE

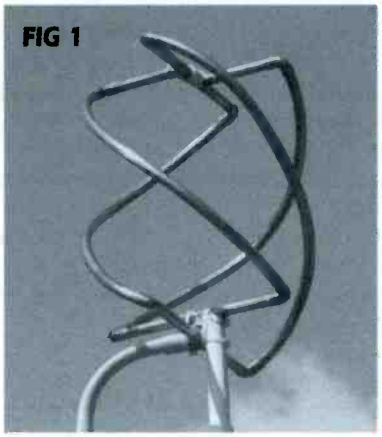
WATCHING THE WEATHER SATELLITES

Lawrence Harris
Lawrence@itchycoo-park.freeserve.co.uk
http://www.itchycoo-park.freeserve.co.uk

Beauty and the Beast

Beauty is definitely in the eye of the beholder – especially with antennas! One of my neighbors saw me fixing a new antenna to the top of my "easy access" mast, for a few days of testing reception capabilities for the polar weather satellites. She commented that it "seemed wonderful that I could receive signals from satellites using a collection of old pipes!" Her husband added (with a big grin) that it was illegal for householders to brew their own whisky in Britain, so why was I hanging the plumbing where it could be seen by everyone?

There are several types of antenna used for receiving VHF signals from weather satellites. Popular types include the crossed-dipole and turnstile. The quadrifilar helix antenna (QFH) is gaining considerable popularity, partly perhaps as a result of discussions on the Internet "wxsat" forum where enthusiasts discuss all aspects of the subject.



Quadrifilar helix antenna

For further information on QFH antennas, visit:
http://www.pilotltd.u-net.com/qha.htm
To join the Internet forum mailing list, send an e-mail to: *wxsat-request@met.fsu.edu*

Beastly upgrades!

As a writer on weather satellite matters I do spend a quite unreasonable amount of time not only monitoring weather satellites but on testing new software. Equipment suppliers occasionally give me early access to updated software releases, necessitating more than one computer. On some occasions I have upgraded a computer by motherboard and processor replacement, and sometimes I've simply bought a new machine. The current total is five – ranging from a 386 (used by my wife for word processing, and which she absolutely refuses to allow to be "upgraded") up to my latest Pentium Pro 3.

When I took delivery of a PP3 in late March, this represented a considerable upgrade from my 200 MHz Cyrix clone. The latter had produced image synchronization problems that I suspect resulted from the (non-Intel) processor's architecture.

The new computer, however, proved a disaster, crashing several times a day, even while decoding automatic picture transmission (APT). The supplier replaced it after a week of tests, but the replacement behaved similarly. A further replacement simply would not work, so a full refund was agreed. Another PP3 computer was bought from a different national supplier and has proved faultless.

The same software has therefore performed differently on three separate, "compatible" computers, leading me to the conclusion that one has to be very careful when judging the cause of software "problems."

Operational Weather Satellites

Meteor 3-5 resumed APT transmissions on May 12 after an absence of some weeks. I was surprised when it failed to return to operations after its orbital plane completed passage through the terminator. Resurs-01 N4 has continued to relay automatic picture transmission (APT) despite the failure of its X-band transmitters (that carry higher resolution data). An occasional transmission from Sich-1 and Okean-4 (also known as 1-7) has been heard over Europe, though I have yet to acquire any image lasting longer than a couple of minutes. Meanwhile NOAAs 12, 14 and 15 have continued to provide reliable multispectral imagery on APT and HRPT (high resolution picture transmission) frequencies.

The last few weeks have seen three new imaging satellites launched – the latest just a few hours ago as I write. The launch of the next GOES weather satellite was postponed for a few days from May 15, but by publication date should be undergoing on-orbit tests prior to its status as a standby US satellite.

New Chinese Weather Satellite

News came in just before deadlines, of the launch of the new Chinese polar orbiting weather satellite Feng Yun 1-C. The China Meteorological Administration (CMA) had advised the World Meteorological Organization (WMO) that China was planning to launch FY-1C on a CZ-4B vehicle from Taiyuan during the period 10-15 May 1999.

The first satellites in the series – FY-1 A and FY-1 B – were considered experimental; launched respectively in 1988 and 1990, these polar orbiting satellites carried both HRPT and APT systems. Transmissions were NOAA-compatible, but the spacecraft failed within a short period. China decided to continue the series and launch FY-1 C, and D, both based on the same design.

Besides improving reliability and extending the life of the satellite, the number of channels within the scan radiometer is increased from five to ten. Sensors include the Multi-channel Visible and IR Scan Radiometer (MVISR), a 10 channel sensor with four visible, three near IR, one short IR and two long IR sensors, with a nadir (ground immediately below) resolution of 1.1 km. Unfortunately, there will be no APT from FY-1C.

New Landsat launched

Landsat-7 was launched on Thursday, April 15, 1999 from Vandenberg Air Force Base, California. Launch went flawlessly and the satellite was placed into a preliminary orbit. Telemetry was received; the satellite separated from the vehicle; and the solar array was then deployed.

Mission Operations Center and the Earth Resources Observation System (EROS) Data Center are involved in the satellite operations. The first engineering image was successfully acquired and processed on Sunday, April 18. Over the following 60 days, Landsat-7 will be maneuvered to final orbit at an altitude of 705 km. During this period of orbit raising, an under-fly of Landsat-5 will occur, allowing the collection of coincident data from both satellites. Landsat-7's final orbit will place it eight days off from Landsat-5.

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The spacecraft will be continuously nadir pointing with an equator crossing of 10:00 a.m. mean local time. It will have a repeat cycle of 16 days, completing 14.5 orbits per day. The primary ground site for satellite operation and scene collection is the Landsat Ground Station (LGS), located at the Earth Resources System (EROS) Data Center (EDC) in Sioux Falls, South Dakota.

Information about future events and the *Landsat 7 Quarterly Newsletter* are available, together with sample images and documentation from the Landsat site:
http://landsat7.gsfc.nasa.gov/intro/Intro.htm

FIG 2: *Fremont, California, courtesy NASA and EROS Data Center.*

New Indian imaging satellite

India has a fairly long record of activity in the field of satellite operations: its first – Aryabhata – was launched on April 19, 1975, by a Russian vehicle. Their first remote sensing satellite – Bhaskara-1 – was launched on June 7, 1979, also by a Russian launch vehicle. Bhaskara-1 carried television and microwave cameras, and was followed later by Bhaskara-2. According to my logbook for that period, I picked up signals from Aryabhata, presumably a beacon transponder, in the 136 MHz band.

Their first operational multi-purpose communications and meteorology satellite was Insat-1A, procured from the USA and launched by a US Delta launch vehicle on April 10, 1982. The Insats have capabilities for telecommunications, television, search and rescue, meteorology, and radio networking. Further Insats have been launched in recent years, the latest – Insat-2E – on April 3 by an Ariane rocket.

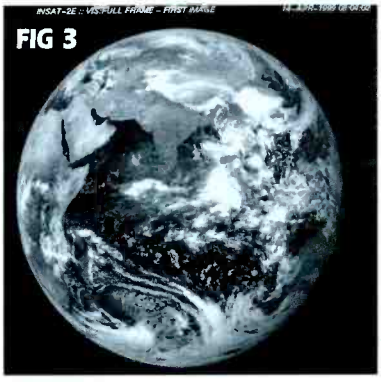
First pictures from Insat-2E

Having completed the orbit-raising and deployment operations, payload related activities on Insat-2E were started on April 14 with the switching on of the Very High Resolution Radiometer (VHRR), comparable to those on NOAA weather satellites. The instrument consists of a detector and scan mechanism, and incorporates a passive cooler for infrared imaging. It operates in three spectral bands, one in the visible spectrum having a ground resolution of 2 km.

Meteorological data from the VHRR is transmitted on a separate carrier and this was also activated on April 14. After confirming its nominal performance, the processing electronics were checked. The payload can image the earth as a full disc, or zoom to any selectable region. Around noon, the first imagery in the visible spectral band for the full disc was commanded "on" from Insat Master Control Facility (MCF), Hassan. "Quick look" data showed good overall performance and a detailed qualitative evaluation of the instrument was later carried out.

My thanks to the Indian Space Research Organization, Bangalore, India, for providing this information and the first picture:

For further details of the Indian Space Research Organization's programs check out the web sites:
http://www.isro.org/
http://www.isro.org/space_services.htm



VHRR-2

Correspondence from India

I am always pleased to receive correspondence from far-away countries where copies of *Monitoring Times* and *Short Wave Magazine* (a UK publication) evidently circulate. Coinciding with this feature on Insat-2E, I received a picture taken by Alastair Campbell who currently lives in Jamnagar in the Northeast of India, and receives APT. Alastair was posted there following a cyclone, and has impressed the locals with his satellite operations; they foresee it as an aid to predicting future occurrences.

"Simple the system may be," says Alastair, "but as a back up to BBC World Weather on the TV it has shown the approach of severe thunderstorms to this locality very accurately and with good detail."

His images are received with a crossed-dipole and reflector feeding an Icom PCR-1000 receiver. The signal is processed with Wxsat version 2.4 running on a Toshiba Laptop PC.

FIG 4: *Meteor 3-5 over India in late February*

FREQUENCIES

NOAA-14 transmits APT on 137.62 MHz
NOAA-12 and -15 transmit APT on 137.50 MHz
NOAAs transmit beacon data on 137.77 or 136.77 MHz
Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
Resurs 1-4 transmits APT on 137.85 MHz
Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz
GOES-8 and GOES-10 use 1691 MHz for WEFAX

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Larry Van Horn, N5FPW
email: larry@grove-ent.com

USS Enterprise (CVN-65)

One of my favorite navy aircraft carriers in active service is the Big "E" – *USS Enterprise* (CVN-65). As a young seaman, I had a chance to follow the Big "E" around during an overseas deployment many years ago, and it was my first brush with naval aviation. At presstime, the *Enterprise* is on its way back from another deployment to its United States homeport, Norfolk, Virginia, after a lengthy cruise with the second fleet in the Arabian Gulf.

Enterprise was commissioned on November 25, 1961, and was the first nuclear powered aircraft carrier built, as well as the longest warship ever. She was built with a distinctive square island supporting phased-array radars and a complex electronic warfare system.

She participated in the blockade of Cuba in 1961, and circled the globe in 1963 with *USS Long Beach* and *USS Bainbridge*. She was the first nuclear ship to enter combat when her aircraft struck targets in Vietnam, and she assisted in the evacuation of Saigon at the end of the Vietnam conflict.

The years 1979 to 1982 were spent at Puget Sound Naval Shipyard receiving a reconstructed island and numerous improvements. During 1990-1995 she was reconstructed at Newport News, being updated for service through 2015. Upon her retirement, she will be 54 years old.

One of our regular *Milcom* readers recently passed on the following aircraft UHF radio presets to help *MT* readers monitor the action on the Big "E" when she is doing air operations.

Ship: *USS Enterprise* (CVN-65)
Homeport: Norfolk, Virginia
International Callsign: NIQM
US Navy MARS Callsign: NNN0COG
Tactical Callsign: Climax
Website: **http://www.navy.mil/homepages/cvn65/**

CARRIER AIRWING 3 UHF RADIO PRESETS

Chnl No.	Frequency (MHz)	Use
1	257.45	Tower (Climax) Land/Launch
2	380.65	Departure Control
3	236.45	Strike (Tac Eagle)
4	240.65	Red Crown (FADIZ) Fleet Air Defense Inter Zone
5	289.80	SCC C&R
6	360.95	C-2W C-R
7	286.10	Strike A
8	337.95	Strike B
9	355.90	Fighter Control A
10	271.10	Fighter Control B
11	342.85	Fighter Control C
12	346.15	Fighter Control D
13	327.25	Eagle Control
14	277.80	Fleet Tactical Warning
15	362.75	Approach A
16	385.35	Marshall
17	337.30	Approach B
18	256.50	CCA Overload
19	383.50	Carrier Airwing 3 Common
20	346.90	Squadron Common

The *Enterprise* uses a GE UHF trunked system called HYDRA and the following frequencies have been reported in conjunction with that system: 409.200 MHz data channel, 407.200 MHz phone patches, and 406.15 MHz normal voice traffic. A complete bandplan has not been determined.

Marine Corps Air Station Yuma

MCAS Yuma is one of the Marine Corps' premier aviation training bases, with access to 2.8 million acres of bombing and aviation training ranges, and superb flying weather. MCAS Yuma supports 80 percent of the Corps' air-to-ground aviation training.

Laura Quarantiello forwarded the list below of frequencies for MCAS Yuma. Laura said she found the list on the MCAS Yuma web site. Thanks for sending us this list, Laura.

MCAS YUMA, ARIZONA (KYUM)

Website: **http://www.yuma.usmc.mil/**

118.00	Yuma MCAS Clearance Delivery
118.80	Yuma MCAS ATIS
119.30	Yuma MCAS Tower
120.00	Yuma MCAS Departure Control
121.90	Yuma MCAS Ground Control
122.90	Aux IV Unicom
122.95	Yuma MCAS Unicom
124.15	Range Control (R-2301 West, R-2306 A/B/C/D/E, R-2307, R-2308, R-2507 North/South, R-2510, R-2512)
124.70	Yuma MCAS Approach Control
132.05	Yuma MCAS GCA Radar
262.90	VMA-311 (AV-8B) The Tomcats (Marine Air Group 13/3rd Marine Air Wing) Squadron Common Callsign="Cat" Tail code=WL [This frequency is also used as a visiting squadrons coordination net channel]
263.65	3rd MAW Helicopter Common
272.30	VMFT-401 (F-5E/F) (Marine Air Group 46/4th Marine Air Wing) Squadron Common Callsign="Sniper" Tail code=WB
273.20	Yuma MCAS ATIS
274.00	Range Control (R-2301 West, R-2306 A/B/C/D/E, R-2307, R-2308, R-2507 North/South, R-2510, R-2512)
279.20	Tactical Aircrew Combat Training Systems (TACTS) "Sand Box"/"City Hall"/"Hassle Base"
287.80	VMA-513 (AV-8B) (Marine Air Group 13/3rd Marine Air Wing) Squadron Common Callsign="Nightmare/Evili" Tail code=WF
290.10	Yuma MCAS Squadron Common
311.90	TACTS Range "War Wagon"
315.70	Yuma MCAS Ground Control
317.00	Yuma MCAS Departure Control
328.10	VMA-211 (AV-8B) The Avengers (Marine Air Group 13/3rd Marine Air Wing) Squadron Common Callsign="Wake" Tail code=CF
336.40	Yuma MCAS Clearance Delivery
337.90	Yuma MCAS Command Post
349.90	Yuma MCAS Metro
358.60	Cactus West/Aux II Cactus West
362.90	VMA-214 (AV-8B) The Black Sheep Squadron (Marine Air Group 13/3rd Marine Air Wing)

TABLE 1: USS ENTERPRISE AIRWING: CVW 3 TAIL CODE AC

Squadron	Home Plate	Aircraft	Nickname	Callsign	Modex #
VF-32	NAS Oceana	F-14B	Swordsmen	Gypsy	100-123+132 (108-109 and 118-122 not used)
VMFA-312	MCAS Beaufort	F/A-18C	Checkboards	Checkmates	200-213 (208-209 not used)
VFA-37	NAS Oceana	F/A-18C	Bulls	Ragin	300-314 (308-309 not used)
VFA-105	NAS Oceana	F/A-18C	Gunslingers	Canyon	400-413 (408-409 not used)
VAW-126	NAS Norfolk	E-2C	Seahawks	Closeout	600-606 (605 not used)
HS-7	NAS Jacksonville	SH-60	Dusty Dogs		610-613
HS-7	NAS Jacksonville	HH-60	Dusty Dogs		614-615
VAQ-130	NAS Whidbey Island	EA-6B	Zappers	Zapper	620-623
VS-22	NAS Jacksonville	S-3B	Checkmates	Vidar	700-710 (708-709 not used)
VQ-6	NAS Jacksonville	ES-3A	Black Ravens	Raven	76X
VRC-40	NAS Norfolk	C-2A	Rawhides	Rawhide	40 and 56

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Squadron Common Callsign="Black Sheep"
Tail code=WE
374.80 Yuma MCAS Approach Control
382.80 Yuma MCAS Tower

In addition to the frequencies Laura provided above, here is some additional information from my personal notes.

3rd Marine Air Wing Tactical Communications: 250.300 268.300 273.800 281.900 299.500 310.600 318.700 382.100
ACMR Tactical Common: 381.900 384.400 385.100
Air-to-Air: 236.275 236.450 249.950 250.150 263.425 375.075 385.275
Air-to-Ground: 274.525 300.550 301.900
Air-to-Ground Training: 381.925
Bombing Range Coordination Net: 140.950 (AM mode)
Emergency Medical Coordination Net: 138.825 (Net 1-AM mode) 141.950 (Net 2-AM mode)
Maintenance and Training: 233.750 249.925
Marine Tactical Training Squadron: 266.675
MTDS: 307.500 310.200 325.400
Squadron Common: 262.600 262.975 264.025 275.575 283.125 285.100 285.375 293.100 299.300 300.450 301.375 305.125 310.300 315.300 318.500 352.300 363.400
Squadron/Tactical Intra-communications: 269.700 302.900
Visiting Squadron Coordination Net: 242.200 313.400
Other Freqs: 238.025 251.350 253.125 254.025 254.175 263.475 274.625 276.375 281.075 299.575 314.775

You will also find a lot of SINCGARS (Single Channel Ground and Airborne Radio) frequency hopping activity at this base in the 30-88 MHz range. The channel spacing appears to be about every 50 kHz throughout the range.

One of the more interesting frequencies to keep an eye on in the area is 281.000 MHz. I would be interested in receiving any reports from monitors in the Arizona and Southern California area on what is being heard on that frequency.

National Guard Y2K Exercise

During April, the Army National Guard conducted a nationwide Y2K exercise. *MT* regular Jack Metcalfe followed the exercise closely and passes along the callsign/frequency information in Table 2. These frequencies could prove interesting during the latter days of this year.

Callsign Digest

Since we are visiting the Department of the Navy in this month's column, we will feature some of the more common unit tail codes heard on various military frequencies in this month's Callsign Digest, Table 3.

Again, thanks to all of our contributors this month for sending us their frequency lists. Remember, we want to hear from you. Send in your frequency/callsign reports to Milcom, P.O. Box 98, Brasstown, NC or you can e-mail them to: larry@grove-ent.com. See you in two months and good hunting.

TABLE 2: ARMY NATIONAL GUARD OPERATION 99-1 "HIGHER FOCUS"

Frequencies (all in kHz): 3.032, 4445, 4520, 5202, 5217, 6766, 6910, 7648.5, 8047, 8061.5, 8093, 9121, and 10796.

NGB HQ, Arlington, VA NGB01
NG HQ, Andrews AFB, MD NGB02
ANG, Crystal City, VA NGB03
NGB Test Station, Winchester, VA NGB08
ANG HF School, Bethany Beach, DE NGB09
Montgomery, AL NGB10
Ft Richardson, AK NGB11
Phoenix, AZ NGB12
Little Rock, AR NGB13
Sacramento, CA NGB14
Englewood, CO NGB15
Hartford, CT NGB16
Wilmington, DE NGB17
Washington, DC NGB18
St. Augustine, FL NGB19
Atlanta, GA NGB20
Tamuning, GU NGB21
Honolulu, HI NGB22
Boise, ID NGB23
Springfield, IL NGB24
Indianapolis, IN NGB25
Johnston, IA NGB26
Topeka, KS NGB27
Frankfort, KY NGB28
New Orleans, LA NGB29
Augusta, ME NGB30
Baltimore, MD NGB31
Millford, MA NGB32
Lansing, MI NGB33
St. Paul, MN NGB34
Jackson, MS NGB35
Jefferson City, MO NGB36
Helena, MT NGB37
Lincoln, NE NGB38
Carson City, NV NGB39
Concord, NH NGB40
Trenton, NJ NGB41
'Santa Fe, NM NGB42
Latham, NY NGB43
Raleigh, NC NGB44
Bismark, ND NGB45
Columbus, OH NGB46
Oklahoma City, OK NGB47
Salem, OR NGB48
Annville, PA NGB49
San Juan, PR NGB50
Cranston, RI NGB51
Columbia, SC NGB52
Rapid City, SD NGB53
Nashville, TN NGB54
Austin, TX NGB55
Draper, UT NGB56
Colchester, VT NGB57
Richmond, VA NGB58
St. Croix, VI NGB59
Tacoma, WA NGB60
Charleston, WV NGB61
Madison, WI NGB62
Cheyenne, WY NGB63

TABLE 3: CALLSIGN DIGEST

Tail Code	Aircraft Type	Military Unit	Home Base	Nickname
CW	C-130T	VR-54	NAS/JRB New Orleans	Revellers
ET	ES-3A	VQ-6	NAS Jacksonville	Black Ravens
JK	C-2A	VRC-40	NAS Norfolk	Rawhides
JQ	EP-3E/UP-3B/P-3C	VQ-2	NS Rota, Spain	Batmen
JR	C-20G	VR-48	NAF Washington	Capitol Skyliners
JS	C-9B	VR-46	NAS Atlanta	Peach Airlines
JT	C-9B/DC-9	VR-52	NAS/JRB Willow Grove	Taskmasters
JU	C-9B	VR-56	NAS Norfolk	Globemasters
JV	C-9B/JV	VR-58	NAS Jacksonville	Sun Seekers
JW	C-130T/JW	VR-62	NAS Brunswick	Mass Transit
LA	P-3C	VP-5	NAS Jacksonville	Mad Foxes
LC	P-3C	VP-8	NAS Brunswick	Tigers
LD	P-3C	VP-10	NAS Brunswick	Red Lancers
LE	EP-3J/P-3C	VQ-11	NAS Brunswick	Bandits
LF	P-3C	VP-16	NAS Jacksonville	Eagles
LK	P-3C	VP-26	NAS Brunswick	Tridents
LL	P-3C/VP-3A	VP-30 (FRS)	NAS Jacksonville	Pro's Nest
LN	P-3C	VP-45	NAS Jacksonville	Pelcans
LT	P-3C	VP-62	NAS Jacksonville	Broadarrows
LU	P-3C	VP-64	NAS/JRB Willow Grove	Condors
LV	P-3C	VP-66	NAS/JRB Willow Grove	Liberty Bells
LY	P-3C	VP-92	NAS Brunswick	Minutemen
OB	(E)P-3C/P-3C	VPU-1	NAS Brunswick	Old Buzzards
PD	P-3C	VP-9	NAS Barbers Point	Golden Eagles
PG	P-3C	VP-65	NAWS Point Mugu	Tridents
PJ	P-3C	VP-69	NAS Whidbey Island	Totems
PR	P-3B/EP-3E/UP-3B	VQ-1	NAS Whidbey Island	World Watchers
PZ	P-3C	VP-94	NAS/JRB New Orleans	Crawfishers
QR	P-3C	VP-40	NAS Whidbey Island	Fighting Marlins
RC	P-3C	VP-46	NAS Whidbey Island	Grey Knights
RD	P-3C	VP-47	NAS Barbers Point	Golden Swordsmen
RS	DC-9	VR-61	NAS Whidbey Island	Islanders
RU	C-130T	VR-55	Moffett Federal Airfield	Minutemen
RW	C-20G	VR-51	MCAF Kaneohe Bay	Windjammers
RW	C-2A/UC-12B/F	VRC-30	NAS North Island	Providers
RX	C-9B/DC-9	VR-57	NAS North Island	Conquistadors
RY	C-9B/DC-9	VR-59	NAS/JRB Fort Worth	Lone Star Express
SP	(E)P-3C/UP-3A	VPU-2	NAS Barbers Point	Wizards
SS	ES-3A	VQ-5	NAS North Island	Sea Shadows
YB	P-3C	VP-1	NAS Whidbey Island	Screaming Eagles
YD	P-3C	VP-4	NAS Barbers Point	Skinny Dragons
WV	C-130T	VR-53	NAF Washington	Capitol Express

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Jean Baker, KIN9DD

Shanwick Radio

Welcome aboard and fasten your seatbelts; our first stop today is Shanwick Radio! Thanks to Mark Zee of Shanwick Radio, for permission to use this material.

The Shanwick Oceanic Control Area is one of five areas which make up the North Atlantic Ocean region, the others being New York (USA), Gander (Canada), Reykjavik (Iceland), and Santa Maria in the Azores. These five centers control all traffic transiting the North Atlantic.

"Shanwick" is made up of two words: *Prestwick*, where the actual air traffic control (ATC) center is located in Scotland, and *Shannon*, where radio operators relay the controllers' instructions to the aircraft. The Shanwick Radio station is just north of Shannon airport in the west of Ireland, housed in a small single-story building deep in the rural countryside, and flanked by its huge receiving and transmitting antennas.

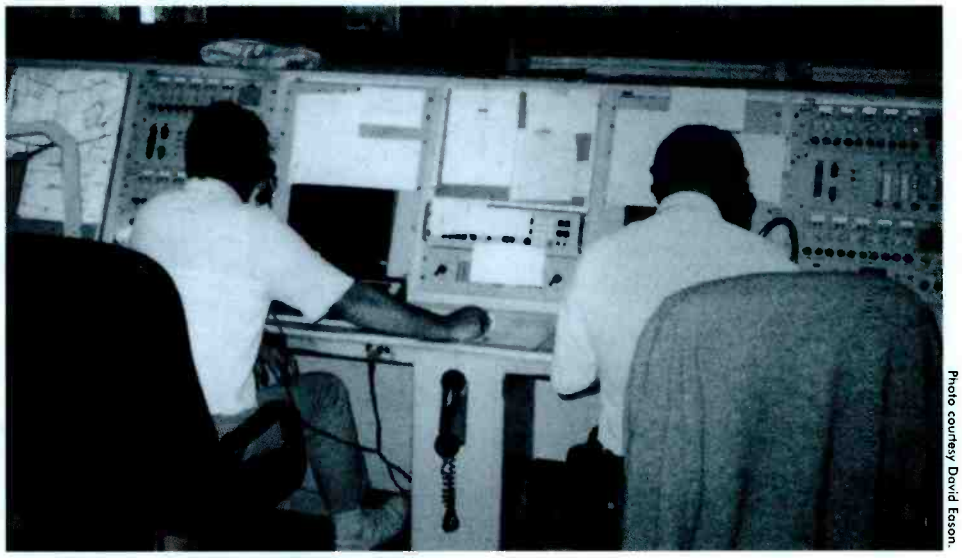
Photo courtesy David Esson

North Atlantic radio operators at "Shanwick."

Operators sit in front of a console comprising a control panel for the radio, a SELCAL unit, and a simple PC monitor and keyboard. Underneath the console is a foot pedal used to key the radio into transmit mode. In the center of the room is another operator who mans the link to Prestwick via a landline cable. It is here that clearances arrive from the controllers in Scotland; when a message is received, it is sent to the appropriate radio operator and appears on his screen so he can relay it to the relevant flight.

Adjacent to the communications room is the recording room (where every transmission is stored on tape for 30 days), and the Shannon Volmet transmitter. Information from the various weather centers is received here, and a computer with a database of meteo-words then translates this into what is heard on the Volmet frequencies.

Position Reporting:

As the controllers have no radar image of the aircraft, they instead build up a picture of traffic by using position reports sent from the aircraft, mainly on HF. These position reports are in the format: airline, flight number, current position, time and flight level, next position, estimated time at next position, followed by the next position after that.

Usually the reports will be a mixture of coordinates and reporting points, e.g., "Shamrock 112, 54 North 20 West at 0634, Flight Level 350, estimating 53 North 15 West at 0656, BURAK next." The shorthand version of this would be: "EIN11254N20W 0634 F350 53N15W 0656 BURAK"

Using these reports, the controllers can then ensure that there is safe separation between all aircraft. The standard separation is 60 miles laterally, 2000 feet vertically, and 10 minutes flying time horizontally.

SELCAL:

SELCAL, or selective calling, obliterates the need for pilots on HF to constantly monitor the frequency. It works by the ground station sending a signal which activates a light and bell on the flight deck, alerting the crew to the fact that the operator wishes to speak with them.

Flights normally obtain a SELCAL "check" on establishing communications with the ground station. Each aircraft has a four-letter SELCAL code, of the form AB-CD, for example. The codes are allocated to ensure that no two aircraft flying in the same region have the same code.

Publications such as *High in the Sky* print a list of codes and the aircraft to which they are allocated, so if the SELCAL is known, the listener can then find out which aircraft they have heard.

Frequencies:

Shanwick currently operates on the following radio frequencies:

3016, 5598, 8906	NAT-A (Southern routes)
2899, 5616, 8864	NAT-B (Central routes, American and Canadian aircraft)
2872, 5649, 8879	NAT-C (Central routes, European, African and Asian aircraft)
2971, 4675, 8891	NAT-E (Polar routes)
3476, 6622, 8831	NAT-F (Central and Northern Routes, overflow frequency)

The other four Atlantic stations, Gander, New York, Reykjavic (Iceland), and Santa Maria can also be heard on the above frequencies. The most active are 5616 and 5649, as the bulk of traffic is between the US and Europe.

Shanwick may be heard on 5680 when a rescue operation is in progress.

Listeners in the UK and Ireland may also be able to receive some Shanwick VHF transmissions:

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Oceanic Clearances: 123.95, 127.65, 135.525 MHz
Position Reporting at Oceanic Entry Point: 127.9 124.175 MHz
Location of Reporting Points used by Shanwick:
BABAN: 54'00N 12'00W - Next reporting point after either 54N 15W or KORIB
BELFAST: 54'40N 06'14W - VOR in Northern Ireland
BENBECULA: 57'29N 07'22W - VOR in Scotland
BURAK: 53'00N 12'00W - Next reporting point after 53N 15W
DOLIP: 52'00N 12'00W - Next reporting point after 52N 15W
GIPER: 51'00N 12'00W - Next reporting point after 51N 15W
KENUK: 50'00N 12'00W - Next reporting point after 50N 15W
LASNO: 48'36N 09'00W - Oceanic Entry and Exit Point
GUNSO: 49'04N 11'45W - Next reporting point after 49N15W
KORIB: 54'13N 13'0013'00W - Oceanic Entry and Exit Point
MACRIHANISH: 55'26N 05'39W - VOR in Scotland
MASIT: 54'00N 12'00W - Oceanic Entry Point
OMOKO: 48'50N 12'00W - Oceanic Entry and Exit Point
QUIMPER: 47'57N 04'11W - VOR in France
STORNOWAY: 58'12N 06'11W - VOR in Scotland
TIREE: 56'27N 06'52W - VOR in Scotland

In practice, the "next" points after Oceanic Exit such as BABAN, BURAK, DOLIP, GIPER, KENUK, and GUNSO are never actually flown to. Once the aircraft check in with Shannon ATC on their assigned VHF frequency, they will be given direct clearance to a point further ahead on their route.

Airport Movement Area Safety System

The following comes from the Electronic Sensors and Systems Sector of Northrup Grumman's company magazine, *Circuit*, contributed by Robert Hubbard. The Electronic Sensors and Systems Sector (ES^3) of Northrup Grumman delivered the third and final full-scale development version of its Airport Movement Area Safety System (AMASS) in mid-March. The system was provided to William B. Hartsfield Atlanta (International) Airport.

AMASS is designed to continually monitor all surface traffic at an airport and automatically alert controllers with audible and visual warnings to potential conflicts.

AMASS processes data from the sector's ASDE-3 (Airport Surface Detection Radar System for ground traffic) and from ES^3's ASR (Airport Surveillance Radar) for landing aircraft.

Field testing of the Atlanta-based, final full-scale development of AMASS continued through the end of March. The other two full-scale development systems produced by the sector have been installed at airports in Detroit, Michigan, and St. Louis, Missouri.

"AMASS is a key element of the FAA's plan to increase air safety at the nation's busiest airports," said Don Cuozzo, manager of Airport Surface Movement and Guidance Systems at ES^3's Norden Systems facility in Norwalk, Connecticut.

"Full deployment of this system will soon provide controllers with an unparalleled abiliity to safely handle the ever-increasing air traffic being experienced at these major airports." he said.

ES^3 is under contract with the Federal Aviation Administration to provide 36 production AMASS systems. The first of these units is currently in systems test at Norden Systems' Norwalk plant. AMASS is slated to be installed at all of the 35 U.S. airports currently equipped with ASDE-3 radar systems.

See you in August for more aero comms news and views! Until then, 73 and out.

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FCC Online

Things change fast in the domestic broadcasting world. Shortwave broadcasting is certainly dynamic, but the international bands don't see nearly as many new stations, identity changes to existing stations, or technical changes as the domestic bands. I regularly promote membership in the specialized DX clubs as a way of keeping up, but there's another alternative.

The Federal Communications Commission maintains an excellent Web site full of information. Two items, released nearly every business day, are of particular interest to DXers: the Broadcast Applications and Broadcast Actions Public Notices (**http://www.fcc.gov/Bureaus/Mass_Media/Public_Notices**)

Broadcast Applications starts with renewal applications. Station licenses are valid for eight years; after this period, they must be renewed. The FCC almost never intentionally fails to renew the license of an operating station. (Though they do occasionally screw up and "un-renew" one by mistake!) Federal law requires that the licenses of stations that remain off the air for a year or more be revoked; if such a station's license comes up for renewal, the renewal is denied. Sometimes a station will ask the government to reconsider this revocation. All of this information appears at the beginning of Broadcast Applications.

When permission is granted for a new station or for technical changes to an existing station, a *construction permit* (CP) is issued. This permit is a kind of guarantee that the station will be licensed if built according to specification. It also grants permission to test the equipment on the air and to make measurements to ensure everything works properly and no interference is caused. Once the station has completed these tests, it applies for a *license to cover*, which appears under Broadcast Applications.

After all the renewal and license-to-cover applications, you find all other types of application. The most common type are *transfer of control* and *voluntary assignment of license*. In both cases, the station has been sold; the FCC must approve such sales. Of course, a change in ownership doesn't affect the "DXability" of a station, but the identity of the new owner can sometimes give a clue to programming changes. For example, a station sold to a church is unlikely to continue a format of heavy metal rock music!

Also common for FM (though rather rare for AM) are applications for *CP for new station*. This means what it says; someone wants to build a new radio station. Often, the letters *NCE* are also present; this stands for "noncommercial, educational." When the application is for an FM translator station, the primary station call letters are also specified. The translator station will rebroadcast this primary station.

There may also be applications to change HAAT (height above average terrain, the "effective" height of the transmitting antenna), ERP (effective radiated power – which takes antenna efficiency into account), and TL (tower location).

Recently, we've seen a lot of applications for *CP to correct coordinates*. The FCC has recently decided to require registration of all towers as a safety measure for aircraft. Many stations are finding their towers aren't exactly where the license says they are, and are applying to correct the FCC's records. Nothing actually moves in these cases.

The second daily report of interest is **Broadcast Actions**. This report shows how the Commission has disposed of the applications it has received. It (usually) starts with license renewals. All other actions are lumped together. The same types of action – new stations, technical changes, licenses-to-cover, etc. – are covered. Sometimes, additional technical information is provided.

DXers should read a third report: **Call Sign Changes** is released intermittently, roughly every week or two. The first part shows "reserved" calls. Often, when a station is sold, the new owners plan to change the call letters. They cannot do so until the FCC approves the sale, but they don't want to risk having someone else take the new calls before they get a chance. The new owners can reserve the calls they want, with the change becoming official after the sale is approved. Most of this report are regular (effective immediately) call changes. As with changes in ownership, you can often make an educated guess about the programming of a station by noting its new callsign. For example, it's probably a safe bet that KFFX-TV will be a Fox affiliate, or that WNRQ-FM will play rock music of some kind.

DXers in Canada or near the border should also read the Canadian Radio-television and Telecommunications Commission site at **http://www.crtc.gc.ca/eng/news/whatsnew.htm**. This site contains similar information for new stations, technical changes, and transfers of control for stations north of the border.

WHLY-1620 is one of the more widely-heard expanded-band stations. Their regular-band station, WJVA-1580, is also DXable across a fair part of the East.

Bits and Pieces

I have no expanded-band news this month. The lack of news doesn't mean a lack of DX, though! Several DXers have set a goal of logging all the expanded-band stations. This goal is a lot harder to achieve today than it was two years ago, but it's still possible for the dedicated listener.

- New station CJMS-1040 Saint-Constant, Quebec has been heard testing. This will be a French-language country music station. Saint-Constant is a Montreal suburb.
- *Below 500 kHz* editor Kevin Carey has acquired a new used radio, an RCA Globetrotter. Kevin says it has excellent AM sensitivity and selectivity, along with good audio. He wonders if it might have been intended as competition for the GE SupeRadio? Does anyone else know anything about this set?
- Our youngest readers may not remember a day when there were only three TV networks in the U.S.. But Fox was not the first company to try to run a fourth TV network. Dave Zantow in Wisconsin forwarded the URL to a site remembering the DuMont TV Network, which operated from 1946 to 1956. Check out **http://members.aol.com/cingram/television/dumont.htm** for some TV nostalgia.

The nights are short this time of year, but there's still DX to be had. Are you hearing anything interesting? Write me at Box 98, Brasstown NC 28902-0098, or by email to *w9wi@bellsouth.net*. Good DX!

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OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
George.Zeller@acclink.com

ANARC Net on Summer Vaction

Dave Kirby, N1DK, and Al Quaglieri, NN2U, have announced that the long-standing Association of North American Radio Clubs (ANARC) SWL Net has suspended operations during the summer. For many years the 7240 kHz amateur radio net has announced shortwave radio loggings submitted by check-ins and non-amateurs who phoned in information. Very fresh pirate and clandestine station logs have always been among the typical fare on the net, traditionally scheduled for 10:00 am Eastern Time on Sundays. Declining check-ins and an unfortunate jamming incident contributed to the summer hiatus.

Dave and Al indicate that the net is not completely abandoned, and that new means to distribute the information are being explored. Dave Kirby's web site at **http://www.n1dk.com** contains the latest status update.

Schoech QSL Page

Our regular German reporter Martin Schoech notes that his web site contains a very extensive QSL collection, notably including an extensive set of clandestine radio station QSLs. A variety of international broadcasters and pirates are represented on the site. Point your web browser to **http://www.swl.net/swl-de/swl-qsl.htm** for this interesting service, which also contains a link to all back issues of the quite valuable *Clandestine Radio Watch* newsletter.

Another interesting and useful site is Mike O. Farad's *The Pirate Monitor*, found at **http://www.geocities.com/CapitolHill/Lobby/2395/390.html** on the web.

FCC Embarrassed

According to the *Philadelphia Inquirer*, the May 7 edition of the FCC *Daily Digest* e-mail service was inadvertently replaced by a dirty joke involving "nuns in heaven." FCC Chairman William Kennard said that the FCC's prohibition against use of e-mail for personal use will be enforced more vigorously in the future. Normally the *Daily Digest* is a useful source for FCC information. Current and back editions can be viewed at **http://www.fcc.gov/Daily_Releases/Daily_Digest/1999/welcome.html** on the internet.

Radio Eclipse Wins Poll

Steve Mann of **Radio Eclipse** walked off with the Best Free Radio Station of the Year award in the annual 1999 Pirate Popularity Poll in *The ACE*, with **Mystery Radio** bagging runner-up honors. On the downside, **WARR** and **Deliverance Radio** snagged the booby prize for least popular stations. **Betty Boop Radio** was honored for best program of the year, which they transmitted on Halloween.

Shortwave Pirate Activity

North American pirate radio stations heard by our readers last month all used frequencies within 500 kHz of 6955 kHz, typically from two or three hours before sunset until at least 0500 UTC. Morning and afternoon broadcasts increase on the weekends. Programming formats and contact maildrops (when known) are listed. Summer propagation means that activity increases after 0000 UTC.

Alan Masyga Project- They play Alan Parsons rock in honor of a pirate DXer. (Providence)
Blind Faith Radio- Dr. Napalm still produces classic rock, lately memorializing the 1970 Kent State shootings. (Merlin)
Deliverance Radio- Arkansas good ole boys feature dueling banjos. (None)
Desert Vibrations Radio- Parody ads dominate shows on this one, which has not been widely heard. (Providence)
Free Radio America- The Don says that they now have a maildrop. (Belfast)
Jerry Rigged Radio- Their rock music format is common on shortwave pirates. (Providence)
K-Mart Radio- Stone Cold programs rock music. (None; uses *stonecold6955@hotmail.com*)

KMUD- Chumbawamba music from the return of this veteran station is best heard on the West Coast. (Belfast)
Laser Hot Hits- Al Quaglieri and Mike Prindle note that this is among the best heard Europirates in North America; try 6218.8 kHz around 0400 UTC. (Merlin)
Radio Azteca- Bram Stoker's DX parodies with Bullwinkle sound effects are extremely entertaining. (Belfast)
Radio Chad- A new e-mail address is unconfirmed so far. (Unknown)
Radio Eclipse- Congratulations to Steve Mann for his award! (Providence)
Radio Metallica Worldwide- Dr. Tornado and Señor El Niño produce rock and commentary from "The 10,000 watt flame-thrower." (Blue Ridge Summit)
Radio Tornado Worldwide- When Metallica signs off, its parody station often signs on. (None)
RBCN- Radio Bob now has e-mail at *rbcn1@hotmail.com* on the internet; it's for comments, not reports. (Lula)
Scream of the Butterfly- http://www.geocities.com/SunsetStrip/Garage/9861/ is their new web site. (Providence)
SWRS- They relay many other pirates from Europe; try 11470 kHz for best reception. (Basel)
Voice of Prozac- "The relaxation station" features female announcers. (Pittsburgh)
WEMP- A new one with a classic rock "electromagnetic" format. (None, logs to *The ACE*)
WKND- Radio Animal's main subject matter includes rock music, pirate radio, and dogs. (Blue Ridge Summit)
WMPR- Their techno rock "dance party" usually has an excellent signal. (Still none)
WPUP- Dogs, puppies, dog food ads, and other canine fare are heard here. (Belfast)
WGTG- Not the real religious broadcaster; Father Fornicate has a parody operation. (Providence)
WJPM- The call letters on this new one stand for "Just Play Music." (None)

Reception reports to pirate stations require 3 first class stamps for USA maildrops or $2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711, PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 25302, Pittsburgh, PA 15242; PO Box 11522, Huntsville, AL 35814; PO Box 24, Lula, GA 30554; PO Box 1464, Manomet, MA 02345; PO Box 293, Merlin, Ontario N0P 1W0; and 4010 Basel, Switzerland .

Thanks!

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We appreciate material sent in this month by John T. Arthur, Belfast, NY; Shawn Axelrod, Winnipeg, Manitoba; Radio Bob, Lula, GA; Ranier Brandt, Hoefer, Germany; David Clark, Thornhill, Ontario; Jerry Coatsworth, Merlin, Ontario; Bill Crocker; Joe Filipkowski, Providence, RI; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; William Hassig, Mt. Prospect, IL; Vince Havrilko, CA; Maryanne Kehoe, Atlanta, GA; Dave Kirby, Willowick, OH; Zacharias Liangas, Italy; Chris Lobdell, Stoneham, MA; Ben Loveless, Bloomfield Hills, MI; Greg Majewski, Oakdale, CT; Bill Mandel, Simi Valley, CA; Armando Mastrapa, New York, NY; Bill McLintock, Minneapolis, MN; Mike Prindle, New Suffolk, NY; Al Quaglieri, Albany, NY; Johnny Rockin', Providence, RI; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; Hugh Stegman, Culver City, CA; DJ Stevie, Basel, Switzerland; Kirk Trummel, Montreal, Quebec; Mary Villano, Van Nuys, CA; Niel Wolfish, Toronto, Ontario; and David Zantow, Janesville, WI.

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BELOW 500 KHZ

DXING THE BASEMENT BAND

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Your FAQs Answered

In the world of online computing, "FAQ" stands for Frequently Asked Questions. This month, I'd like to apply this concept to the hobby of longwave radio. As with any corner of the communications hobby, longwave has its own share of jargon and assumptions that are tossed about by seasoned listeners—often with little thought given to the newcomer.

This month's Q&A format should help unravel some of those mysteries and promote a better understanding of the basement band. Following are some of the most common questions I receive from *MT* readers:

Q: What is the best antenna to use for longwave?

A: The choice of an antenna depends on your receiving objectives and the conditions at your location. In a rural setting with low interference levels, a "random wire" of 100 feet or more can be quite effective. These antennas can be rather noisy when used in an urban or suburban environment, however.

In noise-challenged locations, a compact active antenna is a better choice. An active antenna's smaller size makes it less likely to be a "noise collector"— thus improving the signal-to-noise ratio of received signals. An active antenna is essentially a short whip (4 feet or so) attached to a preamplifier circuit. The amplifier is intended to make up for what the antenna lacks in length. For best performance, use an active antenna specifically designed for longwave.

If you want directivity in your reception, a loop antenna should be considered. Loops often allow you to null out man-made static or unwanted beacon signals that may be covering a station you want to hear. A drawback to loops is that you might miss a signal that is not in the favored plane of reception as you tune through the band.

Q: What is WWVB and why is it necessary with WWV transmitting on several HF frequencies?

A: WWVB (60 kHz, Ft. Collins, CO) is a sister station to the well-known time station WWV that transmits at 2.5, 5, 10, 15 and 20 MHz. Like its HF counterpart, WWVB transmits time signals, but they are not broadcast in voice. Rather, WWVB transmits an encoded data stream that can be interpreted by specialized receivers, test equipment, and even some consumer-grade clocks.

WWVB's 60 kHz signal is also used as a frequency standard by many laboratories and power utilities to maintain the calibration of their equipment to exacting standards. Although some of these functions could be carried out on HF, variables in HF propagation can cause delays or distortions that are unacceptable to some uses. Low frequency signals travel primarily by ground wave, and are far less susceptible to such changes.

Q: What is the lowest frequency man-made signal?

A: To the best of my knowledge, the U.S. Navy's Project ELF (extra low frequency) transmitters at Clam Lake, Wisconsin, and Republic, Michigan, take this award. Operating at 0.76 Hertz (less than 1 kHz) these stations pump millions of watts into wire antennas that extend for several miles. The site at Clam Lake, for example, uses two wire antennas that are 28 miles long—a total of 56 miles! (See pp. 60 and 101 for more. -ed.)

The ELF systems are used for communication with submerged submarines. Because of the limited bandwidth available at these frequencies, only small amounts of information can be passed at any given time. This leads many to believe that the system is used mainly as a "bell ringer" to alert crews to surface for communication by conventional means. Another, more chilling theory is that the system could be used to issue launch codes for nuclear weapons carried aboard the subs.

Q: How can I get a QSL (confirmation card) for hearing a longwave beacon?

A: The first step is to positively identify the station. A beacon guide, such as the *BeaconFinder*, P.O. Box 56, West Bloomfield, NY 14585, can be used for this purpose. In most cases a guide will indicate not only the city where the beacon is located, but also the air facility that the beacon serves. A brief letter written to the "NAVAIDS" personnel of this facility will often bring results.

The operators of beacons don't generally have QSL cards to issue, so you must include a "prepared form card" or "PFC" with your request. The PFC should show the ID of the station, date and time heard, frequency, etc.

A space should also be included on the PFC for the Engineer-in-Charge to sign the card, and fill in any other pertinent details about the station (power output and antenna type, for example). Always be sure to include a self-addressed, stamped envelope with any QSL request. Look at past issues of *Below 500 kHz* for some fine examples of PFCs created by *MT* readers.

Q: What are the warbling tones I hear between 285 and 325 kHz?

A: You are almost certainly hearing some of the Coast Guard's Differential GPS (DGPS) stations. These retrofitted beacons are used to send correction signals to Global Positioning System users in the vicinity of the station. Although GPS is quite accurate on its own, the DGPS signals provide even better performance for mariners operating in congested areas such as in harbors.

The transmission mode for DGPS is known as Minimum Shift Keying (MSK) and a "DGPS-ready" receiver must be used to decode it. DGPS stations are very common along coastlines, where marine beacons were formerly operated. The Federal Aviation Administration has also been experimenting with DGPS technology for inland applications.

Q: Why do Canadian beacon IDs often begin with a "Y"?

A: I had to check with *MT's* Jacques d'Avignon for a definitive answer on this one. Under International Civil Aviation Organization (ICAO) rules, CYxx is assigned to Canadian airports. When it comes to airport beacons, however, the "C" is dropped for brevity. For example, "CYPQ" is the identifier for Peterborough airport, but the airport beacon transmits "YPQ." The Kingston airport identifier is "CYGK," but the beacon sends "YGK."

What's the significance of the last two letters in a 3-character ID? "Usually none," reports Jacques. The majority of these IDs were assigned during World War 2, and for security reasons, characters were chosen that gave no clue as to the airport location.

Another category of Canadian beacons are those that use a 2-character ID. These beacons are typically *not* associated with a major airport, checkpoint or other prominent location. Because many of these sites were established after the war, their IDs sometimes provide a hint as to their location. The Vancouver beacon (VR/266 kHz) is one example.

Finally, we have the letter/number combinations such as F9 or 2U. These IDs are normally assigned to *privately owned* beacons at smaller airfields.

Your Turn

There are many more questions we could address in a column such as this, but we've run out of space for this month. How about sending in your questions for a follow-up FAQ column? You can direct your questions to *Below 500 kHz*, P.O. Box 98, Brasstown, NC 28902.

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Rich Arland, K7SZ
k7sz@juno.com

Kits to Keep it Simple

The radio hobby is, by nature, a technical one. There are those who engage in the listening and operating side of the hobby to the exclusion of all else. Likewise, there are those within the radio hobby that build, tinker, and modify equipment but seldom operate. There is a happy medium.

This month we are going to look at electronic kits geared to the radio hobbyist. The pride that accompanies building all or part of your station is immeasurable. At the turn of the century, when radio was new, anyone wishing to experiment with this new medium had to build his/her own equipment. Commercial gear just didn't exist. The "building bug" was part of the radio hobby until the late 1950s, when the explosion of good commercial equipment, coupled with the affluence associated with a booming postwar economy, took the hobby by storm.

Things have changed over the last 40 years. It seems that now those who build their own gear are in a very small minority. Commercial equipment reigns supreme. Well, if you are adventurous and have a modicum of electronics skill, you can still participate in building some or all of your listening post or ham station.

Many of us Old Timers (myself included) fondly remember Heath Company of Benton Harbor, Michigan, supplier of thousands of electronic kits to eager builders. Heathkit catalogs of the 1960s and 70s abound with HiFi, television, test equipment, CB, shortwave and ham radio kits. In that same era, a Collins KWM-2 HF amateur transceiver cost about $1500 and a Hammarlund HQ-170 general coverage receiver cost $359 (in 1960 dollars!) — well above the budget for many a new ham radio operator. However, a Heathkit station could be had for a fraction of the cost of a Collins or Hammarlund and would provide years of fun on the HF bands for those adventurous enough to undertake the task of building the kits.

Sadly, in the early 1990s Heath Company ceased their kit production to concentrate on educational systems. With the demise of Heathkit, an era of the radio hobby died. No longer were good quality kits available to the frugal home constructor. For several years, thousands of radio hobbyists and electronic experimenters lamented the passing of this kit-making giant.

FIG 1. *A pair of customized Wilderness Radio Sierra transceivers: left is an analog version, and right has a digital read-out. Both are outstanding performers.*

Things have turned around in the last couple of years. Jumping into the void left by Heathkit, many small kit companies offer a great selection of kits that include scanning accessories, active antennas, HF/VHF transceiver kits, robotics kits and lots of other do-it-yourself projects for the electronic enthusiast. It seems that the demise of Heathkit spurred smaller companies into high gear, and the results, as we shall soon see, are spectacular.

Ramsey Electronics (793 Canning Parkway, Victor, NJ 14564), offers a selection of kits that will make the prospective builder's mouth water! They have everything from simple one night projects to compact HF and VHF transceiver kits and even a complete FM stereo broadcast station! I have built several of their kits including their monoband 20 meter QRP transmitter (QRP-20) and companion receiver (HR-20) costing $29.95/each, and have used them with good success.

The Ramsey SM-100, Signal Magnet Noise Reduction Antenna is a good performer, especially on the HF bands below 15 MHz. This antenna tunes from 500 kHz to 15 MHz, and makes a dandy addition to the antenna farm for those who need a compact antenna for DXing the Tropical Bands.

Graymark (Box 2015, Tustin, CA 92781), offers a multitude of kits primarily geared for educational classroom use, but the electronics experimenter can have a lot of fun with some of them, also. Graymark features kits for AM radios (to show the student how AM is received and demodulated), simple test equipment (continuity tester, logic probe, power supply, resistance and capacitance substitution boxes, etc), and a great selection of simple robots.

The robotics series is worth a closer look since it allows the builder to construct several different types of working robots which use various object avoidance systems. In short, these fun kits teach robotics and show real-world applications simultaneously.

Ham radio operators have a tremendous choice of kits, especially geared to the low power operator. Dave Benson, NN1G, owner of **Small Wonder Labs** (80 Robin Drive, Newington, CT 06111, TEL: 860-667-3536), offers several QRP transceiver kits. His new SW-40+ is a great little rig that can get the frugal ham radio operator on 40 meters for about $55! This little rig (the PC board is about 4 x 2.5 inches) offers a superhet receiver design with IF crystal filtering, about 2 watts output (using 13.8 Vdc) and full break in (QSK) CW keying. Add the Dave's Freq Mite ™ digital frequency readout ($20) and you have a monoband CW transceiver for 40 meters that features digital readout for $75!

Does the SW-40+ work? You bet it does! I have worked many CW contacts on 40 meters with mine, including the designer, NN1G himself! What was Dave using when we made contact? A new creation: a digitally synthesized version of the SW-40+! His direct digital synthesis (DDS) SW-40+ will be on the market shortly.

Small Wonder Labs also offers several other QRP rigs in kit form, including the White Mountain transceiver, the only QRP SSB transceiver kit currently on the market. This monoband SSB kit is a solid performer that offers SSB operation at low cost (about $170).

FIG 2. *The NN1G SW-40+ CW transceiver for 40 meters is perfect for backpacking or camping, with its small size and low current drain.*

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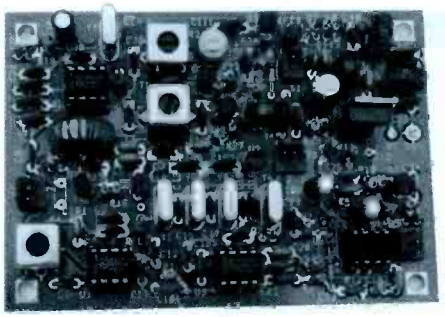

FIG 3. *The actual circuit board for the SW-40+ transceiver. Don't let the small size and low parts count fool you!*

Kanga Kits, a British kit maker, offers a selection of QRP kits and accessories for the radio shack. Their stateside representative, Bill Kinsley, N8ET, stocks the Kanga kits for US consumption. I have built their Stockton Wattmeter (a very accurate design for HF through 6 meters) and the Kanga universal frequency standard. Both kits worked first time and were valuable additions to the K7SZ shack. Contact Kanga Kits at Kanga US, 3521 Spring Lake Drive, Findlay, OH 45840, TEL: (419) 423-4606 or hit their webpage at: **http://qrp.cc.nd.edu/kanga**.

Wilderness Radio (PO Box 734, Los Altos, CA 94023-0734; 415-494-3806) has established themselves as a rock solid company with outstanding kits and first class customer support. The brain child of Bob Dyer, KD6VIO and Wayne Burdick, N6KR, Wilderness Radio has grown to become one of the major QRP kit suppliers in the world. Starting with the NorCal-40, a 40 meter CW transceiver kit, and expanding to include the NorCal Sierra multiband CW transceiver kit, and ultra compact SST, Wilderness Radio offers some of the best kits in the world.

Performance is the name of the game and, thanks to the engineering talents of Wayne Burdick, N6KR, all the Wilderness kits are world class performers. The current world record for 2-way low power communications on 40 meters was set using two Wilderness Radio Sierra transceivers! Not a bad endorsement.

The hottest news from **Planet QRP** is the K-2 multi-role HF transceiver kit from Elecraft. The K-2 was designed by Wayne Burdick, N6KR, and Eric Swartz, WA6HHQ, and features some fabulous specs. The receiver is a single conversion superhet featuring variable bandwidth IF crystal filtering along with active audio filtering. The transceiver is PLL synthesized and microprocessor controlled, has dual VFOs with multiple memory channels, receive and transmit incremental tuning (RIT/XIT), built in memory keyer, fast attack IF-derived AGC, and output power is adjustable from 0 to 10 watts output. Receiver performance, according to the manufacturer, is on par with the Ten-Tec OMNI-VI!

The initial kit is a 80-10 meter CW transceiver that has options to expand it to 160 meters, add SSB modes, along with an internal battery pack, automatic antenna tuner, dual receive antennas and additional IF crystal filters. Price is a hefty $549 for the basic kit. Options are, of course, extra, The first 100 kits have been shipped to the Beta Test Team and initial reports are extremely flattering. Wayne and Eric did their homework and this kit should revolutionize the QRP kit market. Interested? Contact Elecraft at PO Box 69, Aptos, CA 95001-0069, TEL: (831) 662-8345 or visit their website at: **http://ww.elecraft.com** for a complete run down on this mega-kit.

Ten-Tec (1185 Dolly Parton Parkway, Sevierville, TN 37862), the commercial ham radio giant, has also entered the kit building market with their T-Kits. Ten-Tec offers some really neat kits that are not offered anywhere else.

While the company is geared to the ham radio market, Ten-Tec also offers the Model 1253, a regenerative shortwave receiver for $59.00 and the Model 1254, a superhet shortwave receiver with digital read out for $195.00! (See Sept '98 review) When's the last time you tried to buy a shortwave receiver in kit form? Well, now, thanks to Ten-Tec, you can assemble a nice shortwave monitoring station at a reasonable price.

Ten-Tec also offers many accessories including HF/VHF wattmeters, speech processors, preamps, converters, in addition to complete VHF FM transceiver kits and a selection of monoband QRP CW rigs, too. My six meter station consists of a Ten-Tec Model 1208, 6 meter converter feeding a Ten-Tec Argosy-II HF transceiver. This is a very inexpensive way to enter the world of VHF weak signal work. For around $100, I am able to enjoy the 6 meter band at a fraction of the cost of a new, or used, 6 meter rig.

Ten-Tec also offers the Model 1210, a 2 meter converter, so Low Earth Orbit (LEO) satellites and 2 meter weak signal work are now within easy reach of the average ham radio operator using an HF transceiver as the IF strip.

As you can plainly see, the electronic kit business is thriving! Undoubtedly I have left out several kit manufacturers, so please forgive me. If you scour the ads in *Monitoring Times, QST, CQ* and *73* magazines, you are sure to find other kit manufacturers advertising their wares.

So, if you want to expand your radio horizons, start building your own gear. There's no better way to **K**eep **I**t **S**imple!

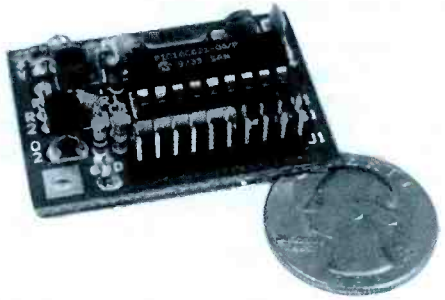

FIG 4. *NN1G's FreqMite digital frequency readout board will make most rigs into a digital readout radio. The frequency is sampled and read out via Morse code at either 13 or 26 wpm. This little board fits nicely into the SW-40+ custom case.*

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Computer Update: Trends & Features

Think computers are still too expensive? Maybe you're not current. In mid-April, eMachines (**http:// www.e4me.com**) advertised a Cyrix MII-333 system with 2.1-GB hard drive, 32-MB RAM, 32x CD-ROM, 56k/v.90 modem, and Windows 98 for $399. A monitor added $100.

Microworkz Computer (**http:// www.microworkz.com**) had a Cyrix MII-300 WEBzter Jr. with a 3.2-GB hard drive, 32-MB RAM, 56k/v.90 modem and Windows 98 for a paltry $299. Add $99 for CD-ROM and floppy drives, and $140 for a 15-inch color monitor.

First-time Buyers

If you're a neophyte or just getting into computing, your best bet may be a name brand with top bang for the buck. Hewlett-Packard has some lucrative deals on their Pavilion 6xxx series, an example of which is the HP-6465 with an Intel 433 MHz Celeron CPU; 96-MB RAM; 9.6-GB UDMA HD; 32x CD-ROM; 56k/v.90 modem; 8-MB ATI video; great sound system; Windows 98 and loads of software. The price was $1099 (less monitor) at Fry's Electronics.

Don't get excited about "lucrative" deals from Compaq, Gateway, and Packard Bell. These "closed" systems can pose problems for generic add-on expansion components. Dell, Micron, and Hewlitt-Packard are good "open" systems, though. No-name deals from neighborhood computer shops can go either way. So read the fine print.

Read the Fine Print

Now is a good time to buy, but consider that a bargain system might not meet your needs.

- Some come with all necessary hardware, but no operating system or software.
- Some don't come with monitor, CD-ROM, floppy drive, sound, or modem, etc.
- Some are just "bare bones" (case, power supply, motherboard, and CPU).
- Some have "everything" but with small hard drives and minimal RAM. (Don't skimp on RAM or hard disk space.)
- Read the fine print - know what you are buying.

Nobody gives stuff away. Cheap PCs cut corners to lower the price. This is not to suggest cheap PCs are unreliable. Just don't expect top performance like with name brand, high-end machines.

Think about how you will use the computer before you buy or build. Cheap PCs are great for Web surfing, radio applications, sending email, playing solitaire, and other simple computing. But if you like to play the latest 3-D games, watch full-motion hi-res video, or run the latest productivity software, then a cheap PC could yield poor performance. (You can *build* a cheap PC with great performance, though.)

Roll Your Own?

I started this computer-update series in Nov-95 with four articles premised on the economics of rolling your own from scratch. I'm not so sure the economics still apply, at least not starting from scratch. It makes better sense now to build around a "bare bones" package, (case, power supply, motherboard, and CPU). Again, you're looking at $200 or so for an acceptable mid-range starting point, with most of the assembly already done for you. Add components shown in Table 1 for a great system at an unbeatable price.

Note: I just saw a Pentium III-450 MHz CPU with an Intel 440BX motherboard for $528, but prices are around $200 for the Pentium II class and $75 for the old Pentium I. Avoid the latter unless you have all the parts.

Fry's Electronics and other computer stores offer quality "bare-bones" systems for $200 or less, typically including case, power supply, motherboard, and CPU. Add 32-64 MB RAM; hard-, floppy-, and CD-ROM drives; video, network, and sound cards; and software for a great system at a nice savings. Here is an example from today's ads: Bare bones case/power supply/ motherboard and AMD-K6-2 350 MHz processor: $200. 32-MB SDRAM: $40. 3.2-GB HD: $90. 31/2" floppy drive: $20. 24x CD-ROM: $40. 8-MB PCI video: $40. Keyboard: $10; PS/2 mouse: $20; 56k/v.90 modem: $20. Sound card: $10. Speakers: $10. Network card: $20. 17" monitor: $190, totaling $710 for a complete system. Cost plummets if you have any add-ons laying around.

While Pentium I (133-233 MHz) computers are ample for radio needs, the basic, no-frills, entry-level PC now seems to be a Pentium II-300. There isn't much sense in building a lesser one. It's smart to start off even or ahead; not behind.

A modern innovation now emerging into prominence is the Universal Serial Bus (USB). Make sure your new computer has it.

Universal Serial Bus "USB"

Several years ago, a group of PC and telephone industry leaders developed the Universal Serial Bus (USB) specification. With USB, users need not open a PC to plug in peripheral/accessory cards. Instead, adding peripheral devices is as easy as plugging in a table lamp.

USB products sport unprecedented ease of installation and functionality. Examples of devices that can be designed to work on the Universal Serial Bus include telephones and telephone networks, modems, printers, microphones, digital speakers, writing styli, joysticks, pointing devices, page scanners, game pads, digital and video cameras. Supposedly even monitors can be made USB-compliant.

USB is true Plug'n'Play – it detects when devices are added or removed, which, unlike with conventional expansion slots, can be done with the power on and without having to reboot. Moreover, USB automatically determines necessary host resources for each device, including driver software and bus bandwidth, and makes those resources available without user intervention. Lastly, USB offers a standard socket and plug for all peripherals, thus eliminating a confusing mix of connectors.

USB accessories are only now appearing on the market as alternatives to the standard PCI, ISA, and serial counterparts. I'm not aware of any USB-compliant radios or radio accessories yet, but rumor has it that WiNRADiO will make an entry later this year or early next. It's a matter of time before most radio manufacturers support the USB standard. Your new computer should be USB-ready.

USB has been available for two or three years on most Pentium AT and ATX motherboards, but older Pentium AT machines might not have USB ports accessible on the back panel like that shown in Figure 1. If not, you might only need an inexpensive back panel expansion strip with USB sockets.

First, scrutinize your motherboard along its

FIG-1: REAR PANEL OF A MODERN PC

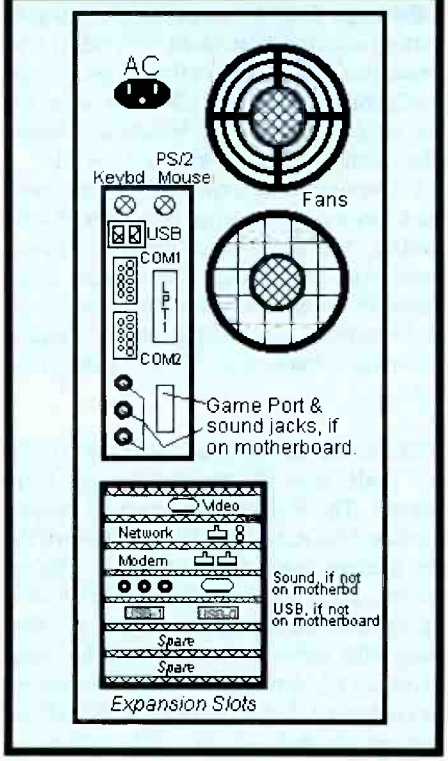

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FIG-2: USB ADD-ON & PINOUT

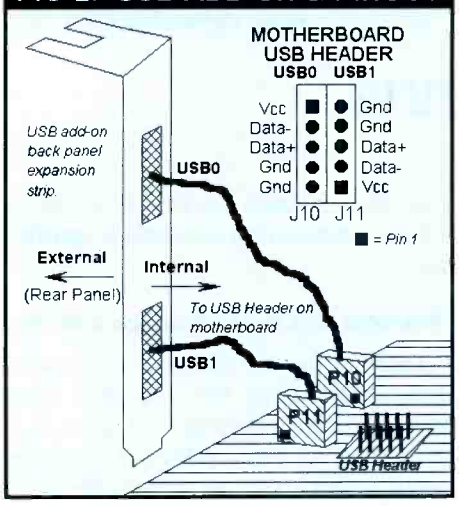
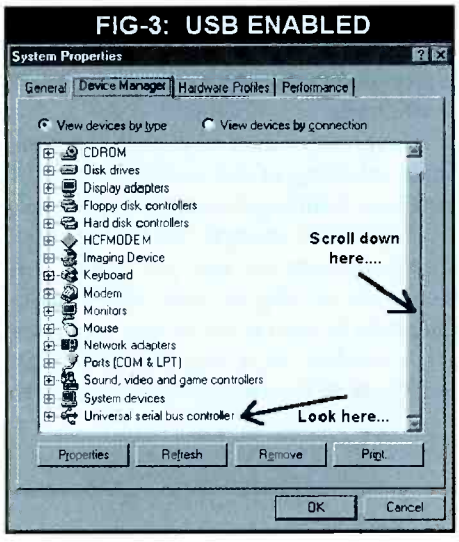


FIG-3: USB ENABLED



inside rear edge for a 10-pin USB header like shown in Fig-2. If present, then you just need the add-on USB socket expansion strip.

The USB feature might be turned off in the computer's CMOS/BIOS. You can tell for sure by right-clicking on Win95/98's MY COMPUTER; choose PROPERTIES; followed by DEVICE MANAGER. If USB is enabled, it will appear at the bottom of the list. (See Fig-3.) If not, you'll have to reboot and go into the BIOS to turn it on – probably under the "chipset" or "integrated peripherals" settings.

Then install a USB socket strip in an empty expansion slot opening and connect its internal cables to the USB headers on the motherboard. Figure 2 shows how the add-on socket strip works and the pinout of a standard dual USB motherboard header. Most computer stores can supply add-on USB sockets. For more information on USB, see: **http://www.intel.com/design/USB/USBBACK.HTM**

Note: Windows 98 and later versions of Windows 95 support USB, but the early Windows 95 and all Windows 3.x do not – a good reason to upgrade your Windows, perhaps?

IEEE-1394 "Firewire"

Similar in concept and operation, but far superior to USB is the IEEE-1394 "Firewire." The bandwidth of USB is about 12 Mb/s whereas Firewire screams at 100-400 Mb/s. While Firewire has attracted industrial attention and support, it hasn't filtered down to the hobby and home markets yet.

Still, if you have an opportunity to snag a computer or motherboard with Firewire capability, it might be a good leap, especially if the price is right. For an overview of the IEEE-1394 Firewire, see: **http://www.skipstone.com/compcon.html** Back up one level at this site for links to a broad range of technical articles and papers on the Firewire.

Parallel Printer Cable Note

Got mysterious printer problems? Certain modern printers require a special cable. Not just any old parallel cable will do! Yours might need an "IEEE-1284 Bi-Directional Parallel Printer Cable." These cables cost more, but there isn't a choice if you want your printer to be all that it can be.

Hard Disk Considerations

Hard drives are almost "free" with 3.2-GB going for $89. You have to be careful, though, and read the fine print. Fer'instance, cheap hard drives may come with 256-kB (or less) buffer cache. A minimum of 512-kB is preferred and costs only a little more. Specify "UDMA" (Ultra Direct Memory Access) with "512-kB+ buffer" and you'll not go wrong.

Avoid drives larger than about 8.4-GB. For one, earlier Windows may have trouble with unpartitioned disks larger than 8.4-GB, but more importantly, it's better to have two smaller drives than one larger, for the sake of backup and redundancy.

A pair of 4.3-GB hard disks, installed as C:\ and D:\ is a great setup. Reserve C:\ for Windows and major programs and D:\ for your data, personal stuff, and minor programs. Create a directory on C:\ for backups of your important data from D:\ . (You won't lose much if one drive should fail.)

Install C:\ as the master drive on the motherboard primary IDE channel and D:\ as a slave. CD-ROMs can go on the secondary IDE channel, the first as a master, and a second, if any, as a slave.

Memory Considerations

Times were when 4-MB RAM was ample. Windows 95 required 8-MB minimum. Regardless of what they say, Windows 98 begs 16 MB. Frankly, 32 MB isn't a luxury, and 64 MB isn't absurd. By next year, 64 MB will be a minimum with 128 MB or more preferred.

If you have any 30- and 72-pin SIMM memory lying around, see if you can sell it. It's soon to be worthless. Modern computers accept 72-pin SIMMs but prefer 168-pin DIMMs, so go for the DIMMs. (The newest motherboards accept only DIMMs.) Specify "PC-100 SDRAM," and don't settle for less than 64 MB without a compelling reason.

The Bare Minimums

The rock-bottom hardware minimums for modern computing steadily creep higher. Table 2 lists what I think are conservative minimums for hardware in all new computers purchased or built today.

Please note my new permanent e-mail and web addresses. Support for this and all my columns is freely available by e-mail. If you're not computerized, please include an SASE with postal requests.

TABLE 1: ADD-ON COSTS

Item	Size/Desc	≈ Cost
Hard Drive	3.2 GB UDMA	$ 89
"	5.1 GB UDMA	$109
"	8.6 GB UDMA	$149
Floppy Drive	3.5"/1.44-MB	$ 25
CD-ROM Drive	24x/up (IDE)	$ 40
ZIP Drive	100/120 MB	$100
RAM	64-MB SDRAM	$ 65
Video Card	AGP slot, 8-MB	$ 89
"	PCI bus, 8-MB	$ 49
Sound Card	ISA/economy	$ 10
"	ISA/PCI mid-range	$ 39
"	PCI High end	$ 99
Modem	56k/v.90 Internal	$ 19/up
"	" " External	$109/up
"	" " USB	$129/up
Network card	Ethernet PCI bus	$ 19/up
"	Ethernet ISA bus	$ 9
USB	Connector strip	$ 12
Monitor	15"	$120
"	17"	$200
"	19"	$300/up
Keyboard	Windows	$ 10/up
Mouse	PS/2	$ 20
"	Serial	$ 5
"	USB	$ 20

TABLE 2: MINIMUM HARDWARE

Item	Description/Minimum	Preferred
RAM	PC-100 SDRAM DIMM	
"	Win95/98: 32-MB min	64-MB
"	NT 4.0/Win2000: 64-MB	128-MB
HDisk	2.1-GB to 4.3-GB, UDMA (with 512-kB+ cache buffer) (two smaller hard disks may be better than one large, i.e. two 4.2-GB)	6-GB/up
CD-ROM	24-speed or better	32x/up
DVD	Still too expensive	Wait a year
Monitor	15"/.28 dot pitch/Trinitron	17"/.26 pitch
Video	2D/4-MB VRAM	3D/8-MB
CPU	Pentium 200 MMx	Pentium II-300
Ports	1-parallel/2-serial/2-USB	2p/4s/2-USB
Sound	16-bit, ISA	32-bit/PCI
Network	10-mb/s, ISA	100-mb/s PCI

E-mail: bcheek@comtronics.net
WWW: http://www.comtronics.net
FAX: (619) 578-9247
Postal: PO Box 262478; San Diego, CA 92196-2478

Caveat: Modification may void your warranty or FCC certification.

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Clem Small, KR6A
email: clemsmal@bitterroot.net

Vacation with an Antenna

This month and next, many *MT* readers will be taking vacations with an antenna of one sort or another. Monitoring from a different locale sometimes produces some interesting results. If on your vacation you're going to be at one location for just a short while, the antennas you find convenient at home may not be practical. Of course for VHF or UHF a rubber duck or a whip on your scanner usually gets the job done, and these small antennas are easily carried for use while on vacation. But on HF or the lower bands, we often want something more. So this month let's think "vacation antennas for HF and lower bands."

Antennas that need no erecting

Although we usually think of **rubber duck** and **whip** antennas as VHF-UHF antennas, it is true that, when properly designed, these are also useful at HF and lower in frequency. Even if you're accustomed to using antennas with more gain than the duckie or whip you may find these two antennas satisfactory for your vacation use. A big plus here for vacations is that these antennas are quite small and require no poles or ties to a high point to put them into action.

We don't want to overlook **active antennas** here. Even at low frequencies an active antenna is often remarkably effective. Not infrequently these small antennas give results comparable to much larger antennas. Most models are easily packed in a suitcase with room left for a modest-sized receiver, and even a few clothes! The downside is that active antennas can have problems handling excessively strong signals. A signal from a transmitter that is close to your location can cause these devices to have intermodulation distortion and desensitization. Nevertheless they are often a good choice.

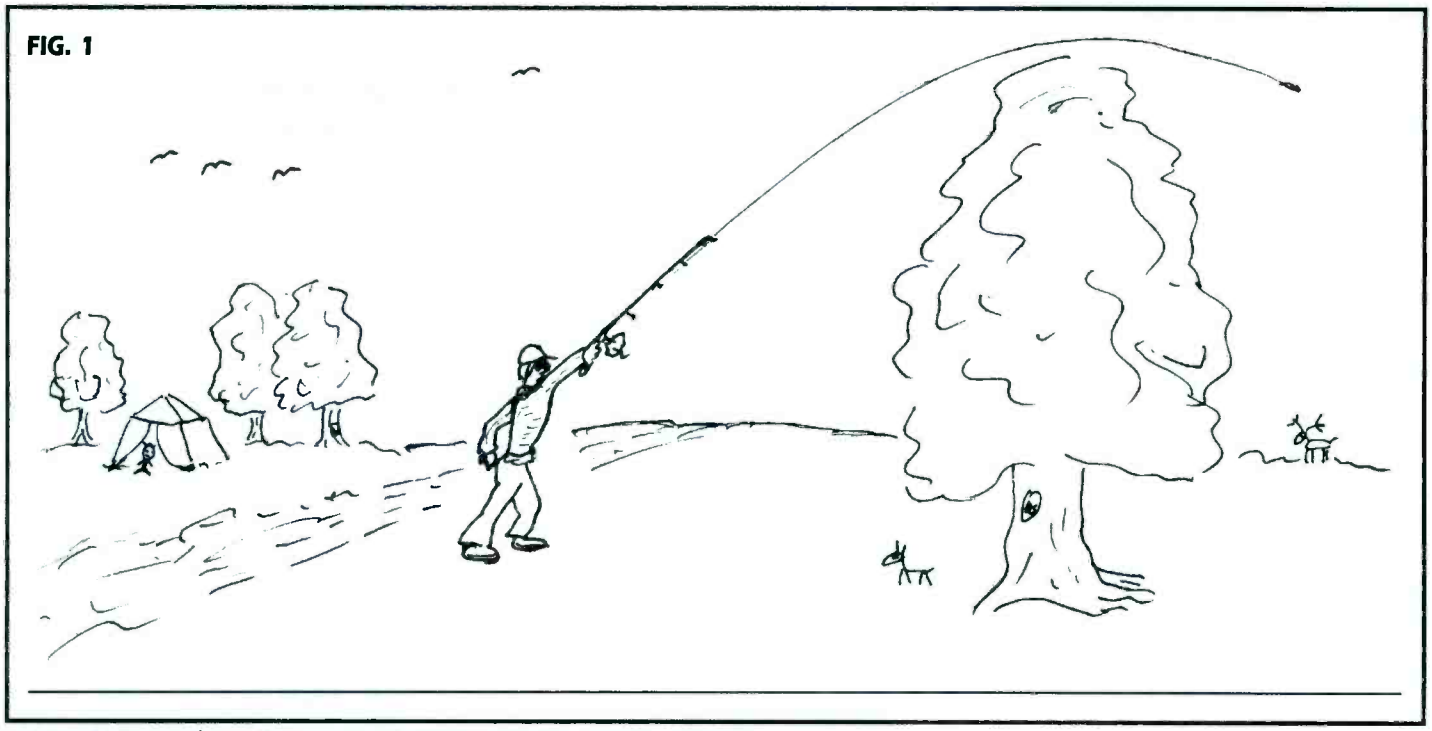
Another favorite of the AM broadcast-band DXer is the **table-top loop**. These small loops can sometimes pull in otherwise elusive signals due to their ability to null out some sources of noise and interference.

Antennas that need almost no erecting

There are several antennas which often provide satisfactory results with a minimum of time and effort required to put them into action. An old standby is a **random-length of wire** laid out around the hotel room. Despite its simplicity this antenna is often a respectable performer. Use the longest length of wire you can conveniently use to spread along the floor, behind furniture, or wherever.

As with any indoor antenna the unintentional shielding of the received signal by metal in a building may drastically reduce received signal strength inside that building. Sometimes we can get around that problem by tossing our wire out a window. Care must be used when putting something out a window, as it may present a sight unacceptable to others in the area, or to the

FIG. 1



One method of getting a line over a tall tree for vacation-antenna erecting.

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landlord. A dangling wire can also present a hazard if it is near the ground, or touches any other conductor.

Another quick and easy antenna which sometimes performs acceptably consists of a piece of **metal foil** wrapped (for perhaps a foot or so) around a phone cord or the AC-power cord of an electrical appliance. Care must be taken that the cords are not frayed or cracked and the metal foil doesn't contact the wires in the cord. Even connecting a **metal window screen** or metal balcony railing to the antenna connector of a receiver will sometimes produce decent results. A length of wire with an alligator clip will help connect this, or some of the other antennas mentioned here, to your receiver's antenna input connector.

Antennas that need a modest amount of erecting

Outdoor antennas generally perform better than indoor ones. If the length of your stay at a particular location will justify the time required for it, you may want to consider putting up an outdoor antenna. Often a length of line (the tow line) with a weight tied to its end will serve to quickly throw a line over a nearby tree. The tow line can then be used to pull a heavier cord up which can then be used to pull the antenna into position. Sling-shots and bow-and-arrows have also been used to pull the tow-line over the tree. I find a long fishing rod and large spinning reel to work best for me (see fig. 1).

If there are no trees or other high-tie points conveniently near, you may be surprised at the performance of a wire antenna held up by being laid out atop a patch of tall weeds. Yes, that's only 3 or 4 feet off the ground, but I've seen such an antenna work Germany, believe it or not. A rule of thumb is to mount an antenna as high as practical, but, when it's necessary, a low-mounted one sometimes will produce some worthwhile results.

And at frequencies below the HF band it is sometimes even possible to lay antennas directly on the ground and get useful results. **On-the-ground antennas** work best where the ground is very dry.

Realize that I'm not saying that low-height installations are desirable, it's just that if that's as high as you can manage it sometimes works out OK.

A **random-length** of wire often makes a decent outside antenna – the longer and higher the better. Once, when using a simple vertical vacation antenna run to the top of a tall tree, I could tap my transceiver's key, and then receive that "dit" after its speedy round-the-world propagation!

Where do you get vacation antennas?

Various types of small antennas suitable for traveling are available from such radio supply houses as Grove Enterprises, MFJ Enterprises, or other suppliers who advertise in *Monitoring Times*.

Most radio suppliers also stock books which can help you build your own vacation antenna prior to vacation. Two of the best are William Orr's *HF Antenna Book*, and the *ARRL Antenna Book*.

Check it out

If any of the antennas discussed above appeal to you for your next vacation then get one and try it out. For HF antennas be sure to try the antenna when the band you are listening to is open. It is easy to conclude that an antenna is a poor performer when actually there are just no signals to be heard on the band at the time you are listening! By checking the antenna out before the trip you will understand its capabilities and limitations with your receiver before you leave on your vacation.

RADIO RIDDLES

Last Month:

I asked "Is it possible to make a repeater from nothing but wire? How about from nothing but a sheet of metal?"

The answer is "yes" to both questions. An antenna reradiates much of the signal which it receives. And so a single HF antenna on a ridge can receive a signal, and reradiate that signal at reduced strength into the valley below.

It is also possible to receive a signal via a high-gain antenna on one side of the ridge, pass it over the ridge via a feedline, and direct it into the valley via a second antenna. Such antenna repeaters are called "passive repeaters." Even a sheet of metal can be used as a passive repeater when used to redirect a signal by reflection. Reflectors which resemble large billboards are sometimes used as passive microwave repeaters which redirect signals which they intercept.

This Month:

OK, so a repeater can be made from a piece of wire, but can an antenna be made from a piece of insulator?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. Til then Peace, DX, 73

What have we done for you lately?

Tripled the amount of information on the *MT* website, that's what. Our site is a great companion to your printed copy of *MT*, including a constantly-updated glossary of terms and web links mentioned in the magazine, spectrum allocations; clubs, links, events, frequencies, and mucho more! It's all at **www.grove-ent.com/hmpgmt.html**

DRAKE SW-2

OPTION

The **Drake SW-2** provide continuous coverage from 100 to 30000 kHz in AM, LSB and USB modes. Tuning is easy via manual knob, up-down buttons or 100 memories. The sideband selectable synchronous tuning stabilizes fading signals. Other refinements include: RF gain, tuning bar graphs, huge 100 Hz LED readout, keypad and dimmer. The optional remote (shown) lets you operate this radio from across the room (*Order #1589* $48.95). All Drake receivers are proudly made in Ohio, U.S.A. and feature a one year limited warranty.
Regular Price ~~$489.95~~ **Sale $399.99** (+$7 UPS)

The **Drake SW-1** broadcast receiver also covers 100 to 30000 kHz, but in AM mode only. Features include: 1 kHz LED readout, keypad, RF Gain and 32 memories. Both models operate from 12 VDC or via the supplied AC adapter. A great starter radio!
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ON THE HAM BANDS ...

THE FUNDAMENTALS OF AMATEUR RADIO

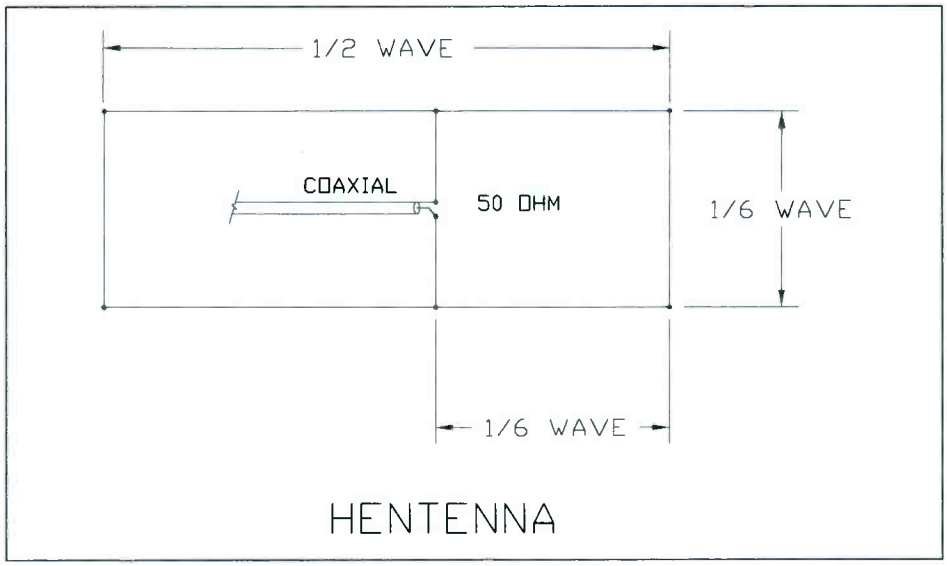
Ike Kerschner, N3IK
email: n3ik@hotbot.com

A Different Antenna

Over the years I have experimented with many different antennas, some were great, some poor; most were average. Standard practice says bigger is better, and so far that rule seems to hold true.

A requirement for a two meter antenna that gave some gain and was easy to put up sent me on a search through the various handbooks. I recalled an antenna called the **Hentenna**, which was said to be bidirectional, very easy to tune, and provided gain on the order of 4 to 6 dB over a dipole. This antenna was developed in Japan — *hen* meaning "fantastic" in Japanese.

The *ARRL Antenna Compendium, Vol 5* contained information on how to build a Hentenna, so I whipped one together for two meters. Total time to build the antenna was about two hours from start to operation.



Description

The Hentenna is a loop that is one-half wavelength on two sides and one-sixth on the other two. My two meter unit measures 38 x 12-3/4 inches. To feed the Hentenna, measure one sixth wavelength from one end and attatch your coax (see figure 1).

One distinctive feature of this antenna is that when the antenna is positioned on its side, the polarization is vertical; when the antenna is in a vertical position, polarization is horizontal.

Construction

My unit is made from number 4 solid copper wire. (If you use copper wire, be sure to "hard draw" it by connecting one end to the frame of your car, and the other to a solid support like a tree and stretching the wire 10 to 20 percent.) The center support is a pine one-by-two with several coats of shellac.

I formed my antenna entirely by hand and used some 18 gauge solid wire to join the loop. The diameter of the element is quite large, so use a heavy soldering iron (at least 100 watts). Connect the loop to the support and measure one sixth wave from one end. I use 18 gauge wire with a center insulator made of Plexiglas.

Initially connect an alligator clip to each end of the shunt wire (feed point). Move the shunt a quarter inch at a time till the antenna matches the line at the chosen frequency (146 MHz in my case), then solder the shunt to the element.

Operation

Normally I use a Ringo Ranger for two meter FM simplex operation. I have several friends that live due west of me and are usually readable unless a local is on the frequency. Range is about 50 miles, which is about the same distance as Philadelphia is from this location. Naturally the gang down in Philly can't hear my buddies, and most of the time stations from Philadelphia can be copied on every simplex channel at my QTH, which really limits my rag chews out in western PA.

After installing the Hen, I have had a lot more success with schedules; the stations from Philly can still be heard, but at a much reduced level, and I can find frequencies that are not occupied due to the bidirectional nature of the Hen. In the favored directions, the Hen does perform better than the Ringo Ranger. For an antenna that costs less than $5 to build, the Hen is a real performer.

Other Bands

I like 17 meters, so decided to construct a Hen for that band. I used two 10-foot long lengths of half-inch conduit for the short ends, and 14 gauge hard-drawn copper for the halfwave sections. Automotive hose clamps held the longer wire elements in place.

This antenna took a very short Sunday afternoon to construct. Tune-up was a breeze. The antenna is suspended by a rope from the 40 foot level of my tower and can easily be turned manually to take advantage of its bidirectional nature.

One additional feature of the Hentenna that I like a lot is the cost. My 17 meter Hen cost just over $7 with all new parts, and with careful scrounging the cost can be even less.

I compared this antenna to my double-extended Zepp that I normally use on 17 meters. First QSO was into LU (Argentina) on the Hen – my signal was 579; on the Zepp it was a 559. Several other stations to the south were worked with similar results. Turning the Hen to favor the Pacific Northwest, I worked a station in Oregon with a signal report of 5/9 plus; switching to the Zepp produced an S7 signal (the Zepp favors south, however, and cannot be turned). While not exactly a fair test, it does indicate the Hen is an improvement, since it can easily be turned by hand to a favored direction.

By the time you read this, I will have Hen antennas for 12 and 6 meters. If I could figure a way to put one up on the lower frequencies and still turn it, I'd give it a try, but my space will not allow anything over a 20 meter Hen. If you try a Hen, I would like to hear from you. There is a lot of experimenting that can be done with this design without throwing a lot of money around.

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Jock Elliott, KB2GOM
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Drake FRS Sport 110 Raises the Ante

It never fails to happen . . . that same reaction whenever I show someone a Family Radio Service radio for the first time. They pick it up and say something like, "This is kinda cute." When they hear the clarity of the audio, the response is usually, "Hey, these are really cool!"

Then comes the inevitable question: "What do they cost?" When I say $119.95 or $149.95 or $200, they swallow hard, look at me suspiciously and inquire, in a voice two octaves above normal, "a PIECE?!"

When I nod "yes," I can practically read their thoughts: "Holy smokes, I can buy a cell phone for that" or "I can buy two CB handitalkies for way less" or "Wouldn't those kids' walkie-talkies for $29.95 a pair work about as well?" The point is, price is often an obstacle for the average consumer looking at FRS radios.

Yes, there are inexpensive FRS handitalkies available, but usually they feature only one or two channels. My feeling is that, as more people purchase FRS radios and use them at potentially FRS-rich sites such as malls and amusement parks, they are going to want a full 14 channels and Continuous Tone Coded Squelch System (CTCSS) capability. After all, CTCSS provides that ability to set a tone code that blocks all transmissions except those that are on the same channel and use the required code.

So imagine my surprise when Larry Magne emails me a web page. It turns out that R.L. Drake, famous manufacturer of shortwave and ham radio gear, is selling FRS radios on its web site. Further, the Drake FRS110 has 14 channels, 38 CTCSS codes, rechargeable batteries and a drop-in charger, for just $79.95 each. Buy two, and Drake will cut the price to $74.95 a piece.

On its website, Drake claims the FRS110 (which is identical in appearance to the Audiovox FR-214Y FRS radio) is "one of the smallest FRS transceivers available in today's market." The Cherokee FR-460 still holds the title of smallest. Nevertheless, the Drake FRS110 is small: just 3-3/8 inches high by 2 inches wide by 1-3/8 inches diameter, excluding antenna.

The FRS110 is a "knobless" radio. On the front panel is a backlit liquid crystal display with indicators for channel, CTCSS activation, signal strength, scan, transmit, receive, low battery, and lock. Just below the LCD is the "push to talk" button, in the center of the radio. Below that, five buttons for controlling the radio. At the bottom front of the radio is a grill for the speaker.

The Drake FRS110 offers sparkling basic performance at a very friendly price.

On top of the FRS110, you'll find the antenna and jacks for an optional speaker/mic. On the back panel, there is a removable belt clip and a slide-off hatch for three AA batteries. Incidentally, the rechargeable batteries supplied with this radio are separate, AA-sized nickel cadmium cells. That means for extended usage you can start out with charged-up batteries, then switch to standard AA alkaline batteries when the first set runs down. Just make sure you don't inadvertently throw away the rechargeable cells or pop the radio into the charger with alkaline cells installed.

Operating the FRS110 is fairly straightforward. Power it up by pressing the red button. To change the volume, press the Up or Down key. To change channels, press the "F" button once, then use the Up/Down keys. To start scanning, press and hold the Up or Down key while in channel selection mode. Pressing the "F" key multiples times allows access to other functions – such as CTCSS tone selection and CTCSS activation – which are then controlled by the Up/Down keys.

To select a CTCSS code, press the "F" button twice, then use Up or Down to select the code you want. To activate the code, press the "F" button three times, then use Up or Down to turn the code on or off. When CTCSS is activated, the selected code is applied to all channels.

An unusual capability of the FRS110 – and one that I highly approve of – is the ability to digitally set the squelch level. Pressing the "F" button four times allows you to use the Up/Down keys to set the squelch higher for electrically noisy areas and lower for those that are not.

The performance of the FRS110 simply sparkles. The audio on transmit and receive is exceptionally crisp and clear, and the range is solidly in with the other "Big Gun" FRS transceivers. The bottom line: if you don't need the sophisticated functions of the high-end FRS units, the Drake FRS110 delivers great performance, 14 channels, rechargeable batteries, drop-in charger, and CTCSS tones at a price that is very kind to the wallet.

The FRS110 is sold only direct through Drake. Call 1-800-9-DRAKE-4 or visit **www.rldrake.com**.

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John Catalano, PhD
j_catalano@conknet.com

Get the picture with RadioCom 3.52

A picture is worth a thousand words. So the old adage goes. If you aren't convinced, take a look at Figure 1. This is *NOT* a composite screen that we have stuck together. This is the business end of Bonito's RadioCom 3.5; you can easily see why it caught my eye.

Although shortwave broadcasting of unencrypted digital signals, such as RTTY, has been steadily decreasing over the past years, many of us still enjoy the challenge. For us brave souls, RadioCom 3.5 offers the almost perfect listening environment. Its basic concept is the combination of computerized receiver control *and* digital signal decoding in one, easy-to-use program.

Those of you who have been reading this column for the past seven years will remember me babbling about the need for a "total monitoring environment" ... one where the listener has all they need – receiver control, decoding and database – in one user-friendly piece of software. Over the years a number of companies have made programs which come close. RadioCom 3.52 pushes it even closer.

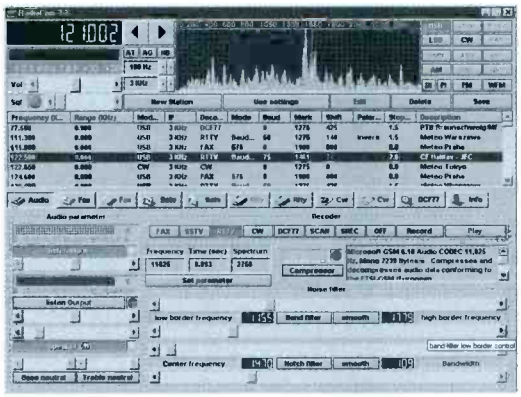

FIGURE 1 - *RadioCom 3.52's Opening Screen*

What You Need

In order to take advantage of all the features of RadioCom, a computer-controlled radio is required. The list of radios supported is quite extensive, ranging from most ICOMs, Yaesus, Kenwoods, Lowes, JRCs and AORs. Notably missing, however, is one of my favorites – WiNRADiO. Of course, you could use the decoding section and database with any radio, but that would not really utilize the full potential of this program.

Since RadioCom does so much, you cannot get away with using an old 486. At a minimum, a 100 MHz Pentium, with a 16 bit sound card, High Color (16 bit) video card and running Windows 95 or NT is required. We used an HP 3266 Pavilion (233 MHz MMX Pentium) running Win 95.

What You Get

The program comes with three items: the program on a 3.5 inch disk (I downloaded the update version 3.52 from their website), a thirty-four page manual, and a part called a "switchbox" in the manual. The manual is adequate with numerous screenshot illustrations. The English is a bit rough and requires some patience (and re-reading).

However, something got lost in the translation of "switchbox." In fact, this is really a serial port signal re-router. It has no switches and is housed in an elongated, gender-changer-type shell. This is plugged into the computer's serial port, while the other end is connected to the radio. Of course, if your radio requires an external computer adapter, then the other side of the "switchbox" goes to the adapter.

The inside of the "switchbox" is potted (encased in a resin compound) so you cannot see what components and circuitry are used. One word of caution on an apparent peculiarity of the switchbox: Since I use my computers for many different applications, I have a Belkin Components data switch (model F1B028-E) connected to my serial port. This enables me to connect four different serial port devices and switch between them without plugging and unplugging.

When I received RadioCom I simply attached the Bonito "switchbox" to the data switch. But when I ran RadioCom it could not find my radio. I installed and uninstalled, used different settings, checked all connections, made sure the radio was operational, and, finally in desperation, attached the Bonito switchbox directly to my computer. You guessed it ... it worked perfectly.

I have reinserted the data switch and even tried data switches from other manufacturers, with the same results. Since this is the first, and only, problem of this type I've encountered, I'm not sure of the source of the problem. For now, I can only suggest that you don't use a data switch with RadioCom.

In order to use the digital audio filters you must connect the audio out of your receiver to your computer soundcard's line input.

Installation and Use

Installing the software is quick and simple. Two installation screens require user actions. In one screen the user selects the receiver to be used from a list. Then the "switchbox" type being used must be selected. Bonito has two different switchboxes; one for ICOMs and the other for all others. The rest is pretty automatic. Once installed, the program is run from a shortcut which is conveniently placed on your desk top and you are greeted by Figure 1.

RadioCom's default screen is broken down into four sections, stacked vertically. The top section provides receiver control and displays the audio spectrum of the received signal. The next section provides access to the database. If we look closely at a line in the database we can see that each entry not only has frequency and mode information, but also includes decoder setup parameters.

Look at the highlighted line in Figure 1. On the right side of the screen is the station's name; in this case CF (Canadian Forces) Halifax. The database comes loaded with lots of station data which can be modified, deleted or used as-is. Here, the JFC next to Halifax is my note that I have verified this logging.

Looking to the middle of the highlighted line we can see that left clicking on this database entry will not only tune the receiver and set its mode, but it will also set the decoder to RTTY with a baud rate of 75. The mark tone frequency will be set to 1461 Hz, while the shift will set to 74 – *all* done by a click of the left mouse button! Right clicking tunes to that station's frequency and mode, but does not change the other parameters – useful when the same frequency is used for different digital signals, such as RTTY and FAX.

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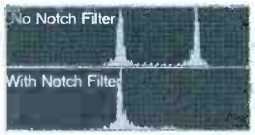

FIGURE 2 - *The Effectiveness of RadioCom's Notch Filter*

Decoders and DSP Filters

The **digital audio filter** section is the area at the bottom of the screen. We have all had headaches from whistling heterodynes generated by interfering stations. Using the notch filter at the bottom of the screen will make some unreadable signals readable and make monitoring more pleasurable.

The procedure is simple. A few clicks will bring up the Notch filter button which produces a "U" shaped line on the audio spectrum display. Move the slider at the bottom of the screen until the "U" is over the offending whistle peak (right peak, top of Figure 2). Then the Bandwidth slider tightens the "U" around the whistler. The whistle will be gone aurally and visually from the audio spectrum (Figure 2, bottom)!

RadioCom's filter replaces the costly, external digital signal processor (DSP) filter unit that I usually use when monitoring. Used correctly, having a suite of adjustable filters at your disposal adds a whole new dimension to monitoring.

The **decoder** selection line in the center of the screen is where the user selects the type of signal to be decoded: FAX, SSTV, RTTY, CW or German Time Signal decoder (DCF77 at 77 kHz). Three additional modes, Baudot, Synchronous Baudot and Sitor-B, are possible under the RTTY heading.

Selecting a decoder type changes the bottom of the screen to display decoder parameters and decoded text. Figure 3 shows the signal tuning display at the lower left and the decoded meteo weather data from CF Halifax. Once you find the correct decoder parameters for a given station you can save it in the database.

You can see from Figure 3's tuning display (lower left corner) and the audio spectrum (top center) that Halifax's signal was relatively in the clear. The decoder performed very well and produced the decoded text on the lower right. It was impressive even in high noise situations where the intercept signal was not visible above the noise in either display.

When decoding FAXes they scroll down over the whole lower area, replacing the tuning display and decoded text area. FAX reception was easy, resulting in good images.

"Total Monitoring Environment" ? Almost

RadioCom is a very ambitious product and is a tribute to the author's abilities. Most of the features work well. But we did experience a number of problems. The most annoying was a tendency for the program to stop with a screen saying "Floating Point Error - Bad Argument in Function ...."

Although requiring the program to be restarted, little if any data was lost and Windows 95 did not crash. It appeared to be related to the use of the digital audio/filter section. Changing the audio parameters also seemed to cause the program to stop and require restarting.

Although I have done a number of diagnostic tests, I'm still not 100 percent sure that it is not something unique to my system software. My system's hardware is as-supplied by Hewlett Packard with no additions or modifications. However, the problem could be associated with one of my memory-resident programs, such as Virus Scan, or a sound card incompatibility. I'll keep you posted when/if I find out any more details.

The number of decoder types are limited to the basic few which carry clear language. This may be adequate for HF, but we suggest the author add decoder types useful to VHF/UHF monitors, particularly ACARS.

Although the database is user friendly it lacks two useful features, in my opinion. I could not find a date-of-monitoring field, nor a comments field. Also, though adding new stations was very easy, there does not seem to be a method of sorting the database. New stations are added to the end of the list, regardless of frequency. A Sort command is a necessary tool which is missing. I'm sure that the database could be manipulated using some standard database program, but you would lose the total monitoring environment.

RadioCom is so-o-o close to being a total monitoring environment. In my opinion, in concept, implementation, and ease of use it leads the pack in 1999 for monitoring software.

Check out RadioCom's website at **www.bonito.net/bonito/gbhome.htm** (or contact Bonito-Germany, Dennis Walter, Gerichtsweg 3, D-29320 Hermannsburg; Fax: 05052-3477, email: *info@bonito.net*). RadioCom is not cheap, starting at around $185 USD. It is available from the website along with a list of dealers in various countries. However, when you consider the cost of a decoding package (~ $100) and a separate receiver and database program (~ $80) and all its other features and convenience, its price is on the Mark ... uh, or is it the Eurodollar?!

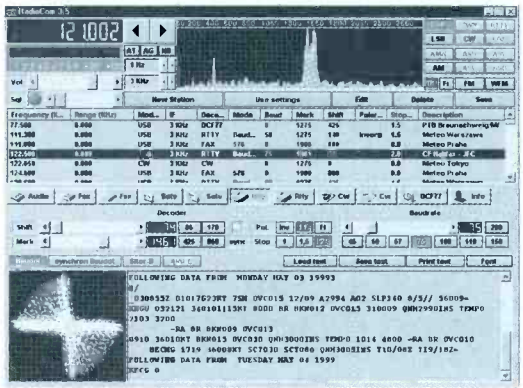

FIGURE 3 - *RadioCom's Decoder Screen*

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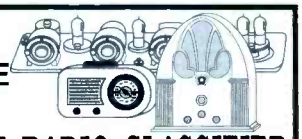

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MAGNE TESTS

SHORTWAVE EQUIPMENT REVIEW

Lawrence Magne
Editor-in-Chief, Passport to World Band Radio

Latest Version of Japan Radio's NRD-545

When we checked out two versions of Japan Radio's new NRD-545 DSP receiver last summer, we found much to commend. In particular, it has not two or three or four bandwidths, but nearly a thousand—overkill, perhaps, but certainly a welcome improvement over other models. More important, its skirt selectivity is razor sharp, slicing off interfering signals like a guillotine.

Add to that a number of important and useful features, along with excellent ergonomics and Japan Radio's well-earned reputation for superior quality of construction, and it has many of the earmarks of a real winner. This has translated into financial success, as well—industry reports indicate the '545 has sold faster than the factory can produce them.

Superior receiver, but with drawbacks

Of course, for $1,800, street price, you expect something special. But even Ferraris have drawbacks, and so too does the '545. Audio quality continues in the Japan Radio tradition of mediocrity, for example. Too, there is no AGC adjustment in the AM mode, which is the mode used by world band stations; the single AGC time constant configuration is such that world band listening is an aural strain unless the synchronous detector is used.

But what we didn't expect to find was surprisingly limited ultimate rejection, the measurement of the maximum depth of selectivity before an adjacent signal begins to leak through or under the filter's skirts. On the simplest of portables this tends to run in the range of 42-50 dB—a mediocre showing suitable for a mediocre radio. But high-quality tabletop models usually run between 70-90 dB, which helps allow the listener to hear a feeble DX signal that's smack alongside a powerhouse signal.

Digital circuitry can degrade ultimate rejection

In the old days measuring ultimate rejection was straightforward. But with the advent of synthesized tuning, synthesizer noise has added an element of degradation. True, leakage might theoretically be at "X," but the intrusion of wideband synthesizer noise would

limit the effective ultimate rejection. Of course, this noise also limits the degree to which ultimate rejection can be measured, so there is no accurate way to ascertain that theoretical "X."

With completely digital receivers, this same basic problem of compromised ultimate rejection has the potential to be compounded, as fewer analog circuits are used. This has been the issue with the DSP Japan Radio NRD-545, whose ultimate rejection characteristics have proven to be unusually nettlesome.

The earliest versions of the '545 had serious limitations in that regard. Although ultimate rejection was improved by the time we tested a revised version late last summer, it was still the worst we had ever encountered in a tabletop communications receiver.

We recently tested two new samples of the '545 to see whether this performance variable had been improved, and in a nutshell it hasn't. Yet, it is equally clear from several months of reader feedback that what is taking place is new and complicated enough to require a more detailed measurement than has been given by the traditional ultimate rejection figure. With that in mind, we set out to devise a more meaningful way of measuring this unprecedented phenomenon.

New measurement now created

What we have come up with are two types of measurement of ultimate rejection for DSP models with intruding spurious noises or tones: the traditional figure, such as is used for radios with standard discrete filters (*viz.*, ceramic, mechanical, crystal-lattice, LC); supplemented by a new measurement that we'll call the "average ultimate rejection equivalent." The former is an absolute figure—no ifs, ands or buts. However, the new figure is the ultimate rejection with DSP spurious noises and tones allowed in and explained separately.

Except for the little-produced initial version, the former and current versions of the '545 have a traditional ultimate rejection of 45 dB, clearly substandard for a receiver in this class. Specifically, the '545 has 45 dB of spurious-free rejection of signals within plus or minus 10 kHz of the center frequency. However, with the DSP spurious tones allowed in—the average ultimate rejection equivalent—this improves to between 55 and 60 dB, an acceptable if uninspiring level.

Impact on broadcast DXing

What does this mean in the real world of broadcast DXing?

First, keep in mind that the '545's shape factors are outstanding, so up to the point where ultimate selectivity becomes an issue this rig does a first-rate job of slicing away adjacent-channel interference.

Second, the DSP in the '545 which provides the continuously-variable final selectivity is protected by an 18 kHz (at -6 dB) ceramic filter at a 455 kHz IF. Thus, signals roughly ten kilohertz or more removed from the desired center frequency are rejected and do not impinge upon the DSP processor. But all signals within that 18 kHz "window" are injected into the DSP and can overload it.

What we have found is that signals which are 300 µV or less at the antenna input are handled very well by the digital processor. Unfortunately, if undesired signals outside the user-selected bandwidth are stronger than 1000 µV (1 mV) they will exceed the linear processing range of the DSP chip.

What this means is that when the chip goes into limiting, it suddenly produces spurious signals of its own. If overloaded by a single carrier, the DSP will produce a modest number of spurious tones. But when two or more carriers or modulation from a strong signal overload the DSP, an intermodulation spectrum is produced that has several dozen spurious tones.

"Monkey chatter" produced by overloaded DSP

Thus, a strong world band station on an adjacent channel (5 kHz away) or an alternate channel (10 kHz away) can overload the DSP with its carrier and modulation. If, for instance, an alternate-channel signal is very strong—say, with its carrier and modulation

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envelope in excess of 1 mV—this spectrum will intermodulate in the DSP processor, producing high-order IMD products that end up in-band, smack atop the desired weaker signal. Thus the distortion products do not leak around the DSP filter, but are *produced by the processor*. These 3rd, 5th, 7th, 9th, etc. order intermodulation products end up in-band, sounding like leakage or splatter.

Of course, the same anomaly applies to a similar extent with BCB (AM-band) DXing, where channel spacing is 10 kHz or 9 kHz, and narrow-spaced "splits" are not uncommon.

This explains what '545 listeners have been encountering, which is generally reasonable ultimate rejection except for what has been described as "monkey chatter" sometimes being audible. These "chatter" signals are the intermodulation products produced by the overloaded DSP.

If audio components within plus or minus 10 kHz are few and not strong, perceived ultimate rejection is fairly good. If, however, adjacent- or alternate-channel broadcaster(s) are emitting heavy amounts of audio within the 18 kHz pre-DSP filtering window, the "monkey chatter" is audible to that extent. This means, of course, that the interfering "splatter" is being produced within the radio, which is why in A-B comparisons it doesn't show up on other models of communication receivers.

There is a philosophical question as to whether this should be considered a component of ultimate rejection or a specialized form of dynamic range, but because its impact is on ultimate rejection we will consider it as being of that genre.

Top-notch utility receiver, with limitations for AM-mode reception

Bottom line is that the NRD-545 is a sterling DX machine for utility chasing. For utility reception, ultimate rejection and audio quality are less relevant than with broadcast reception, and with non-AM-mode reception the '545 has excellent AGC flexibility.

Yet, for DXing or listening to shortwave broadcasts the '545's solid virtues have to be weighed against its ultimate rejection limitation, the lack of adjustable AGC in the AM mode, so-so audio quality, and the lack of the ability to install an IF output so such audio-enhancing accessories as the Sherwood SE-3 can be added.

Grundig Yacht Boy 300PE being introduced

By the time you read this, Grundig should have introduced the new Yacht Boy 300PE. With a street price of $99.95, the 300PE features an illuminated digital frequency readout, tuning in 5 kHz increments, 24 presets, direct-access keypad tuning and up/down slew tuning. Nearly all the shortwave spectrum is covered except the world band segments between 7305-7600 and 9300-9495 kHz.

We'll be testing it as soon as it becomes available.

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Racing Electronics RE2000 Alpha Portable Scanner

Racing Electronics is a company that sells communications equipment and frequency lists to auto racing drivers and fans. Their catalog shows Motorola 2-way radio equipment, Uniden scanners, and the RE2000 Alpha – a portable scanner made in Japan by RELM especially for Racing Electronics. The RE2000 is very much like an enhanced HS200, a scanner we reviewed in April 1997 *MT*.

Like the HS200, the newer RE2000 is equipped with built-in CTCSS (continuous tone controlled squelch system) and DCS (digital coded squelch) decoding. The RE2000 has additional features like alphanumeric memory labels and computer downloading capability.

The Basics

The RE2000 tunes the conventional bands, including 800 MHz and civil aviation. Citizens Band is included, too (see measurements table). AM and NFM (narrow FM) modes are automatically selected based on frequency and cannot be overridden. The aircraft band is covered in 25 kHz steps, versus 12.5 kHz steps found in other scanners. Both the RE2000 and HS200 support VHF high band step sizes of 5 and 6.25 kHz, though the latter is not mentioned in the manuals.

The 200 memory channels are divided into 10 banks. The RE2000 is supplied preprogrammed with dozens of racing frequencies, tone codes, and labels, though we reprogrammed the channels to suit our testing. Channels can be locked out from the scan list or cleared. The first channel of each bank is a priority channel that can be checked every 2 seconds. You can access a channel directly through the keypad or scroll through the channels by twisting a top mounted selector knob.

The RE2000 and HS200 key sequences follow in the tradition of older Regency programmables, like the M400. You program a memory channel by typing the frequency digits, then press Enter and the channel number, followed again by Enter. You can stop there or use the keypad or selector knob to specify a CTCSS or DCS code. Pressing Enter stores the code in the current memory channel. A 2-second rescan delay can be enabled or disabled for all channels at the same time, not on a per-channel basis.

Racing Electronics claims a scan speed of "up to 100 channels/second," but we measure a rate of about 43 channels/second with a mixture of frequencies and CTCSS codes in different bands and banks. The word SCAN appears on the display instead of a sequence of channel numbers or "rolling zeroes."

The RE2000 has a weather search key and supports one search bank with programmable limits. Up to 100 frequencies can be locked out during a search, twice as many as the HS200. Reprogramming either search limit erases the skip memories. We measure a search rate of 104 steps/second, regardless of step size. When placed in search mode, the DL/HL (delay/hold) key toggles between two settings: restart delay or search hold, which halts the search upon finding a signal. In the latter case, the channel selector knob can be used as a VFO (variable frequency oscillator) tuning knob, although the RE2000 contains no VFO, per se.

Tone Squelch

The HS200 was the first portable scanner to include a CTCSS tone squelch. The ICOM IC-R2 and now the RE2000 have followed suit. CTCSS / DCS tone squelch is a great asset in areas where frequencies are shared by disparate users. If you know the code used by the system you want to monitor, you can program the proper code into memory and the HS200 will ignore signals on that frequency unless they are transmitted with the matching code.

Our county sheriff uses the same frequency as the Chicago Police, 60 miles away. We program the CTCSS code for our sheriff so we don't have to listen to Chicago during band openings.

The RE2000 tone squelch can be used while in manual mode or while scanning, but not while searching.

Power and Packaging

The RE2000 is designed to operate from AA penlight cells. The battery trap door is difficult to open on our scanner. The batteries can be alkaline or nickel cadmium, and a NiCd charging circuit is built inside the scanner. A 12 Vdc power jack is located on the side of the case and a wall wart power supply is furnished. It can power the scanner while charging NiCd batteries (not supplied). A battery saving feature reduces current drain after a few seconds of silence in manual mode.

The RE2000 powers up doing the same task it was doing when last powered off: scanning, searching, or in manual mode. Too bad more scanners don't behave this way. If you use the scanner as a monitor receiver in manual mode, it saves you the bother of taking the scanner off your belt and pressing the Manual key each time you turn it on.

The RE2000 liquid crystal display contains most of the information you would expect in a portable scanner, plus a 5-bar S-meter. The low contrast display makes viewing difficult unless held at the proper angle. The plastic lens is flush with the front panel, exposing it to more scrapes than a recessed lens would be.

Kudos to Racing Electronics for including a backlit keyboard. The Lamp key illuminates both keyboard and display using green LEDs, which remain lit for 3 seconds unless another key is pressed. The lamps light whenever a signal is present or the squelch opens. We couldn't find a way to disable this feature for those times it's not needed.

Computer Downloading

The optional RE2000-PC kit includes a 3-foot cable to connect the RE2000 to the 9-pin serial port on a personal computer, a software disk, and an "e-GUIDE" disk. The e-GUIDE disk contains 24 files of racing frequencies, CTCSS / DCS codes, and alpha labels ready to download into the scanner. We are writing this column at the end of April and our e-GUIDE disk was dated April 1999.

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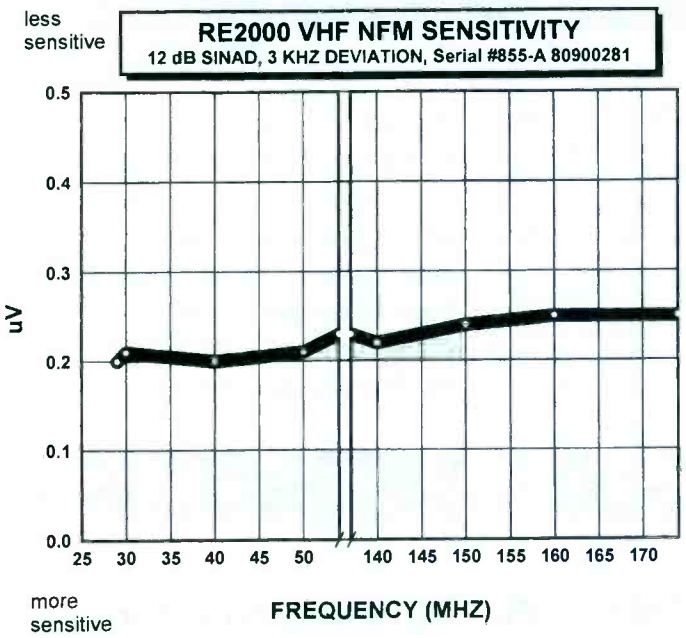

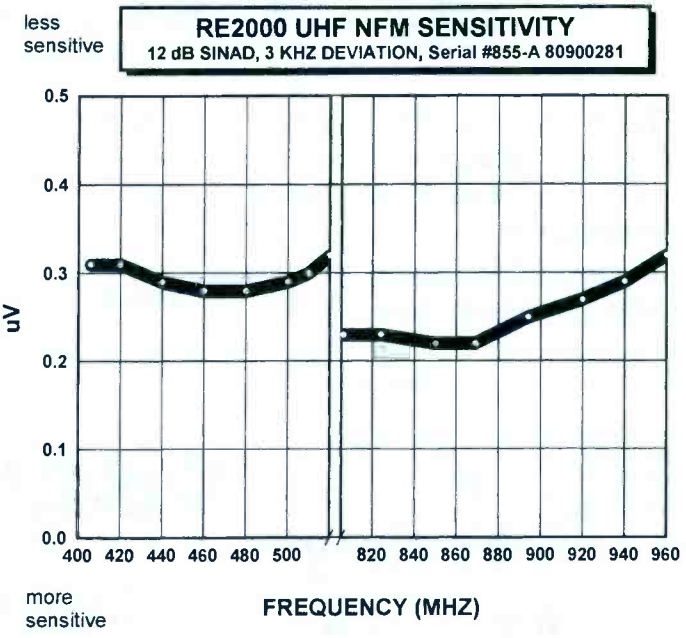

RACING ELECTRONICS RE2000 MEASUREMENTS

SERIAL NO. 855-A 80900281

Frequency coverage (MHz):
- 26 - 28.995 in 5 kHz steps (AM)
- 29 - 54, in 5 kHz steps
- 118 - 137, in 25 kHz steps (AM)
- 137.005 - 174, in 5 and 6.25 kHz steps
- 406 - 520, in 12.5 kHz steps
- 806 - 824.0375, in 12.5 kHz steps
- 848.975 - 869.0375, in 12.5 kHz steps
- 893.975 - 960, in 12.5 kHz steps

FM sensitivity:
- (12 dB SINAD, 1 kHz tone, 3 kHz deviation, see charts)
- less than 0.32 uV

Modulation acceptance:
- 15 kHz

Intermediate Frequencies:
- 280.2 and 0.45 MHz

Practical scan rate (approx.):
- 43 channels/sec.

Search rate (approx.):
- 104 steps/sec.

Audio output power (measured at earphone jack):
- 138 mW @ 10% distortion into 8 ohm load

Current consumption @ 6VDC:
- 70 mA scanning,
- 140 mA scanning plus lamp,
- 218 mA open squelch, max. volume.
- Battery saver reduces consumption considerably in manual mode.

The Racing Scanner software, version 1.20, resembles the software furnished with the RELM MS200 mobile scanner. Frequency files, named with an .scn extension, consist of comma-separated lines of ASCII characters. You can copy frequencies from the computer to the scanner and vice-versa, but the software does not control scanning.

An optional RE2000-CC cloning kit contains a cable to connect two RE2000s. This permits the memory contents of one scanner to be copied to the other scanner.

Does it Work?

The RE2000 is supplied with a 6-1/4 inch rubber-covered helical antenna, fitted with a BNC connector. The RE2000 antenna is different from the HS200 antenna and a lot more flexible.

Our RE2000 is sensitive both on the bench and in the field. We measure better than 0.3 µV SINAD NFM sensitivity on most frequencies (see graphs). The RE2000, like the HS200, is an excellent companion during trips to busy shopping malls. The good sensitivity and fast search capability allowed us to find and monitor security and inside sales operations of several area stores while sitting in the parking lot.

The user manual did not specify the IFs (intermediate frequencies). Like the HS200, the RE2000's first IF appears to be 280.2 MHz and the last IF is 0.45 MHz. The high first IF and selective front end does a good job of rejecting images, though cellular telephone signals popped up in the 800 MHz range when we drove near cellular base stations.

RE2000 audio quality is good, but not quite as loud as the HS200 we tested. We measured about 140 mW of audio at the earphone jack (vs. 200 mW for the HS200); it's probably attenuated to avoid hearing damage.

Summary

We enjoy using the Racing Electronics RE2000. It has several important strengths: CTCSS and DCS decoding, outstanding performance, alpha display, and computer downloading capability.

The RE2000 is available in either black or red. It is supplied with a helical antenna, metal belt clip, earphone, carrying strap, AC wall wart, and a comprehensive booklet of auto racing frequencies and CTCSS / DCS codes, vol. 11, no. 3, dated 1999. For more information, contact Racing Electronics, 34 Somerset Ave., Pleasantville, NJ 08232, call 1-800-272-7111 or visit their web site at **www.racingelectronics.com**.

May Column Correction

Ray Parker caught a potentially dangerous error in figure 2, the remote scanner controller schematic on page 92 of our May column. Relay RL4's contacts are shown breaking the neutral side of the ac plug. They should be breaking the hot side of the ac plug instead. Thanks to Ray for calling this to our attention.

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ASK BOB

ANSWERS TO YOUR RADIO QUESTIONS

Bob Grove, W8JHD
bgrove@grove-ent.com

***Q.** Last February, as President Clinton's motorcade drove past my Boston office, the TV picture was disrupted for about 30 seconds. What caused this? (Jim Ashe, Weymouth, MA)*

A. If your TV set is attached to an antenna rather than cable or a satellite dish, you most likely experienced either fundamental overload or harmonic interference from radio equipment in the convoy. Remember, the convoy carries the most important political figure in the world, so there is a great deal of communications equipment in operation.

Most (if not all) of this radio action is in the government portion of VHF high band (162-174 MHz) and UHF (406-420 MHz).

***Q.** Around noon, while listening to 11.605 MHz international shortwave, I hear a terrible, loud, roaring noise on the otherwise strong signal. But if I switch to their alternate frequency, 15.615 MHz, they are loud and clear on my battery-operated portable.*

Bob's Tip of the Month

• More on the Fat vs. Thin Antenna Wire Question

In our April column, a reader asked why, when he substituted a length of 3/4" hardline coax for a previous wire antenna, his signals seemed stronger.

While length, not width, of the conductor is the primary factor, a number of other factors come to play as well, as we mentioned in that same column. For example, unless he made the A/B test between the two antennas at the same time, same height, and same plane, and separated by more than a quarter wavelength at the lowest test frequency, directivity and propagation could make a major difference.

Several astute readers suggested some other factors as well. Gary Krohe and Bob Boch, Jr., both pointed out that the extra girth of the antenna could, indeed, improve the signal. Gary went on to detail why.

The larger the element's thickness compared to length, the more constant will be its (low) impedance over a wider frequency range. The thicker antenna will maintain a closer impedance match to the coax transmission line over more spectrum, equating to less loss. The thin wire, on the other hand, will exhibit many high-impedance "humps" over the same range, contributing mismatch with the transmission line and consequent signal loss.

Engineer Radcliffe Cutshaw had some excellent input, too. The increased diameter means better conductivity, even though the hardline shield is aluminum. The considerable reduction in resistance means that more current can flow in the antenna, equating to a stronger signal.

Makes sense. Thanks, everyone!

• More on the "License-Free Wireless Mike" Question

In our March issue we implied that wireless mikes do not require licensing by the Federal Communications Commission. Bruce Clark of Mannheim, Germany, correctly pointed out that while this may be true for 88-108 MHz Part 15 devices, other wireless mikes in the 169-172 MHz federal radiotelemetry band (Part 90), and 174-216 MHz TV broadcast service (Part 73) do, indeed, need licenses. They might not have them in the boxes, and the manufacturer may not say a word about it, but because they are a source of potential interference to co-channel users, a license requirement is specified by the FCC. Thanks, Bruce, for this clarification.

• More on Sony Memory Battery Replacement

In our May column, we described a reader's suggestion about putting a filter capacitor across the AA cell terminals in the Sony 2010's battery compartment so that the memory batteries could be replaced without erasing the contents of the memory. Reader Ray White of Kanata, Ontario, reminded me that more than two years ago he suggested the same thing, but using a smaller (1000 µF) filter capacitor.

Ray also reminds us, moreover, that this is certainly not a substitute for fresh batteries; it only holds in reserve a small voltage from the batteries you are replacing, and if they are dead, you've already lost the memory contents – capacitor or not!

This same procedure will work with any radio that has a memory keep-alive battery, including communications receivers. It's always a good idea to replace memory batteries before they are depleted; Ray suggests 1.3 volts per cell as a good minimum for zinc/carbon and alkalines.

And how about lithium cells? ICOM America suggests replacing their 3 volt lithium cells once their terminal voltage reads about 2.85 V. But this means a good 20 years or more of use under normal circumstances.

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What might be the cause? (Gerald Silver, Tamarac, FL)

A. Since at that time of day both of these frequencies are occupied by Kol Israel, I suspect that is your target station. Do you hear the interference anywhere besides on or very near 11.605 MHz? If not, it may be intentional jamming from a politically hostile Mideast country. But if the noise stays at the same level, day and night, regardless of the presence of the broadcaster, it would not be a jammer.

If the noise spreads out over a much wider frequency range than the one channel, then it is some type of local interference like fluorescent lights, electric heaters, thermostats, light dimmers, or some other appliance. You could walk around your home with the portable radio to see where the noise becomes loudest in order to identify the offending accessory.

If you don't find a particular device causing the interference, turn off the main breaker at your service panel to see if it is even coming from your home. If not, look outside, taking the portable toward the power pole, or even walking by neighboring homes to see if you can find where the noise is loudest.

Q. *I notice that the popular, new Icom FRS handie-talkies have a transponder mode which automatically transmits once a minute and listens for another unit on that channel to respond. Wouldn't this make a good tracking system for children, stolen articles, or even vehicles? Couldn't it even be used for private investigators and law enforcement agencies as a "bumper beeper," and for direction finding exercises ("fox hunts")? (Don Harbolt, Blythe, CA)*

A. Yes, it transmits automatically for just over one second in the transponder mode, and both rigs handshake once a minute. Even without the second unit on, the first one, in the transponder mode, sends out a one-second query every 60 seconds.

Q. *The article on fractal antennas in the April issue was intriguing. What is the possibility that such compact antennas might eventually replace the whips on portable shortwave radios, and perhaps even larger Beverage antennas? (Bob Fraser, Cohasset, MA)*

A. Probably not, although there are many unanswered questions about fractal antennas. Even though they seem to provide gain over an equal-length straight wire wire antenna, I suspect the gain comes from patterning – the distortion of incoming signal waves due to the geometry of the conductor in the peculiar antenna.

There is a distinct wavelength relationship to all this, so that at shortwave and lower in frequency, the antenna must become progressively larger. The fractal antenna seems to show its greatest promise at VHF and above (shorter wavelengths), where tiny antennas already rule.

Q. *What is spread spectrum and why is it an advantage to cordless telephones? (Ryan, E-mail)*

A. Spread spectrum is a method of breaking up the sound on the signal into digital bits, then evenly distributing the digitally-modulated signal over several megahertz of bandwidth. A conventional (analog) scanner cannot decode the digital signal, and multiple spread-spectrum telephones can occupy the same spectrum simultaneously because the likelihood of all of the billions of "bits" of information striking exactly the same frequency at exactly the same time is vanishingly small.

I have a Uniden spread-spectrum cordless phone, and all I can hear on my scanner is an increase in background noise over a wide bandwidth when the phone is in use. It is unmonitorable by scanner eavesdroppers.

Interestingly, spread spectrum, a form of frequency hopping, was invented by movie legend Hedi Lamar in the late 1930s in Germany. In defiance of the Nazi Party, she moved to the United States and gave all rights to the U.S. Government to help defeat the Nazis.

Q. *What is the power limit of Traveler's Information Service (TIS) stations on 530 and 1610 kHz? What will be the effect of the new extended broadcast band (1600-1700 kHz) on these stations? (Mark Burns, Terre Haute, IN)*

A. Licensed by the Federal Communications Commission (FCC), these portable transmitters run only 10 watts because of their limited-range requirements. At the present time, there doesn't seem to be much conflict from co-channel users, although the first 1610 kHz broadcaster is expected to be assigned his permit in Texas soon.

We don't know if the Commission is making a conscientious effort to avoid frequency conflicts between these services, nor whether one service will be considered primary and the other secondary. If there is, undoubtedly the broadcaster will get the nod to be on top.

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 WWW site: www.grove-ent.com

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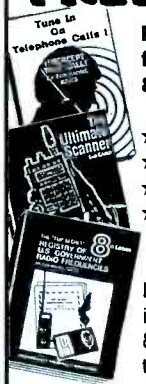

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The Kloss Model 88 AM/FM Radio

By Ken Reitz

Amar Bose debuted his Wave® radio in the early '90s and introduced a new generation of radio listeners to a fascinating concept: the table radio. Its success has been well documented and must have gotten the competitive juices flowing in a certain Henry Kloss, a long time pioneer in audio high fidelity.

In the late '50s and into the '60s Kloss led in America's Hi-Fi craze. Founding companies such as Acoustic Research and KLH, he continually pushed for perfection in audio fidelity. His Model 8 series of table radios brought the sound of big component stereos to smaller FM radios at a time when stereo FM radio stations were just beginning to proliferate. He continued to perfect the product into the mid '70s, but those years were not kind to American manufacturers.

Times change, however, and as Bose has now so ably demonstrated, the time is right to go back to the American market.

A Feast of Features

The Kloss Model 88, introduced just last year, is exquisitely designed and delivers the kind of high-end audio you'd expect to hear from an audio legend. This diminutive radio, measuring just 14"W x 5"H x 8"D, seems created not just for the living room table or bedroom dresser: It's also a perfect fit beside the computer. Let's take a closer look at the features.

The Model 88, available in ivory or slate grey, sports a kind of retro '60s styling. The painted aluminum grill work, which covers all but the front mounted control panel, gives it a solid appearance harkening back to quality you can see and touch, not just hear. With speakers on either side of the control panel, there's a distinctive duct at the lower right of the radio. It's part of the design which delivers the superb bass from the powered sub-woofer.

The front control panel features an LED display which is easy to read even across the room. The panel buttons are well spaced and laid out with screened labels on the front of each. The front panel also includes a discreetly placed but easily accessed headphone jack.

The rear panel includes two sets of stereo input jacks. One set, RCA jacks, are intended to take the output from a small, personal CD player; the other, an 1/8" stereo jack, allows you to play the audio from your computer directly into the Model 88. While the extra long power cord also doubles as an FM antenna, consumers who live outside the primary reception area of FM signals will appreciate the 75 ohm antenna jack on the back as well. For those who like to take their FM reception on the road, a 12 volt power jack is also provided.

And, finally, Kloss allows us to tailor the Model 88's bass response by providing a knob on the back which controls the level of bass you hear. The Model 88 is shipped factory set at the indented center position. Turning the knob either way can back off the lows or accentuate them depending on your taste and whether or not you have neighbors.

Hearing is Believing

The Model 88 comes with an infrared remote control the size of a credit card. Every button on the front panel is duplicated on the remote which has excellent range in both distance and angle from the radio. Tuning the FM band, the Model 88 had the same sensitivity and selectivity I'd expect from an expensive stereo component receiver. But, the fun part was tuning in a strong stereo signal and pressing the "wide" button. Now, special circuitry is engaged which spreads the aural dimension of the unit and actually makes it seem that the speakers are on each side of the room, not just six inches apart. It's a slight of ear which gives the Model 88, literally, a new dimension.

Another advantage in tuning is the mono button. Many listeners living out of range of the primary stereo signal will experience "FM hiss" which is present when the signal is not optimal. But, by pressing the mono button, the hiss disappears and the marginally received station is now crystal clear.

To really test the capabilities of the Model 88, I plugged in the audio from DMX® the satellite delivered CD quality music service. I set the DMX receiver to the Classic Jazz channel and made sure that all innocent by-standers were out of the house. I started easing the volume up on the remote just as DMX was playing legendary jazz bassist Ray Brown doing his *"The Real Blues"* which features an extended acoustic bass solo. I could actually hear Ray Brown's finger slipping off the strings and hitting the finger board as the notes seemed to explode from his bass. I reached "99" on the volume about the time the solo ended and the rest of the band broke in. The room was shaking and I had to back off the volume to avoid structural damage to my mind.

Last Word

With a radio this good, it's hard to be critical. But, there are only six AM and FM station presets. That's not enough to handle the number of favorite public radio stations in this area, let alone the commercial ones. And, there's no built-in clock. This has to be the only electronic gadget made this late in the century which doesn't have a clock built-in.

Okay, I had to be really picky to find something bad to say about this radio. The best thing I can say about the Model 88 I've saved for last: The price is $199, and that puts it about $150 less than the Bose. A better radio with more features and a lower price: It's the American way!

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WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

Uniden BC245XLT

The new Uniden BC245XLT will be the first handheld to possess dual trunking capabilities – scanning conventional and one trunking mode simultaneously. At its debut at this year's Consumer Electronics Show, specifications called for the scanner to also be the first handheld to include GE Ericsson trunk following capability along with Motorola VHF/UHF and 900 MHz modes.

The new scanner covers 29-54, 108-174, 406-512, and 806-956 MHz (less cellular) with 300 memory channels in 12 banks. A 9-pin cable connector (included with the scanner) or external modem with 25-pin connector (not included) allows downloading and computer control. Its "SmartScanner" feature is also touted to allow programming via a phone line – downloading frequencies for your area from a source as yet undisclosed. Factory preprogramming permits instant service search for active police, fire/emergency, air, marine, and weather channels, and now railroads, too.

Identical in appearance to BC235XLT, shown here

Watch for a full description of the unique features of this highly anticipated scanner in the "Scanning Report" column, followed by a review by Bob Parnass when the unit becomes available this summer. Call Grove (800-438-8155) for pricing and availability.

Software for Opto Products

If you own Optoelectronic's Optocom, Optoscan 456, 456 Lite, or 535 computer-to-scanner interface, you'll be interested in checking out PROBE Version 5.0 by DataFile, Inc. This software is written exclusively for these Opto products and provides increased accuracy, speed and control for unattended scanning, searching and logging of active frequencies.

Although PROBE v.5 does not support trunking, it does provide enhanced scanning speed for the Optocom's 38400 baud capacity by utilizing its "native mode" instead of "OS535 simulation mode" as do most other programs. Computer-controlled volume and squelch control and standalone scanner operation are also supported by PROBE. You can upload up to 100 frequencies including delay settings into the Optocom for scanning without the computer.

The user can automatically lock out or mark frequency records: A new feature makes this automatic based on number of hits in the log! Which hits are logged can also be controlled by setting a minimum active airtime. Birdies and annoying control channels can be quickly skipped using functions which monitor the presence or absence of constant modulation, based on user-settable squelch and time limits.

A new CTCSS/DCS tone engine has improved reporting accuracy. A new feature in frequency management is the "replace" function which allows you to replace data in selected records. "Copy/move" functions allow you to change or assign bank description.

PROBE v.5 is available only from DataFile, POB 20111, St. Louis, MO 63123, or send email to DataFiles@aol.com for details and current pricing and upgrade information.

SDU5500 Spectrum Display Unit

This successor to the SDU5000 uses a larger (3.1-inch), high resolution, white-on-blue LCD display. Coupled to the AR5000 receiver or Icom R7100, R7000, or R9000 – any receiver with a 10.7 MHz IF output jack – it provides a visual picture up to 10 MHz wide of radio activity anywhere between 10 kHz and 2600 MHz.

The SDU5500 has improved status read-out on the top-half of the display with a spin wheel tuner controlling the marker position, similar to a dedicated high-priced spectrum analyzer. The spectrum display may be used in a graphical display or statistical analysis mode.

On-screen programming is provided via on-screen menus, in addition to the numeric keypad for frequency entry. The SDU5500 may also be connected to a PC which can emulate all keyboard operations of the SDU5500 and which allows display data to be downloaded for later analysis.

By placing the cursor on any spike, you can read its frequency and input level on screen. The AR5000 and certain other radios may be controlled to automatically tune to that center frequency.

This is the crowning touch for someone who already has a top wideband receiver which doesn't have its own spectrum display. Grove lists the SDU5500 at $999.95. Call 800-438-8155 or visit **www.grove-ent.com** for details and availability.

More to this Alinco than meets the eye

When is a transceiver not a transceiver? Answer: When it's a mosquito repellant! In a moment of whimsy, Alinco added an electronic tone "insect repel" feature to its new 2 meter DJ-195T handi-talkie. "The mosquito repel feature could make the DJ-195T the first radio capable of de-bugging a Field Day operating position," said Alinco's USA branch manager with a smile.

This HT hasn't yet received FCC type acceptance and pricing has not been announced. However, another new Alinco model, the DJ-V5T – without mosquito repel but with VHF/UHF expanded coverage from 76 to 999.996 MHz (cellular blocked) – is already on the market for $345 retail for the 5 watt model. Go to **www.alinco.com,** or check out this affordable, full-featured, dual-band

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radio at your favorite ham radio dealer.

Oak Hills Research kits

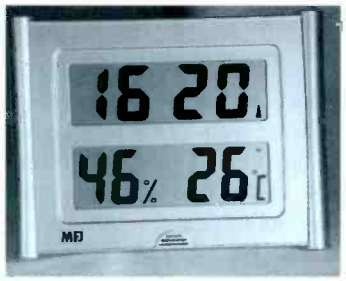
"I've personally built many Oak Hills kits and it is not a stretch to say 'I liked the kits so much I bought the company,'" says Milestone Technologies owner Marshall Emm, N1FN. Oak Hills Research is the company founded by ham guru and *MT* writer Doug DeMaw, now deceased; OHR has been run for the past nine years by Dick Witzke, KE8KL, who will continue to provide technical services.

According to Marshall, Oak Hills Research will be operated as a separate division, and will continue the current line of QRP (low power) transceiver and test equipment kits. The high-quality kits include state-of-the-art technology, cabinet, silk-screened and masked printed circuit board, all components and instructions. The newest (and most sophisticated) kit is a 5-band CW transceiver kit for $349.95.

See the web site at **www.OHR.com** or write Oak Hills Research, 2460 S. Moline Way, Aurora, C0 80014; (800) 238-8205 for orders or fax (303) 745-6792.

Atomic Monster?

Oops, no, make that MFJ's 24-hour Atomic Clock with Monster Display! Not only does this clock keep precision time (calibrated by the US atomic clock in Ft. Collins, CO) in two-inch tall LCD digits, but it also shows indoor temperature and relative humidity! Clearly visible from 20 feet, this clock is a good choice



for studio, fire or police station, but equally suitable for your shack or office.

The metallic tan color clock uses two "AAA" batteries, is 12/24 hour selectable, and adjusts automatically for daylight savings time and leap seconds. For price and ordering information, contact MFJ Enterprises at 800-647-1800, fax 601-323-6551, or visit **www.mfjenterprises.com**

Satellite reception on the road

It's your week to take the grandkids with you on vacation in your RV or custom van. You're halfway there and they've already watched every video they brought along. If only they could watch live television.

Now they can, thanks to KVH TracVision LM. In the U.S. an estimated 250,000 RVs are already equipped to receive satellite TV when stationary. TracVision will give the motorist in-motion access to satellite TV and music programming from a choice of DirecTV or DISH networks. Broadcast internet access is soon to add real-time news, stock market data and weather information.

TracVision automatically acquires and maintains a lock on the satellite, actively tracking at rates exceeding 30 degrees per second. The components weigh about 33 pounds and are housed inside a flush-mount antenna dome that is easy to install. The smallest in-motion land system available, TracVision LM retails for $2,995.

KVH Industries also provides in-motion products for the marine industry. You can visit their website at **www.kvh.com** or call the Middletown, RI, headquarters at (401) 847-3327.

Satellite reception in the air

Inmarsat keeps adding to the range of services it offers. Expanding the mini-M mobile phone developed for land-mobile use, the system will now be offered for small corporate aircraft and general aviation use. Mini-M features affordable, lightweight equipment offering a single channel which can be used for voice, fax, or data communications. Check their web site at **www.inmarsat.org**

California State Agencies

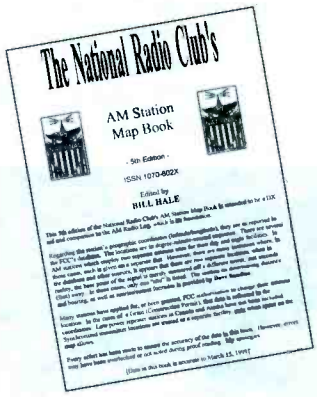
California and border area scanner listeners will have a frequency bonanza in *Government Radio Systems: CA State Agencies* – the newest directory by Robert Kelty. California state law enforcement, fire fighting, investigative, corrections, natural resources, wildlife, and transportation are highlighted. Chanelization plans, subaudible squelch tones, locations, and unit designators are listed.

Government Radio Systems is $18 postpaid by check from Mobile Radio Resources, 1224 Madrona Ave., San Jose, CA 95125. A disk version in WordPerfect is available for $75 postpaid.

NRC AM Station Map Book

For medium wave DXers, nothing beats a reference like this classic, now in its fifth edition. Listed by frequency (530-1700 kHz) and covering continental U.S. and Canadian broadcasters, the 230 unbound pages come drilled for a three-ring binder. Listings include call letters, city, state or province, and geographical coordinates.

The National Radio Club's AM Station Map Book by Bill Hale is $17.95 postpaid from The NRC Publications Center, P.O. Box 164, Mannsville, NY 13661-0164. Enclose a first-class postage stamp for a free copy of their latest catalog.



Crystal Set Loopers and More

There is still something magical about the sound of voices and music coming from a few turns of wire and a metallic crystal with no visible source of power. Those of us who used these sets as youngsters feel a nostalgic tie, and we're not alone. Crystal sets are among the hottest collectibles in radio.

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Volume 8, Crystal Set Loopers and More, is the latest bound collection of Xtal Set Society newsletters containing many construction projects for high-performance – and one or two bizarre (Frisbee and deodorant can) – crystal classics. There's even a three-tube regenerative set for the stalwart weekend experimenter with a parts stash.

Loaded with fresh information, this series is always a pleasant read. $15.95 plus $3.75 shipping from The Xtal Set Society, P.O Box 3026, St. Louis, MO 63130. Phone orders: (800) 927-1771

Business News

- MFJ Enterprises, Inc. announced that it acquired Hy-Gain Antennas, Towers, and Rotators for amateur radio effective May 10, 1999. Hy-Gain will remain a separate entity with separate management, employees and manufacturing facility in Starkville, Mississippi. The company will continue the entire product line that is currently being produced, plus two new vertical antennas announced at the 1999 Dayton HamVention. Hy-Gain can be contacted by calling 800-647-1800 or by fax: 601-323-6551.
- JPS Communications, manufacturer of the respected ANC-4 Noise Canceller, is leaving the amateur radio business due to declining sales. They will honor all warranties, and service non-warranties as well for the foreseeable future.
- *MT* advertiser "Atlantic Ham Radio Ltd" has been taken over by "Radioworld Inc." – Canada's new Superstore for amateur radio, scanners, shortwave radios, marine radios, aircraft radios and CB radios. Visit their new website at **http://www.radioworld.ca** - Address: Radioworld Inc. at 4335 Steeles Ave W, Toronto, Ontario, Canada M3N 1V7; Phone 416-667-1000, Fax 416-667-9995
- For Icom repairs that are beyond the ordinary, reader Don Farr recommends Scott Malcolm, Malcolm Tech Support, 3617 Deep Lake Boundary Road, Colville, WA 99114; 509-732-8883. He says Scott's not fast, but he's good!

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902
Press releases may be faxed to 828-837-2216 or e-mailed to mteditor@grove-ent.com.

2000 edition of *Passport to World Band Radio*
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TIME TO UPDATE YOUR PASSPORT!

The world's best selling shortwave guide is now bigger and better! Edited by Lawrence Magne, Passport is the ultimate shortwave hobbyist's listening reference. At a glance, Passport's exhaustive chart shows world broadcasters by frequency and time, indicating station power and language as well.

Passport includes extensive chapters on program profiles, English language listening, catching clandestine and pirate broadcasters, receiver reviews and ratings, planning your listening post, and Internet Web radio. A powerful listening tool at a low, low price!

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WASHINGTON WHISPERS

By Fred Maia, W5YI
fmaia@cwixmail.com

From Information Superhighway to Super Speedway!

"I ask Congress to step up support for building the next generation Internet. It's getting kind of clogged, you know. And the next generation Internet will operate at speeds up to a thousand times faster than today." (From President Clinton's 1998 State of the Union address.)

The U.S. government first developed the Internet in the 1960s to help government and academic researchers communicate on government defense projects. The current Internet emerged from the collaborative effort of academic and federal research networks in the 1980s.

According to Forrester Research, the number of online accounts in the United States alone will triple to nearly 80 million within three years! Many of those accounts – Forrester says 16 million – will access the Net over high speed cable or DSL (telephone) connections that are up to 50 times faster than today's 56-kbps (kilobits per second) modems.

The approaching bandwidth crisis could force many of the local Internet Service Providers (ISPs) out of business. Right now, cable connections can handle speeds up to 3 Mbps ... and DSL hookups run between 256 kbps and 1.5 Mbps. Three years from now, your Internet connection will be much faster, your monthly Internet bills higher, and your choice of service providers greatly diminished.

Right now, there are approximately 5000 ISPs in the U.S. Within a year or so, that number will drop dramatically. Their future will probably be in Web hosting to businesses.

Later this year, Sprint will begin rolling out its new Integrated On-demand Network (ION), which will deliver voice, video, and data at speeds up to 620 Mbps. Consumers and businesses might be able to purchase an ION Integrated Service Hub at their local Radio Shack store for $200 to $300, about the cost of a DSL or cable modem today. The box will be wired to your telephone system and a card in your PC. At prices starting around $100 a month you will have a constant high-speed Internet connection, videoconferencing, local calling with Caller ID, and virtually unlimited long-distance calling from Sprint.

The Washington, D.C.-based Teledesic is currently constructing a network of 288 LEO (low earth orbiting) satellites to connect remote ISPs to the fiber backbone. The satellite network is scheduled to be completed in 2003, and two-way connections should hit speeds of up to 64 Mbps for downloads, 2 Mbps for uploads. LEO satellite constellations are particularly well suited to telecommunications, since there is no signal delay such as exists when communications must travel to and from a geosynchronous satellite located 22,000 miles high over the equator.

Internet2 and the Abilene Project

Internet2 (I2) is a similar cooperative effort to develop an advanced Internet for the new millennium. The project is aimed at creating an ultra-fast, experimental computer network with speeds 45,000 times faster than the best telephone modems people now use to surf the Web. Speeds that fast could transmit the entire Library of Congress in just 20 seconds!

The Next Generation Internet (NGI) Research Act of 1998 authorized appropriations of $109 million for fiscal years 1999 and 2000 for the Next Generation Internet program. It was signed by the President on Oct. 28, 1998, and became Public Law No: 105-305.

Included among the program objectives are: (1) increasing Internet capabilities and improving Internet performance; (2) developing an advanced testbed network connecting research sites; and (3) developing advanced Internet applications that meet national goals and agency mission needs.

The need for the implementation of NGI is due to the incredible success of the Internet. Since 1988, the Internet has grown at nearly 100% per year and the Internet traffic has been growing at a rate of nearly 400% per year. The current Internet not only is experiencing a huge growth rate but it is also in need of higher bandwidth for multimedia applications.

The U.S. Government's attention to this need has allowed for very intense research and development in this area.

The U.S. Government, industry, and more than 150 U.S. universities are now working together to develop the network which will enable applications such as real time remote control telemedicine, broadcast-quality video, digital libraries, real time telecommuting, advanced weather forecasting, distance learning, virtual laboratories and other capabilities which are not possible with today's Internet.

They have formed into a consortium called the University Corporation for Advanced Internet Development (UCAID). The commercial sector and the educational community – especially K-12 and public libraries – will be the early beneficiaries.

Dozens of high-tech software, hardware and telecommunications companies are either a corporate sponsor or member of the Internet2 effort. MCI/Worldcom Corporation's very high performance Backbone Network Service, provided under a cooperative agreement between the National Science Foundation and MCI, served as the initial Internet2. The just launched, $500 million, "Abilene" high-speed coast-to-coast network is the new Internet2.

The Abilene Project, which operates over fiber-optic cable running along railroad rights-of-way, is named after a railhead established in Abilene, Kansas, during the 1860s. In its time, the ambitious railhead of the 1800s staked a claim on what was then the frontier of the United States.

The Abilene Project establishes a similar presence from which to explore and develop pioneering network technology. The links of last century's railway changed the way people worked and lived. The vision of the Abilene Project is to transform the work of researchers and educators into the next millennium.

It is comprised of 13,000 miles of fiber-optic cabling linking some 70 research centers. Abilene currently operates at 2.4 Gigabits per second and will eventually operate at 9.6 Gb. To put that in perspective, one gigabit per second is 18,000 times faster than a 56 kbps modem.

The Internet2 project is also defining the next version of the Internet Protocol, IPv6 (Internet Protocol version 6). An advantage of IPv6 is that it lengthens IP addresses from 32 bits to 128 bits and allows for the creation of more IP addresses – an identified future problem as more of the world signs on. Internet2 is not going to replace the current Internet; instead it will supplement the current Internet with greater capabilities at faster transmission speeds.

Corporate "partners" that have contributed "hundreds of millions" in equipment, funding, infrastructure and other resources toward to the Internet2 project. For more information, check out the Internet2 Web site at <**http://www.internet2.edu**>

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LETTERS TO THE EDITOR

NEWS AND VIEWS FROM OUR READERS — *Rachel Baughn, Editor*

Greenville VOA Site – Gone?

"In 1994, as a participant of a professional training workshop provided by the United States Information Agency and the United States Telecommunications Training Institute, I visited the Greenville station of the Voice of America. The facility consists of three sites: sites A and B were transmitting installations, while the site C was a receiving site.

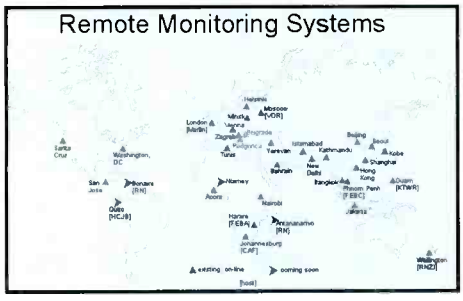
"I was really surprised to read your April *Communications* page story 'Shrouded history of VOA site': was it really all closed? Or maybe only the receiving site C? There were many old RCA HF receivers and a few dozens of directional antennas there, mainly used to monitor foreign shortwave broadcasting stations."

– *Rimantas Pleikys, "Your reader in Lithuania"*

It was only the receiving site of the Greenville complex that has been closed – site C, as you say. The professor overseeing the transition, Byron Burlingham, described the station as being, "very, very sophisticated ... for its day. Today it's an antique."

Rimantas also asks, "If the receiving site is discontinued, from where now does the US government monitor the HF broadcasting spectrum?"

Undoubtedly the U.S. is cutting back on its HF monitoring and not as many sites are needed. Still, the US has monitors all over the world to cover the spectrum – some are U.S. personnel, and some are by way of an information exchange with other countries. Other sites may not be manned at all: for example, see the map of the VOA's remote monitoring locations at **http://monitor.ibb.gov/rms/rmsqth.gif**



Lower away

Inspired by some comments made by Skip Arey in his October '98 *Beginner's Corner*, *Roy Wilson of Harlem, Georgia,* sent this information. "VLF runs from 3 to 30 kHz, although the region below 9 kHz is not allocated by the International Telecommunications Union nor the Federal Communications Commission. The lower the frequency, the greater the penetration into sea water. That's why the US Navy has operated an ELF station pair on a center frequency of 76 Hz, to transmit very short messages to submarines that were several hundred feet down.

"Since the Omega system went down, it leaves several countries with fairly new VLF transmitter and antenna facilities — Argentina, for one. The Argentinean Navy operates, intermittently, a few modern subs. They might want to use the former Omega station for more normal VLF tasks.

"The region above the Omega zone has been used for many years for naval communications. Radio waves in this range do not penetrate into sea water as deeply as at ELF, but they can still be heard by subs down to a hundred feet. There are plenty of US Navy and other naval stations to be heard in this region, including the famous British station at Rugby, GBR.

"In the LF band is one of the WWV time signal stations, as well as the LORAN navigation system at 100 kHz. This system was going to be shut down due to the success of the GPS satellite-based system, until it was found that using a combination of the two gave better accuracy than either by itself. Above LORAN, you can sometimes hear European LF broadcast stations, as well as the lowfers in the 1750 meter band." (See p. 60 for more. -ed.)

UK does require license for CB

In January's "Ask Bob," Bob Grove (in consultation with Jock Elliott) said that there is no licensed CB service anywhere on Earth. However, a postcard from Norman Hill from Virginia indicates otherwise, as does our feature article on monitoring in the U.K.

Hill says, "The British CB band is from 27.60125 to 27.99125 MHz with 10 kHz-FM spacing. The 'Radio Agency' (their FCC) is strict about unlicensed CB use. In fact, some amateurs have had their ham license revoke for 'unofficially' using CB.

"The European Union uses 26.965 to 27.405 (most likely FM-10 kHz). Radios usually come with 80 channels to cover both the UK and EU bands. Also, the British have a short range business radio (SRBR) on 461.2625/.475/.4875. No license is needed for this, which is their low power/itinerant service."

Southern Linc

"Over the past couple of years a new type of radio has been produced called a Southern Linc. The radio contains a pager, radio and telephone all in one unit that clips to your belt. The radio can allow for many groups of people to talk to each other at the same time. The radio can also allow two individuals to talk to each other without hearing anyone else.

"To my knowledge the companies that are in my area that are now using the Southern Linc are Alabama Power, Gulf Power, Alabama Emergency Management Agency (EMA), Alabama Game Wardens, Alabama Bureau of Beverage Control, many sheriff and police departments (for now as a private channel), and many private businesses and individuals. There is even talk that the Alabama Highway Patrol will switch to the Linc as a permanent radio.

"I just recently talked to my county EMA director who told me about his radio system. He said that he can talk directly with every EMA office in the state, and has even talked to his office in southern Alabama from Tennessee and Georgia. He says he has over 100 frequencies that he can use at any time.

"This radio system works great for the user, but there is one problem with it. *I can't hear it with my scanner.* The radio uses 800 or 900 MHz digital technology.

"What can I do? Is this the way of the future? Are my four scanners going to be silent? Do I have to wait until someone revises the present scanners?

"What makes me upset the most is that I can't hear the power company to know when my electricity will come on after a storm. So I guess you could say that I'm in the dark literally and figuratively!"

– *Chris Johns, Brewton, Alabama*

MT writer John Fulford has been using one of these all-purpose phones made by Motorola; as a user, he loves it, and has proposed to write a story for *MT* on this new trend in radio communications. But as a monitor, you're out of luck. What would be interesting to know is how many other areas of the country are planning similar systems?

Thank You, MT

"I don't say thank you often enough, although I THINK it a lot! But [John Figliozzi's] columns in *Monitoring Times*, January and February, re: 'Learning to Fish,' have been extremely helpful to me. I like to listen to news about what's going on in the world, and have been listening (for years) to BBC, R.

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WANTED: Bottom battery cap, item BA-11, for ICOM IC-R1 scanner. Contact 216-241-6380, wolf7@mail.n2net.net

Letters, continued from page 101

Nederlands, Deutsche Welle and R. Australia, (before they cut back). Now, thanks to Bob Colyard's pages (and to you, for pointing me in that direction,) I've got some DXing to do – about 6 pages worth! Not to mention 9 (count'em– NINE) pages of DX programs! Whee!"

– Peg Snyder, Norman, OK

"I have been a SWLer for 12 years now and have never seen anything like *Monitoring Times*. Your magazine is so excellent that I provided it to a co-worker, who is dabbling in SWLing, as a frequency guide. It's like a mini-*Passport to World Band Radio* every month. Long live *MT*!"

– Chris, Lomita, CA

Monitoring Staff Change

On behalf of *MT* and its readers, I want to thank David Datko for eight years of faithful shortwave monitoring from the West Coast and his constant effort to make our center guide the best in the hobby. David deserves a rest! Welcome to our new "ears" on the western seaboard – Dan Roberts, artist, poet, and host of the "Shortwave Report" on public radio station KZYX/Z.

Your letters and comments are welcome at Letters to the Editor, PO Box 98, Brasstown, NC 28902-0098 or via email at **mteditor@grove-ent.com**

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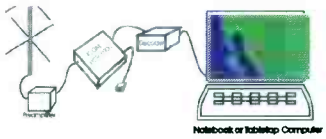

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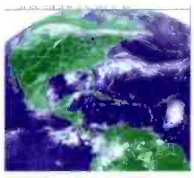
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Dish in window

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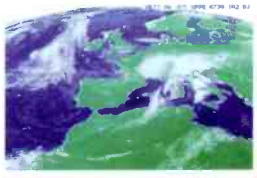
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CLOSING COMMENTS

By Bob Grove, Publisher

The Frequencies, They Are a'Changin'!

While we've been hearing about "spectrum refarming" for some time now, most folks aren't aware of the fact that the new frequency band plans are actually being implemented throughout the country. The Federal Communications Commission has formally advised the communications industry that new frequency assignments will be wedged between existing licensees throughout the VHF and UHF spectrum.

But a search through the FCC Database, as well as a casual monitoring of the VHF and UHF bands, reveals that the plan is already in effect. See this month's Service Search on page 29 as one example. The old 12.5 kHz spacing (reduced from the previous 25 kHz plan) of the 450-512 MHz UHF band is now further reduced to 6.25 kHz, while the current 15 kHz spacing in VHF high band is now experiencing 7.5 kHz-spaced licensees woven between those old assignments.

So far, the FCC's channel narrowing hasn't affected the federal government users who still utilize 12.5 kHz spacing from 162-174 MHz, and 25 kHz spacing from 406-420 MHz. Nor is it planned to impact on the 30-50 MHz low band, or the aeronautical AM VHF and UHF bands.

Does frequency congestion justify all this?

During a recent road trip, I tried to validate all the concern about frequency congestion. After all, large public safety agencies and commercial entities are being urged to move to 800 MHz trunking. The FCC is opening up brand new spectrum in the old 700 MHz UHF-TV band, and plans are underway to auction some of the federal government's 138 MHz band as well. Is all this expansion necessary because the traditional two-way bands are overcrowded?

Traveling Interstate 75 from North Carolina into Florida, I listened to communications in metro Atlanta, Macon, Gainesville, Orlando, Tampa/St. Petersburg, Sarasota, and West Palm Beach. Other than occasional use, the 150 and 450 MHz VHF and UHF public safety bands were *virtually abandoned*. Could "spectrum congestion" be an illusion concocted by two-way radio manufacturers? If so, it must have worked; sales are booming for new, but apparently unnecessary, replacements.

What does all this mean for scanner listeners?

Are our venerable Bearcats destined for the trash dump? Years ago, when 12.5 kHz spacing became commonplace, Uniden ignored the narrower spacing in their scanners; 165.2375 MHz was rounded off by their microprocessors to 165.235 MHz. The slight 2.5 kHz offset didn't miss any communications because the actual modulation bandwidth of the signal was much wider than 2.5 kHz; it is similar to tuning an analog radio slightly off frequency – you still hear the signal just fine.

But with newer licensees transmitting so close in frequency, won't current scanners with their wide bandwidth filters experience interference? You can count on it. During a scan, signals above and below the memorized frequency will break squelch, leading you to believe these off-frequency signals are your quarry.

And there's another problem. The new generation transceivers have narrower deviation (FM modulation), so recovered audio will be lower, meaning that, unless your present scanner's audio system has excellent automatic gain control (AGC), older signals will sound louder through the speaker than the new signals, making volume control adjustment a compromise.

Manufacturers: Take note!

Whether the motivation was greed or need, spectrum refarming is now a fact, and two-way manufacturers are unleashing a new generation of transceivers utilizing the new band plan, and narrower modulation techniques as well. Scanner manufacturers must rethink their present generation scanners with a new look at frequency steps, IF filter bandwidths, and FM demodulation schemes.

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